DATA MANAGEMENT UPPER-AIR METEOROLOGICAL NETWORK

SOUTHERN CALIFORNIA OZONE STUDY 97-NORTH AMERICAN RESEARCH STRATEGIES FOR TROPOSPHERIC OZONE (SCOS97-NARSTO)

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ABSTRACT

The System Demonstration and Integration Division (SDID) of the Environmental Technology Laboratory (ETL), National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce provided management of upper-air meteorological data collected during the Summer of 1997 for the Southern California Ozone Study (SCOS97) - North American Research Strategies for Tropospheric Ozone (NARSTO). Data management included archiving a large quantity/variety of data collected and provided by a number of organizations. The most important data were collected by using a mesoscale network of 26 Radar Wind Profiler (RWP) units with Radio Acoustic Sounder System (RASS). These RWP/RASS units, operated by seven different organizations (California State and Local Agencies, NOAA, and private industry) provided raw radar spectral moment data continuously from June through October. Vertical profiles of hourly-averaged winds and virtual temperatures were derived from all of these radar spectral moment data using standard post processing and objective quality controls (Level 1). A limited subset of the derived wind and temperature data were subjectively tested for consistency across the entire profiler network (Level 2). The original raw radar spectral moment data (Level 0) and the derived meteorological winds and temperatures data (Level 1) are provided over the Internet and via digital tapes. In addition to wind profiler data, surface meteorological, SODAR and rawinsonde data were collected and are provided. Some subjective inter-comparisons were made between measurements from these instruments and measurements from the RWP/RASS units. Results of those inter-comparisons are presented in this report. Examples of data before and after Level 1 quality control are presented on an individual site basis and for a single day across the entire network. Specific cases of quality control during periods with radar signal contamination due to migrating birds are also shown and discussed.

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EXECUTIVE SUMMARY

This report discusses the management of upper-air meteorological data collected during the Summer of 1997 for the Southern California Ozone Study (SCOS97) - North American Research Strategies for Tropospheric Ozone (NARSTO). The report is intended to meet several needs, including the needs of users intent upon applying the data. Therefore, some sections contain a great amount of technical detail that is of no interest to the general reader. Other sections, like this Executive Summary, contain few technical details. In order to meet those several needs, there is repetition, with certain important information found in multiple locations throughout the report.

Obvious parts of data management are the archival and the organization of data from four different types of measurement instruments (26 profiler radars, 6 sodars, surface meteorological instrumentation with most profilers, and numerous rawinsondes from 26 stations) and provided by several different organizations (California State and Local Agencies, NOAA, private industry, and other Government Agencies). But, it was also realized from the beginning that in order to ensure data quality at the end of the study it was imperative to monitor the data as close as possible in time to when the data were being collected. Therefore, prior to field operations in June 1997, a database and communications structure was devised to transfer data as quickly as possible from the field to a central facility in Boulder, Colorado.

Data received daily from the mesoscale network of profilers, the most important measurement instruments, were monitored routinely (a) to evaluate the operational status of those profilers, which were mostly operated unattended at remote sites, and (b) to provide information for planning Intensive Operating Periods (IOPs). Graphical displays of winds and temperature sampled by this profiler network were developed for access over the Web for the planning of IOPs. Data were placed on the WEB as daily plots of wind barb and temperature color contour profiles. Hourly raw data were updated as soon as new data were received. In the case of the NOAA profilers, plots were updated every hour resulting in a near-real-time viewing of the data. To aid in checking consistency across the network in near-real-time, horizontal slices of wind barbs over the entire network at 4 heights were available on the WEB.

In routine operations, first-look meteorological products are generated in the field, while raw data (usually radar spectral moments) are collected for later processing and quality control. It is standard practice today when using remotely-sensed data from profilers to rely upon post analysis to generate reliable meteorological products. Objective quality controls were applied in extensive post processing of profiler radar measurements. Subjective quality control procedures were applied to the profiler data in order to monitor the operations of those profilers during the course of data collection, from June through October of 1997, successfully detecting numerous problems with either radar equipment or their operation. Those problems are documented in detail in an appendix of the report. In most cases, this early detection of problems prevented any significant loss of data. For example, profiler data were been carefully checked for the accuracy of site location information and consistency of time using the information provided by the

operators and from the audits. Corrections were made to all sites to conform to a Universal Time Coordinate (UTC) because the times recorded at several sites were incorrect. Other problems were created when operators of profilers made unplanned and unreported changes in radar operations (these are thoroughly documented in an appendix). These changes required substantial re-programming and re-processing of radar spectral moment data. Oftentimes, multiple sets of data are reported during the same period when changes were made, with each set of data representing a different radar operation configuration.

All raw data collected at the profiler sites were submitted to extensive post processing and review, with objective quality control applied at several different levels. The post processing and objective quality control of radar spectral moments data involves standard signal processing methods and pattern recognition techniques employed for years by NOAA. The quality control identifies and rejects noise and spurious radar measurements prior to the derivation of meteorological products (e.g., winds and temperatures). Radar measurements of radial Doppler velocities are tested for temporal and spatial consistency in an objective analysis in order to eliminate contamination from ground clutter, radio frequency interference, echoes from migrating birds, etc. Both the original raw radar spectral moment data supplied by the data providers and the post-processed meteorological data have been provided over the Internet and on digital tapes.

For this report, a limited number of wind and temperature data, derived from profiler raw data, were subjectively tested for consistency across the entire profiler network. In addition to wind profiler data, surface meteorological, SODAR and rawinsonde data were collected and are provided. Some subjective inter-comparisons were made between measurements from these instruments and measurements from the profilers. Results of those inter-comparisons are presented in this report. Examples of quality control are presented on an individual site basis and for a single day across the entire network. Specific cases of quality control during periods with radar signal contamination due to migrating birds are also shown and discussed.

All profiler data were processed using standard automated methods applied separately to the radar spectral moment data at each profiler site. Some of those data are erroneous or even meaningless due to contamination from clutter, bird echoes, etc. in the radar spectral moment estimates. Some examples are provided and discussed in this report. While it is possible to avoid or eliminate much of that contamination by using more advanced signal processing to generate more reliable spectral moment data, that signal processing was not available on any of the profilers used in this experiment. Furthermore, objective methods applied to radar spectral moments are not completely reliable in detecting spurious measurements, necessitating reliance upon subjective procedures. For instance, observations across the network greatly assisted in identifying some problems with profiler data, which displayed internal consistency at the site but which revealed problems when compared with other nearby observations. However, no automated method exists or was applied to process data across the network.

Radar Wind Profiler (RWP) technology provides measurements of atmospheric winds, and also virtual temperature when RASS (Radio Acoustic Sounding System) is employed. In order to make wind measurements, RWP observes electromagnetic reflections from refractive index

fluctuations in clear air due to turbulence or from micrometeorites in clouds and precipitation. In order to make virtual temperature measurements, RWP observes electromagnetic reflections from refractive index fluctuations in clear air induced by acoustic waves (RASS). However, RWP, like all radar, is also sensitive to reflections from other targets and to electromagnetic radiation from sources other than the atmosphere. These may produce spurious signals in the Doppler radar spectra, which can introduce errors in the reported winds and temperatures or even meaningless measurements that have no meteorological significance. Aircraft, birds, insects, or any flying objects may generate spurious radar echoes that can be mistaken for the atmospheric return. Migrating birds are well-documented sources of wind measurement errors, which have also been observed in the SCOS97 dataset. Other sources of radar signal contamination include atmospheric noise from lightning, instrument electronic noise, and radio frequency interference from man-made sources (e.g., cell phones). Ground clutter from buildings, trees, power lines, automobiles, etc. can obscure atmospheric signals. Sea clutter from ocean surface waves can present problems in coastal areas and near large lakes. Even atmospheric returns from clouds and precipitation entering radar antenna sidelobes can mask weaker clear-air returns in the main antenna beam.

While most of the erroneous measurements have been identified and marked so that they do not impact the modeling study, it is possible that some winds with subtle errors have not been identified or that "good" winds have been marked as questionable. Therefore, and this was recognized from the start, some subjective quality control is necessary. In order to assist in that important task, profiler data were processed in two parallel scenarios, each producing estimates of winds and temperatures.

The processing and quality controls in each scenario are objective, and they are very similar. The main difference between the scenarios is when the data collected on the different radar antenna beams are brought together to generate winds or to correct the temperature for vertical wind. Profilers derive winds from radar measurements made on three or more different antenna beam pointing directions. One of those antenna beams is directed vertically upward to measure the vertical wind component (e.g., in convection) and the fall speed of precipitation. The other antenna beams, oblique beams, are directed off vertical at some small angles in order to measure the horizontal wind components. Since the oblique antenna beams are directed nearly vertically, they necessarily contain contributions from any vertical motion that might be present along with contributions from the horizontal wind. In one scenario, the measurements on the oblique antenna beams are corrected for vertical motion before hourly averaging. In the other scenario, the measurements on the oblique antenna beams are corrected for vertical motion after hourly averaging. Each method has its advantages and its disadvantages, with neither providing the most reliable results under all conditions. Therefore, both methods are necessary to ensure the greatest confidence. Note that, on NOAA's Profiler Network, both processing scenarios are used, with results used from one sometimes and with results used from the other at other times.

The detailed steps in each scenario are discussed elsewhere in this report. Processing and quality control in each scenario was applied independently to the radar spectral moment data throughout the experiment. Generally, the results of both scenarios should be in agreement, within measurement errors. When, the results of the two scenarios show significant disagreement, then

the profiler data must be submitted to subjective quality controls. The temperature measurements are especially sensitive to vertical motion. The temperature should always be corrected for vertical motion due to a vertical wind component (e.g., in convection). However, no correction should be done during precipitation because the fall speed of that precipitation will introduce a very erroneous temperature. One must look at the results of both scenarios when performing the subjective quality control. The quality control flags, discussed in detail elsewhere, are important and useful, but they by themselves are not sufficient for ensuring data reliability. It is not possible to automate all processing and quality control of meteorological products or radar spectral moment data using only objective methods. Subjective evaluation using other independent meteorological information and knowledge are necessary. Presently, there is no alternative.

I. INTRODUCTION:

From June through October 1997, a mesoscale network of in situ instruments and ground-based remote sensors collected upper-air measurements of atmospheric parameters for the Southern California Ozone Study (SCOS97) - North American Research Strategies for Tropospheric Ozone (NARSTO). NOAA/ETL/SDID provided data management, including

1- Archival of all data delivered by data providers, and delivery of those data to the California Air Resources Board (CARB)

2- Organization and classification of data for all instruments, i.e., Radar Wind Profiler/Radio Acoustic Sounding System (RWP/RASS), surface meteorological, SODAR, and Rawinsondes

3- Processing and objective quality control (Level 0.5) of RWP/RASS radar spectral moments data in order to derive vertical profiles of hourly-averaged winds and virtual temperatures

4- Comparisons of RWP/RASS winds and temperatures with independent measurements from surface met, SODAR, and rawinsondes

The data archival (1), data organization (2) , and the details of the data processing/quality control (3) are discussed in Section III. Examples of upper-air meteorological data, results of data processing/quality control (3), and comparisons (4) are discussed in the next Section II. The post processing and objective quality control of RWP/RASS radar spectral moments data involves standard signal processing methods and pattern recognition techniques employed for years by NOAA. The quality control identifies and rejects noise and spurious radar measurements prior to the derivation of meteorological products (e.g., winds and temperatures). Radar measurements of radial Doppler velocities are tested for temporal and spatial consistency in an objective analysis in order to eliminate contamination from ground clutter, radio frequency interference, echoes from migrating birds, etc.

II. DISCUSSION OF UPPER-AIR METEOROLOGICAL OBSERVATIONS

Several methods were used to help determine overall quality of the RWP/RASS data. Figure 1 is a map of southern California showing the location of all 26 RWP/RASS sites. The SCOS97 network consisted of a combination of RWP systems setup and operated by 7 different agencies (Table IIa). It was the job of NOAA/ETL/SDID to post-process the moment data collected. Upon completion of this processing it was also the responsibility of NOAA to QC these data to ensure consistency at a single site and as time and resources permitted across the RWP/RASS network. NOAA realized from the beginning that to ensure data quality at the end of the study it was imperative to monitor the data as close to real-time as possible. A communications structure was devised to transfer data as quickly as possible from the field to the NOAA Data Management System (DMS) in Boulder, Colorado. SCOS97 RWP/RASS data were placed on the WEB as daily plots of wind barb and temperature color contour profiles (Fig. 2.a and Fig. 2.b). These plots, consisting of hourly raw (Level 0) data produced directly by the RWP Profiler On-line Program (POP), were updated as soon as new data were received from that site. In the case of the NOAA profilers, plots were updated every hour resulting in a near-real-time viewing of the data. To aid in checking consistency across the network in near-real-time, horizontal slices of wind barbs over the entire network at 4 heights were available on the WEB (Fig. 3). Again, these data are Level 0. Missing barbs are due either to no consensus calculated for that hour, mean sea-level height of this site is above plotting level, or data are missing. Figure 1 can be used as a key to identify the various sites. Post analysis of the quality controlled data also used this technique in an animation form providing a valuable tool for displaying 24 hrs of data from all sites at a common altitude.

Profiler data have been checked for the accuracy of position information and consistency of time using the information provided to NOAA by the operators and from the audits. Corrections have been made to all sites to conform to a Universal Time Coordinate (UTC). This required adding 8 hours to sites using Pacific Standard Time (PST); see Table IIb. The left column in Table IIb tells the user what time reference the data were recorded in. The second column is the offset to UTC information input by the RWP operator during setup and written to the POP consensus (*.cns) and moment (*.mom) files. This offset information was designed to tell the user how to correct to UTC and should be 8 hrs for sites operating on PST and 0 hrs for those on UTC. As noted in Table IIb there are several sites where the time offset is incorrect. The users of *.cns and *.mom files need to be aware of this. NOAA also received STI formatted files. These files are basically a reformatting of the POP *.cns files. The time offset information from the *.cns file is passed on to the STI file. These files are also more descriptive, i.e. the "Time Zone" is listed as PST or UTC along with the "Diff to UTC". To the best of our knowledge at the time of this report, all NOAA sites operated in UTC with the other sites PST. All times in NOAA generated quality controlled files are UTC.

Audits taken during the early part of the study revealed inconsistencies in antenna pointing angles (Table IIc). Information on corrections of the pointing angles made at the time of the audit can be found in the audit report and in Appendix A.3 of this report. For the cases listed in Table IIc, RWP operating parameters were modified to correct for differences outside of set criteria. The raw (*.cns and *.mom) data taken prior to these changes have not been adjusted.

Corrections to the raw data for horizontal pointing angles should be a simple matter of applying the corrections after checking to see when exactly this change was made. The correction for any offsets in the pointing angle of the vertical antenna or the tilt angle of the oblique antenna are not as straight forward and will require programming changes. Again it should be noted that anyone looking at or using the original raw files would have to take into account these corrections. No corrections for the RASS source level (see original audit report) should be applied. However, a shift in the RASS source pointing angle is analogous to displacement of the acoustic source. Theoretical studies by Lataitis (1993) have shown this displacement can affect the detected power due to the change in the RASS focal spot relative to the RWP antenna beam. This change in detected power will directly affect vertical coverage of the RASS.

Because it is nearly impossible to check all the data from every site, test days were chosen to look at data from all sites and 1 or 2 sites were chosen to look at all the data on all the days. Results from these comparisons are shown and discussed later in this report. In addition to the RWP/RASS data, data from other independent sources exists for the SCOS97 study. These include surface meteorological data, SODAR data, and rawinsonde data. Again, as time and resources permitted these data were compared to RWP data for consistency and accuracy. Surface and SODAR data provided information about the winds and temperatures below the first range gate of the RWP/RASS, while the rawinsonde provided a complete independent profile of wind and temperature.

All RWP/RASS data have been quality controlled using a continuity algorithm (Weber and Wuertz 1991). These data are designated Level 0.5 data. Data that have not gone through this process are designated Level 0. Level 1 data will be those data that have gone through some subjective QC separately at each site. Level 2 QC is then a subjective analysis across the entire RWP/RASS network. Table IId describes the Profiler On-Line Program parameters for the 915 MHz RWP/RASS located at Alpine, CA (#25 Fig. 1). This table is only an example of a particular RWP/RASS. An attempt was made to configure and operate all 26 RWP/RASS the same. This was not possible for many reasons, including site specific needs. It was attempted though to have all RWP/RASS operate in 2 modes and produce hourly consensus winds and temperatures in the field. One mode was designed to produce high vertical resolution winds and temperatures in the lowest ~ 2km and the second mode was designed to produce profiles to the maximum range of the RWP (~5 km). Detailed information about the operation of each individual RWP/RASS can be found in the SCOS97-NARSTO audit report prepared by AeroVironment Environmental Services Inc. for ARB under contract #96-320. This information is necessary in understanding the final data and its quality. It also helps to understand the differences when comparing Level 0 and Level 0.5 data. More details of RWP/RASS operation and post processing can be found in Wolfe et al. (1997).

Figures 4 a-c are examples of bird contamination over a 3 day period at the NTN RWP site. The top plots are the Level 0 winds produced by POP in the field. The bottom plots are the Level 0.5 quality controlled winds produced from the moment data. Each plot contains both high and low vertical resolution winds. The regions with both modes (<2km) appear as a darker band because of the increased wind barb density and overlap. In the overlap region wind barbs should be consistent between modes. Slight differences are to be expected because of the sample volume

size differences and the fact that the samples are not taken at the same time. Note the higher wind speeds beginning just after 0300 UTC (1900 PST) on each day. Bird contamination has been identified before in RWP data and is described in detail by Wilczak et al. (1995) and Merritt (1995). Based on knowledge learned from these previous studies, the QC algorithm has been designed to test for possible bird contamination using SNR and spectral width thresholds in specific time and height windows. These thresholds and windows are discussed in more detail in Section IV. Figures 5a-c show the radial velocities, SNR, and spectral width for a single beam measured at the Norton RWP over the same 3 days shown in Fig. 4. These data represent typical bird migration patterns where just after sunset (1930 PST or 0330 UTC) the birds begin to fly in the same direction as the prevailing winds at an altitude of 1-3 km AGL. The initial large spread over height has been described as the birds searching for the best possible flying altitude. This radial velocity pattern correlates to higher SNR and higher spectral widths. Thresholding is done on SNR and spectral width within a generalized time and height window. Data meeting these criteria are flagged. Figure 6 is an overlay of hourly wind barb profiles and a contour of one of the QC flags showing how the QC algorithm has identified the region of stronger velocities with a bird or contamination flag. Thresholding doesn't always eliminate or identify all bird contamination cases. It does attempt to at least identify areas where contamination may be occurring and permit further subjective analysis. One thing to also note in Figs. 4-5 is how the POP real-time and QC post processing handle these data. On August 14th, the period with the lowest bird density as determined from Figs 5 a-c, we see that the Level 0 data shows minimal contamination and the Level 0.5 data appear to have eliminated it altogether. On August 15th there is considerably more contamination in the Level 0 data, and because of this the continuity algorithm has locked onto this pattern and even extended it into regions where Fig 5 shows low SNR. This is a common occurrence in post processing, but the QC flags allow the user to eliminate such periods using a QC flag test. August 16th is another night with contamination in the Level 0 data, but this time the Level 0.5 quality controlled data show almost no evidence of contamination. This result has been traced to the density of the birds. At some densities there is no longer any true wind information to be extracted from the moment data. Below this density it is possible to eliminate known bird periods and to detect the true background winds. This has been shown comparing RWP winds to rawinsonde data taken during the same time. For this final report no periods were found where rawinsonde data and possible bird contamination could be compared. Because of the large number of RWP sites in a relatively small area and the fact that bird contamination has been shown to relate to bird migration, bird contamination found at one site could mean surrounding sites also may have contamination. For the August 14-16 case contamination is also seen at the following sites: EMT, ONT, LAS, USC, RSD, TCL, VNS, SMI, PDE.

As mentioned before, QC of the RASS data follows the same pattern recognition method as the winds. The acoustic and atmospheric vertical velocities are fed into the QC algorithm. Figure 7 shows a comparison of Level 0 and Level 0.5 RASS data. The Level 0.5 data show the effects of not using a consensus method. More data in the upper range gates appear to have been recovered. Some of the recovery is obviously bad. As with the winds the RASS data carry QC flags identifying these regions. Also shown in the Level 0.5 data are the hourly-averaged surface temperatures converted to virtual temperature. Remember these data are *in-situ* measurements

representing a near surface temperature and not the volume from the surface to the lowest RASS range gate as appears in the figure.

The following diagram shows the flow of the RWP data through the quality control processing. It is followed by a more general description of this process. The processing and the processing parameters are described in detail in Section IV of the report.

SCOS97 DATA PROCESSING
Flow Diagram

Data Files	**RWP (*.mom)**		**RASS(*.mom)**	
Scenario	**WI**	**WII**	**TI**	**TII**
Step 0	**WI-0**	**WII-0**	**TI-0**	**TII-0**
Step 1	**WI-1**	**WII-1**	**TI-1**	**TII-1**
Directory	**MET_0**	**MET_1**	**MET_0**	**MET_1**
Directory	**MET_0c**	**MET_1c**	**MET_0c**	**MET_1c**

Data flow from Top to Bottom beginning with raw moment files (*.mom) and ending with *.miw and *.mit files in the 4 directories

Scenario I = vertical velocity correction during wind calculation for RWP (WI)
NO vertical velocity corrections for RASS (TI)

Scenario II = vertical velocity corrections for both RWP (WII) and RASS (TII) in moments prior to hourly averaging

Step 0 = QC of individual radial velocities (hourly blocks)

Step 1 = QC of hourly averaged radial velocities (24 hour blocks)

MET_0/ MET_1 data directories (RWP and RASS) *.miw and *.mit files
MET_0c/ MET_1c data directories (RWP and RASS combined with surface met)

Radar Wind Profiler (RWP) technology provides measurements of atmospheric winds, and also virtual temperature when RASS (Radio Acoustic Sounding System) is employed. In order to make wind measurements, RWP observes electromagnetic reflections from refractive index fluctuations in clear air due to turbulence or from micrometeorites in clouds and precipitation. In order to make virtual temperature measurements, RWP observes electromagnetic reflections from refractive index fluctuations in clear air induced by acoustic waves (RASS).

However, RWP, like all radar, is also sensitive to reflections from other targets and to electromagnetic radiation from sources other than the atmosphere. These may produce spurious signals in the Doppler radar spectra, which can introduce errors in the reported winds and temperatures or even meaningless measurements that have no meteorological significance. Aircraft, birds, insects, or any flying objects may generate spurious radar echoes that can be mistaken for the atmospheric return. Migrating birds are well-documented sources of wind measurement errors, which have also been observed in the SCOS97 dataset. Other sources of radar signal contamination include atmospheric noise from lightning, instrument electronic noise, and radio frequency interference from man-made sources (e.g., cell phones). Ground clutter from buildings, trees, power lines, automobiles, etc. can obscure atmospheric signals. Sea clutter from ocean surface waves can present problems in coastal areas and near large lakes. Even atmospheric returns from clouds and precipitation entering radar antenna sidelobes can mask weaker clear-air returns in the main antenna beam.

In order to ensure reliable measurements, standard practice with all RWP systems (research and commercial) includes the post processing either of (a) Doppler radar spectra or of (b) spectral moments derived from those spectra. The spectral moments were collected and processed for SCOS97. While many of the erroneous measurements have been identified and marked so that they do not impact the modeling study, it is possible that some winds with subtle errors have not been identified. In order to identify and to eliminate all potential wind measurements with errors introduced by bird echoes or these other sources, advanced signal processing techniques are required. None of the RWP units employed for SCOS97 were equipped with that signal processing and post analysis of spectral moments (the data used for SCOS97) has limited capabilities. RWP spectral moments data have been post processed for all sites (Table IIIc.1) to generate estimates of meteorological winds and virtual temperatures. Data were also obtained from another RWP site located at Vandenberg Air Force Base, but these were not fully processed due to a lack of time. Details on the meaning of the quality control indicators in the Level 0.5 data files are described elsewhere in this report. Also discussed are recommendations on how best to use these indicators. It should be noted that at some point in time subjective interpretation of the final data might be necessary.

Processing and quality control was applied independently to the radar spectral moment data for each RWP station using two parallel scenarios, each producing estimates of winds and temperatures. (See the flow diagram on page 8.) The motivation and utility of using two processing scenarios will be provided shortly. Winds were processed in scenarios **WI** and **WII** and temperatures were processed in scenarios **TI** and **TII**. Each of these scenarios involved two steps. For winds scenario **WI**, there is step **WI-0** and **WI-1**. For winds scenario **WII**, there is

step **WII-0** and **WII-1**. For temperatures scenario **TI**, there is step **TI-0** and **TI-1**. For temperatures scenario **TII**, there is step **TII-0** and **TII-1**.

In each scenario two steps for objective processing and quality control, operating on two different time scales, are used to ensure more reliable meteorological products. The first step operates on the radar spectral moments sampled every few minutes. The second step operates on hourly-averaged radar spectral moments.

In the first step of each scenario processing and quality control was applied independently to the radar spectral moment data during each hour throughout the experiment. In this first step, noise and spurious radar signals in the radar spectral moment estimates are rejected. Then, the remaining estimates within each hour are averaged to produce hourly-averaged radar spectral moment estimates.

In the second step of each scenario processing and quality control was applied independently to the hourly-averaged spectral moment estimates during each day throughout the experiment. In this second step, noise and spurious radar signals in the hourly-averaged spectral moment estimates that were not detected in the first step are rejected. Then, the remaining estimates during each day are used to derive meteorological products, i.e., winds and temperatures.

II a. Data Quality Assessment

Throughout the SCOS97NARSTO experiment and into the QC processing some level of subjectivity was applied to the data. This was necessary in the early stages to help identify sites with possible problems. Subjectivity was then again used to help make sure that there we not problems with the quality control routines. Post processed data were not only qualitatively compared to the wind and temperature data produced in the field (consensus data), but with other instrumentation either co-located or in close proximity.

Review of the quality controlled data shows good agreement between surface winds and the lowest RWP data. Exceptions to this are in the evening with light winds and periods when one would expect the formation of the nocturnal inversion to decouple the surface from upper levels. Overall winds are consistent with the large-scale synoptic weather patterns in this region. Level 0 and Level 0.5 data for the 26 RWP/RASS sites were compared on the same day (24 Jul 1997). Several features were noted. Regions where no winds appear in the Level 0 data but exist in the Level 0.5 data are not filled or interpolated. Rather these winds represent regions with low SNR or temporal variability that didn't pass the POP consensus tests, but were found to be consistent with surrounding data by the continuity algorithm. Within a 1 hour period the RWP actually produces 8-12 independent wind profiles. The POP software does a consensus test on the individual radials and normally requires a consensus of 50% in the oblique radials before it calculates a wind. On the other hand the QC algorithm has no such parameter and if it finds even one radial consistent with its neighbors, it is passed on. Technically you could then get an hourly wind consistent in time from only one of the 8-12 independent profiles. You also get a QC flag telling you that the confidence level in this wind is low, but it is still passed on.

Date from the 26 sites were also compared relative to their positions in Fig.1. By doing this you can begin to get a feel for the data consistency. Consistency of the data to the micro-climatology and the terrain whether influenced by the ocean or surrounding mountains is evident. Mesoscale consistency exists when comparing the winds between similar or neighboring sites. Synoptic consistency can also be visualized in the winds above the convective and marine boundary layers. Finally a consistency is evident in the meteorology and operation of the profilers by observing the change in the maximum height coverage over the entire network through-out the day. A majority of sites show a lowering trend in the maximum height coverage on this day. This pattern of decreasing height coverage throughout the day is representative of a drying out in the upper atmosphere and/or less turbulent mixing which both reduce the maximum operating range of the RWP. The opposite situation occurred for the data on September 25, 1998 where upper-level moisture from hurricane NORA had advected across the region increasing the height coverage to the maximum at all sites. Another method used to subjectively view the RWP data was to analyze hourly horizontal slices (similar to Fig. 3) at four heights at all sites for one entire day. These plots provide a different 3-D perspective of the consistency and meteorological patterns across the SCOS97-NARSTO network.

Based on these comparisons, at least two sites were identified as having problems. Wind profiles for BTW show more than expected missing and obvious outliers in both the Level 0 data and the Level 0.5 data. Further investigation of this indicated that the sensitivity of this RWP was extremely low with maximum SNR values 10-20 dB lower than other RWP sites under similar meteorological conditions. Unfortunately this condition appeared to last throughout the entire study. Profiles from PLM also show missing and abnormal looking data. What in fact occurred here is that the RWP operating parameters were modified on this day affecting the processing. These changes and their possible affects are discussed latter in this report along with a listing of the changes encountered in Appendix A3. Profiles for SMI Level 0 data show how this site operated in a 15 min consensus mode. This type of operation basically increases the number of temperature sampling periods and should not affect the post-processing noticeably.

Figures 9 a-c are comparisons of rawinsonde profiles with the RWP. For the limited number of cases examined, there is very good correlation despite the obvious differences in measurement techniques. The RWP data are volume and time averaged hourly data. The rawinsonde is an in-situ measurement. Given a 5 ms^{-1} ascent rate the rawinsonde takes ~16 min to reach the maximum range of the RWP (5 km) and can be several km downwind at this altitude. The rawinsonde data in these comparisons have not been quality controlled and any smoothing is the result of the rawinsonde system processing software. The RWP data are plotted at the mid-point of the averaging period and the rawinsonde data at the time of the launch. Using post processing of the RWP moment data it is possible to produce higher temporal level winds. Figure 10 is an example of 15 min averaged winds for TTN on August 5th 1997 expanded for the period surrounding the 1100 UTC rawinsonde launch. From this comparison we can see the increased temporal variability in the winds, especially from 1000 to 2200 m, and how the 15 min averaged winds agree better with the rawinsonde than the hourly averages. To even better understand this comparison one needs to determine what type of smoothing (if any) is done to the rawinsonde

winds. From the appearance of the rawinsonde profiles it is almost certain that there is some vertical smoothing going on.

Figures 11 a-c are several examples of RASS and rawinsonde virtual temperature comparisons. Rawinsonde temperatures were converted to virtual temperature. The surface temperature was also converted to virtual temperature and combined with the RASS profile. It should be noted that the RASS temperature profiles actually represent a 5-min sampling period at the beginning of the hour. This is why for most of the comparisons in Fig. 13 there are two RASS profiles bounding the rawinsonde launch time. Also of note is the differences in measurement techniques described earlier.

For the most part this qualitative comparison shows that the RASS data are within the 1° C accuracy reported by May et al. (1989). What is probably more important is that the stability and vertical structure is consistent despite the differences in vertical resolution. As expected, the RASS is unable to resolve some of the detail that is seen in the rawinsonde profiles.

III. DATA INVENTORY

III.a. Surface Instrumentation

Surface meteorological instrumentation was collocated at many of the RWP/RASS sites (Table IIIa). Surface winds and temperatures have been combined with the RASS and RWP processed data (Figures 7 and 8), but at this time only for the NOAA operated sites (except for El Centro). Data are provided in the "tar" file *Surface.tar*, which was created on a Unix computer as follows:

>tar cvf Surface.tar Surface

where *Surface* is a directory with subdirectories for each of the stations. ASCII data files for each of the stations are contained in the appropriate subdirectory for that station. The data directories and data files may be recovered as follows:

>tar xvf Surface.tar

For the NOAA sites the data files are monthly data files as follows:

sss97mmm.05m (5 minute data)
sss97mmm.60m (60 minute averaged data)

where *sss* is the site name abbreviation (i.e., ape, azs, bfd, cbd, gla, las, pde, phe, sca, sce, scl, ttn, usc, vns) and where *mmm* is the month (i.e., jun, jul, aug, sep, oct).

For the STI sites the data files are: *sssh_c.cdf*
where *sss* is the site abbreviated name, i.e., *btw, hpa, rsd, tcl, tml.*

For El Monte, Norton, and Ontario the files are:

elmont.txt *emtmet.txt* *sanbern.txt* *sbimet.txt* *ontpmet.txt*

III.b. Sodar

Sodar data are provided for 6 sites (Table III.b) in the "tar" file:*Sodar.tar* which was created on a Unix computer as follows:

> *>tar cvf Sodar.tar Sodar*

where *Sodar* is the directory with a sub-directory for each site (i.e., *azs, eaf, las, sca, tur, wsp)*. The data may be recovered as follows:

> *> tar xvf Sodar.tar*

Sodar data are not all in a single standard format. This is unfortunate and unanticipated, but time expired before all data could be reformatted, some data arrived late (May-June), and repeated reprocessing of RWP data consumed what resources were available.

Data from the 3 NOAA-operated stations *azs, las,* and *sca* are each provided in two files: *sss.sdr* and *sss.tar*. The station abbreviated name is given by *sss* (*azs, las,* or *sca*). The file *sss.sdr* is an ASCII file containing the same wind information contained in the original data files, which are provided in the "tar" file *sss.tar*. Data for *las* are also provided in two other "tar" files: *lashr.tar* and *lasti.tar*, because the data in *las.sdr* and *las.tar* are incomplete.

Original data delivered by the data providers for each of the 3 stations *eaf, tur,* and *wsp* are contained in the ASCII file *sss.sdr* and in the "tar" file *sss.tar*, where *sss* indicates the station name.

III.c. Radar Wind Profiler

A listing of the RWP data for the 26 RWP sites (Table III.c) is provided in Appendix A. If one hour within a day exists, then a file is listed for that day. A discussion of data file formats for winds and temperatures is provided in Appendix A1 and A2, respectively. Unplanned and unexpected changes in RWP operations are listed in Appendix A3. These changes required substantial re-programming and re-processing of radar spectral moment data. An artifact of changing RWP parameters in the final output files is the possibility of two (or more) wind or temperature profiles existing for the same hour. This happens because whenever the QC program detect a parameter change within an hour, it completes the processing up to that point and starts the QC again for the remaining data. The first profile would represent the data for the beginning of the hour until the change was detected and the second from the time of the change until the end of the hour (or until the next change). Depending on the type of parameter change it may be

possible to average these two together. Because more than one parameter can be changed at a time, determining the impact of the parameter(s) changed was left up to subjective analysis after the fact.

As explained in Section II of this report the data were processed in two scenarios. There are also data processed combined with the surface winds or temperatures. This gives one of "4" possible data files. Rather than giving a unique file name to each processing scenario, individual directories were setup (Met_0, Met_1, Met_0c, Met_1c). Within each directory are identical file names with a *miw* or *mit* suffix to indicate these are quality-controlled data. Appendix A.1 provides an excerpt of a RWP wind data file (*.*miw*), with an explanation of the format.

Appendix A.2 provides an excerpt of a RWP/RASS temperature data file (*.*mit*), with an explanation of the format.

III.d. Rawinsondes

Rawinsonde data are available for 26 stations (Table III.d), the data files for which are listed in Appendix D. It should be noted that these 26 rawinsonde sites were not all located at or near RWP/RASS sites. All data files are provided in their original ASCII data formats as supplied by the data providers, except for those from Vandenberg Air Force Base, which have been reformatted. Lee Eddington provided most of the correct site locations because numerous data files contained incorrect site information. There is no standard data format, although it was our intent to provide all rawinsonde data in a standard format.
These data are provided in a "tar" file *Raob.tar*, which was created on a Unix computer as follows:

>tar cvf Raob.tar Raob

where *Raob* is the directory containing a subdirectory for each of the following stations (Table III.d). For example, *bkr* is a subdirectory containing the data files listed under **bkr**. The rawinsonde data may be recovered as follows:

>tar xvf Raob.tar

IV. RWP QC PROCESSING PARAMETERS

The processing and quality control for each step of each scenario are controlled using a number of parameters (Table IV), whose variable names are the actual ones used in the computer programs for the signal processing algorithms. This information is intended to document the processing of SCOS97 RWP data and is not sufficient to document signal processing algorithms or the computer code in which those algorithms are implemented.

The first parameter *jin* indicates whether the radar spectral moment data to be processed are original (0) or previously processed (1). The second parameter *jout* indicates whether radar spectral moments are to be averaged (1) or meteorological products (winds and temperatures) are to be derived (2).

The third parameter *jwc* indicates correction of radar Doppler velocities for vertical motion: none (-1), using hourly-averaged data (0), using unaveraged data (1). Vertical motion may be due to, for example, vertical wind in clear-air convection or the fall velocity of precipitation. Note that in scenario **I**, the radar Doppler velocities are corrected for vertical motion when the winds are derived (**WI-1**) and the RASS temperatures are never corrected for vertical motion. It is common practice not to correct temperatures for vertical motion due to a lack of confidence in the measurements of vertical velocity when that vertical velocity is small. When the vertical velocity is large, it is likely due to precipitation, whose fall speed should not be used to correct the temperatures. In scenario **II**, both the radar Doppler velocities (**WII-0**) and the RASS temperatures (**TII-0**) are corrected for vertical velocity at the beginning before hourly averaging.

The fourth parameter *ind*, with the same value for all scenarios, indicates that physical units are to be used in measurements of time (seconds) and space (meters). The fifth parameter *delt* indicates that one hour of data (3600 seconds) is to be used in the first step (**WI-0**, **WII-0**, **TI-0**, **TII-0**) and one day of data (86400 seconds) is to be used in the second step (**WI-1**, **WII-1**, **TI-1**, **TII-1**).

The sixth parameter *jnoz* indicates that noise is not to be rejected (0) or that it is to be rejected (1). The next parameter *cmpb* controls the sensitivity of noise rejection with values from 0 to 1. More noise is rejected with larger values, with fewer false alarms but also with more weak signals mistaken as noise.

Parameter number eight *jrej* is set not to reject spurious signals (0) or to reject them (1). If *jrej=1*, then the next 13 parameters are in effect. The parameters *trej(1)* and *trej(2)* are respectively the lower and upper limits on time for spurious signals to be rejected. The parameters *hrej(1)* and *hrej(2)* are respectively the lower and upper limits on height for spurious signals to be rejected. These time and height controls are used to restrict this part of the processing to be applied only to areas of identified problems (i.e. birds). The next two parameters *srej(1,1)* and *srej(2,1)* are the lower and upper limits on the signal to noise ratio for acceptable atmospheric radar returns. Signals with values outside this range are rejected. The two parameters *srej(1,2)* and *srej(2,2)* are the lower and upper limits on the Doppler velocity for acceptable atmospheric radar returns. Velocities with values outside this range are rejected. The next two parameters *srej(1,3)* and *srej(2,3)* are the lower and upper limits on the signal spectral width for acceptable atmospheric radar returns. Widths outside this range are rejected.

These are the parameters used to identify periods with possible bird contamination. They are activated in steps WI-1 and WII-1 of the wind processing. From Figure 5, one would think that bird contamination could be identified and rejected at steps WI-1 and WII-1. This has been true in past experiences and may be true at times for data collected during SCOS97. However, Figure

5b shows that some atmospheric signals also satisfy the same threshold criteria as do the bird contamination.

The last parameters are used to test the temporal and spatial consistency of the Doppler velocities if *qc=1*, but not if *qc=0*. Data with quality control indices less than or equal to the threshold parameter *qct* demonstrate acceptable consistency over time and over space. Quality control indices with values larger than this threshold demonstrate less consistency in proportion to those indices. Comparing a data value with an interpolated value derived from neighboring data points, both in time and in space, objectively tests consistency. The neighborhood of a data point is established with the time interval parameter *dtqc* and the space interval *drqc*, which are factors for the sample intervals of the data. For example, in processing radar spectral moments, let us assume that the data are sampled at 3 minute intervals and every 100 meters in altitude. If *dtqc=2.1*, then all data points within 378 seconds on either side of the sample time for the data point in question are considered to be in the immediate neighborhood. If *drqc=1.1*, then all data points within 110 meters on either side of the sample height for the data point in question are considered to be in the immediate neighborhood. All of the points in the neighborhood are used to interpolate to the time and height of the data point in question. The quality control index is proportional to the difference between the actual data value and this interpolated value, with the proportionality factor being the inverse of the velocity resolution *dvqc* in meters per second.

In addition to testing local consistency of the individual data points as described above, quality control also tested for consistency over the entire sample domain, from the ground up to the greatest height sampled and over the time period of observations. For example, in the first step of processing over one hour at a time, quality control tested for the overall size of consistent patterns of data. If those patterns were minor in size, less than *nminqc*, then the quality control index was set to indicate poor consistency. If the fraction of consistent neighbors was less than *fcnqc*, then that index was set to indicate poor consistency.

Sometimes the RWP radar may be operated in such a way that Doppler velocities are aliased. Then, the parameter *alf* may be used to control de-aliasing of those velocities. This function has been disabled for processing SCOS97 by using a large value of 100. Aliasing was observed in some RWP data on September 25 during the passing of Hurricane NORA and data during this period need to be used cautiously until additional re-processing of these data can be done.

In processing scenario **WI**, noise is rejected and temporal/spatial consistency are tested in both steps. Outliers with unrealistic spectral broadening or signal strength are rejected. In the first step **WI-0**, the data for each antenna beam is tested for temporal and spatial consistency over each hour before performing the hourly average. Radar signals lacking the necessary temporal and spatial consistency are not included in the hourly average. In the second step, the hourly-averaged radial velocities are tested for temporal and spatial consistency over each day (24-hour period). Those lacking the required consistency are not included in the derivation of meteorological wind estimates.

In processing scenario **WII**, the radial velocities on each of the oblique antenna beams are corrected for vertical velocity by using the radial velocity measurement on the vertically directed

antenna beam before testing for temporal and spatial consistency in step **WII-0** and before the hourly average. The temporal and spatial consistency are tested for each hour independently and any data not meeting the consistency requirement is not included in the hourly average. Noise is rejected only in the first step **WII-0**, while outliers with unrealistic spectral widths and signal strengths are rejected only during the second step **WII-1**. Temporal and spatial consistency are tested in both steps, over one hour in step **WII-0** and over a day in step **WII-1**.

RWP/RASS Doppler radar spectral moment data were processed in two scenarios (TI and TII) in order to derive reliable virtual temperatures. RASS spectra usually do not have all of the problems oftentimes observed with wind spectra because of the large Doppler shifts (greater than 300 m/s), which effectively removes the atmospheric signal from ground clutter. Nevertheless, there are some potential problems because of incomplete and inadequate signal processing that is used to derive moment estimates from the Doppler radar spectra.

The most important aspect of scenario **TI** is that the virtual temperatures derived from RWP/RASS spectral moments are not corrected for any clear-air vertical wind component. When the vertical wind component is small (this is the usual case), ground clutter near zero Doppler velocity may introduce biases in the estimates of that vertical wind component. Hence, it is common practice to avoid correcting the RASS virtual temperature estimates, accepting errors on the order of a degree or more rather than introducing unknown biases of the same order of magnitude.

Significant vertical motion can introduce large errors in the temperatures if not corrected. Hence, in scenario **TII**, the RASS acoustic velocities are corrected for clear-air vertical motion in the first step. Note that in cases when precipitation is present, the fall velocity of micrometeorites may be mistaken for the clear-air vertical wind component. Then, the temperatures reported in this scenario may contain large errors.

V. SUMMARY AND CONCLUSIONS

The SCOS97 upper-air data set should be a very useful one for validating transport models and for other applications. ...

Final quality controlled data files contain quality control flags to help users better interpret the data. The purpose of the QC flags is to provide the user with an "objective" indication of the data quality The QC flags are the result of QC programs and parameter sets based on previous processing experience. This experience has shown that there is no way to handle all QC situations from many RWP sites operating under different radar parameters and meteorological conditions, if you are limited by time and money. For the SCOS97 data the normal range of QC flags is 0-100, with 0 being the best and 100 the worse. As a general rule of thumb, QC flags less than or equal to 10 signify data with the highest confidence level. Individual cases or days may still exist where post processing has produced questionable results. This is unavoidable using automated objective methods and it is impractical to apply subjective methods on such a large data set. Raw spectral moment data were collected continuously over a four month period for 26

different stations, sampling every few minutes. The meteorological products derived from these spectral moment data are reported every hour. Past experience has demonstrated that results of post processing/quality control are sometimes sensitive to the parameter values (Table IV). Values that are effective in identifying and removing contamination in some case may not work as effectively in other cases. This has been understood and accepted when working with radar spectral moment data. In order to properly identify and remove all types of contamination, processing must begin with radar signals prior to the estimation of those spectral moments. In all existing systems, including those operated for SCOS97, that signal processing is known to be inadequate. NOAA is currently implementing complete and adequate signal processing that may be installed on all Radar Wind Profiler systems in order to eliminate problems with contamination in the future. For this study, special attention was therefore paid to the data collected during Intensive Operating Periods (IOPs).

There are a number of important lessons to be learned from this experience. Data collection and data management should be given more attention in the future. There was insufficient control over the data providers, who did not always follow good operating practice. There was no uniform time standard amongst the different data providers, and some data providers even changed their time standard part way through the experiment. In addition, data providers modified their instrument configurations arbitrarily and frequently, in direct conflict with accepted practice established prior to the data collection period. With modern remote-sensing instruments, which are easily modified through software, there is responsibility on the part of operators to ensure the integrity of data collected for important applications by the sponsoring organization. Too many data providers did not operate appropriately in order to meet the needs/requirements of SCOS97.

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GLOSSARY OF TERMS, ABBREVIATIONS, AND SYMBOLS

AFB	Air Force Base
AGL	Above Ground Level
CARB	California Air Resource Board
CBL	Convective Boundary Layer
CW	Continuous Wave
ERL	Environmental Research Laboratory
ETL	Environmental Technology Laboratory
ICRA	Intermittent Clutter Rejection Algorithm
JD	Julian Date
Level 0	Level 0 data: raw or original data
Level 0.5	Level 0.5 data: post-processed/quality controlled data
MSL	Mean Sea Level
NOAA	National Oceanic and Atmospheric Administration
Nyquist Velocity	Largest unambiguous Doppler radar radial velocity measurement
POP	Profiler On-Line Program
QC	Quality Control
RASS	Radio Acoustic Sounding System
RWP	Radar Wind Profiler
SDID	System Demonstration and Integration Division
SNR	Signal-to-Noise Ratio
STD	Standard deviation
STI	Sonoma Technology, Inc.
U	East/West meteorological wind component (+ from West)
Un-aliased Height	Maximum unambiguous height of radar samples
USAF	United States Air Force
UTC	Universal Time Coordinate
V	North/South meteorological wind component (+ from South)

FIGURES

Figure 1: Map of southern California and SCOS97-NARSTO RWP/RASS sites
Figure 2a: Level 0 wind barb profiles off web page. Van Nuys, CA August 4, 1997
Figure 2b: Level 0 temperature color contour profiles off web page. Van Nuys, CA August 4, 1997
Figure 3: Example of multi-site horizontal slices at four heights. August 4, 1997
Figure 4a: Wind barb profiles on August 14, 1997. Norton CA. Level 0 (top) and Level 0.5 (bottom). Possible bird contamination.
Figure 4b: Wind barb profiles on August 15, 1997. Norton CA. Level 0 (top) and Level 0.5 (bottom). Possible bird contamination.
Figure 4c: Wind barb profiles on August 16, 1997. Norton CA. Level 0 (top) and Level 0.5 (bottom). Possible bird contamination.
Figure 5: (a) Radial velocities (1st moment), (b) Signal to Noise Ratio (SNR), and (c) Spectral width (2nd moment) for one antenna beam on August 113-16, 1997. Level 0 data. Vertical white stripes are RASS sampling periods. Possible bird contamination.
Fig 6: Wind barb and QC contour overlay. Norton, CA August 16, 1997.
Fig 7: Level 0 (top) and Level 0.5 (bottom) virtual temperature color contour plots. Level 0.5 data include surface virtual temperature. August 4, 1997 Alpine, CA.
Fig 8: Level 0 (top) and Level 0.5 (bottom) wind barb profiles. Level 0.5 data include surface winds. August 4, 1997. Alpine, CA.
Fig 9a: RWP/rawinsonde wind comparison. RWP are hourly winds are plotted at the mid-point of the averaging period. Rawinsonde data are plotted at the time of the launch (UTC). August 4, 1997, Tustin, CA.
Fig 9b: RWP/rawinsonde wind comparison. RWP are hourly winds are plotted at the mid-point of the averaging period. Rawinsonde data are plotted at the time of the launch (UTC). August 5, 1997, Tustin, CA.
Fig 9c: RWP/rawinsonde wind comparison. RWP are hourly winds are plotted at the mid-point of the averaging period. Rawinsonde data are plotted at the time of the launch (UTC). August 6, 1997, Tustin, CA.
Fig 10: RWP/rawinsonde comparison. RWP are 15-min winds are plotted at the mid-point of the averaging period. Rawinsonde data are plotted at the time of the launch (UTC). August 5, 1997, Tustin, CA.
Fig. 11 a: RASS/rawinsonde virtual temperature comparisons. RASS data are a 5-min period just after the top of the hour. August 4, 1997, Tustin, CA.
Fig. 11 b: RASS/rawinsonde virtual temperature comparisons. RASS data are a 5-min period just after the top of the hour. August 5, 1997, Tustin, CA.
Fig. 11 c: RASS/rawinsonde virtual temperature comparisons. RASS data are a 5-min period just after the top of the hour. August 6, 1997, Tustin, CA.

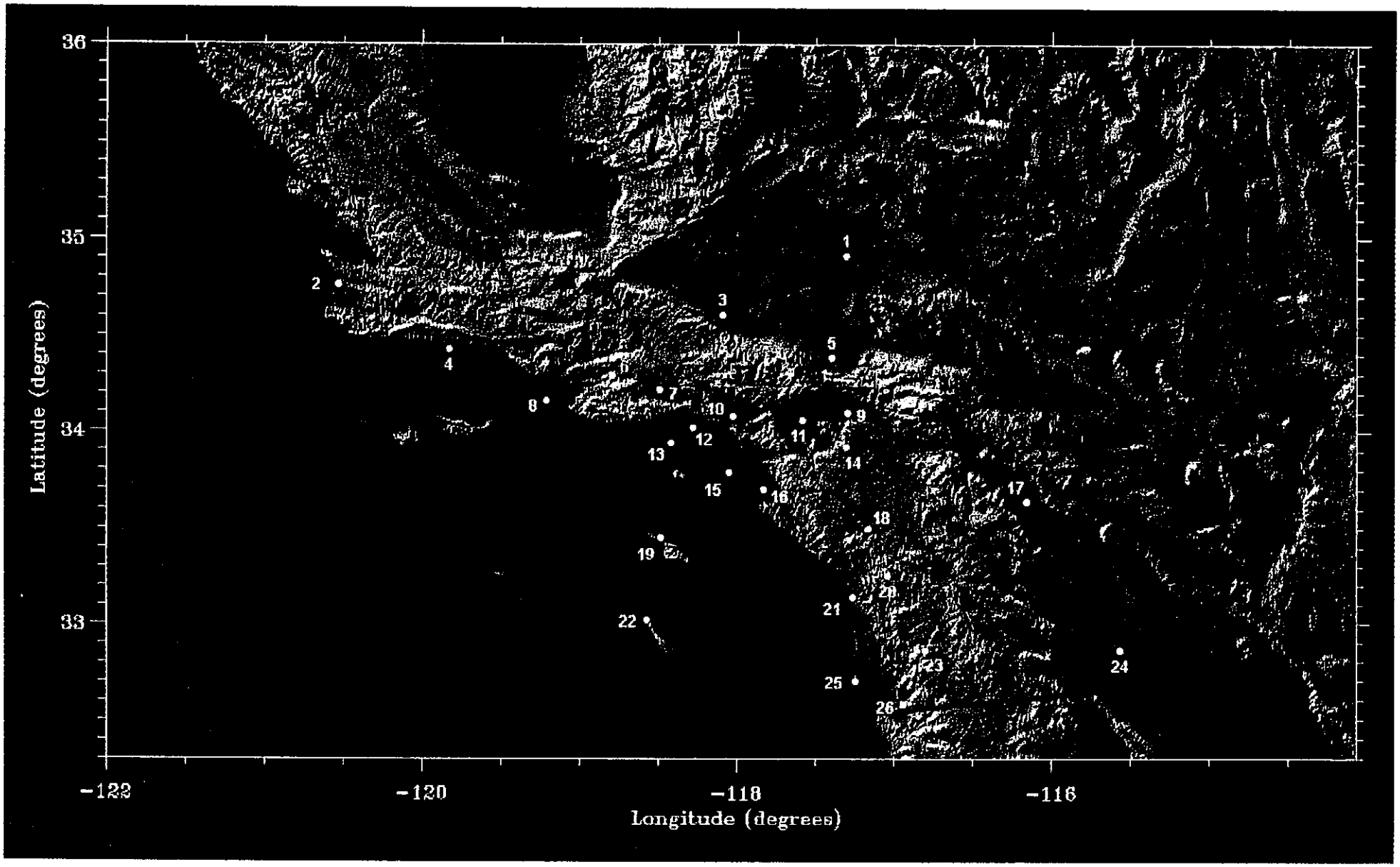


Figure 1: Map of southern California and SCOS97-NARSTO RWP/RASS sites

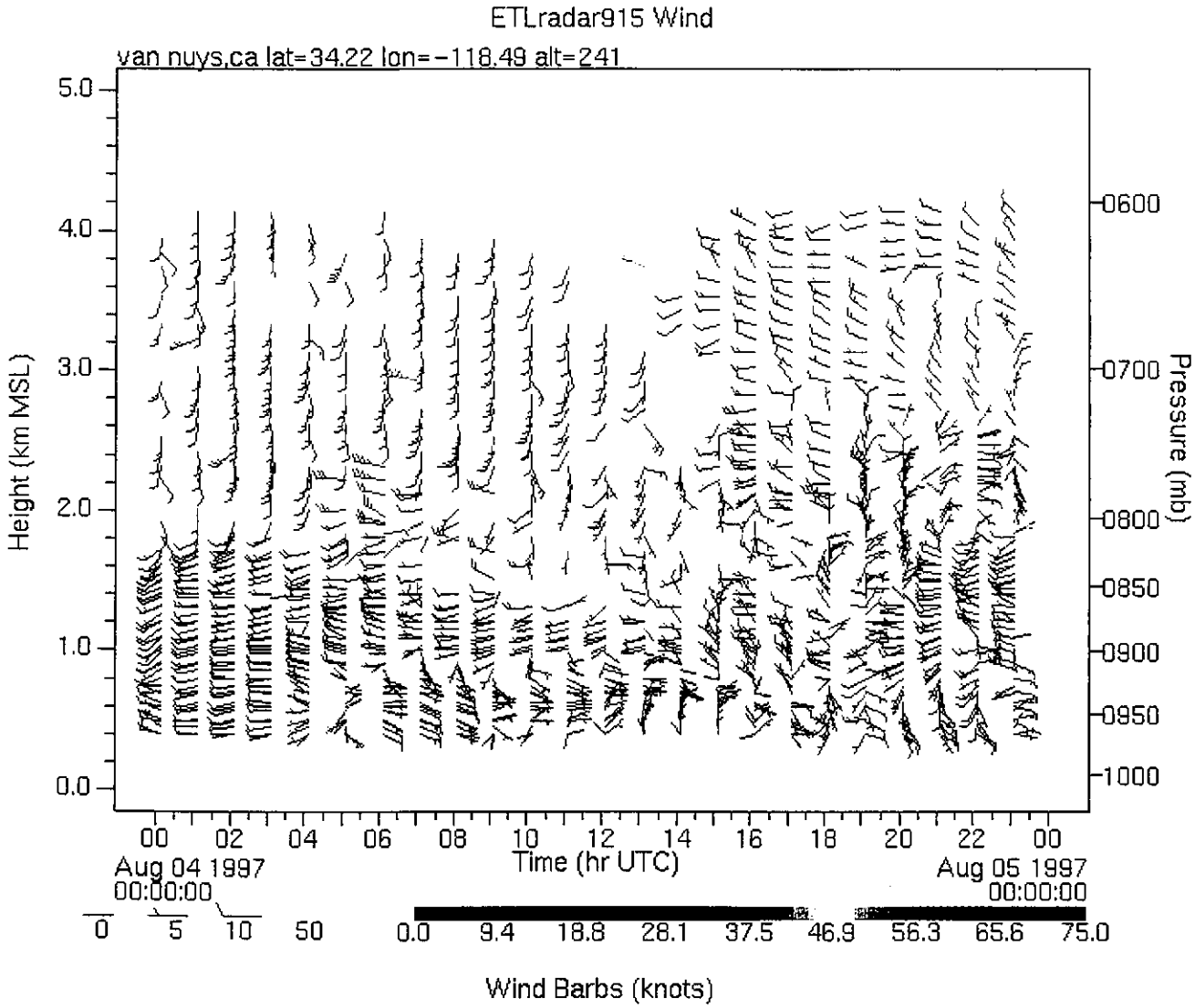


Figure 2a: Level 0 wind barb profiles off web page. Van Nuys, CA August 4, 1997

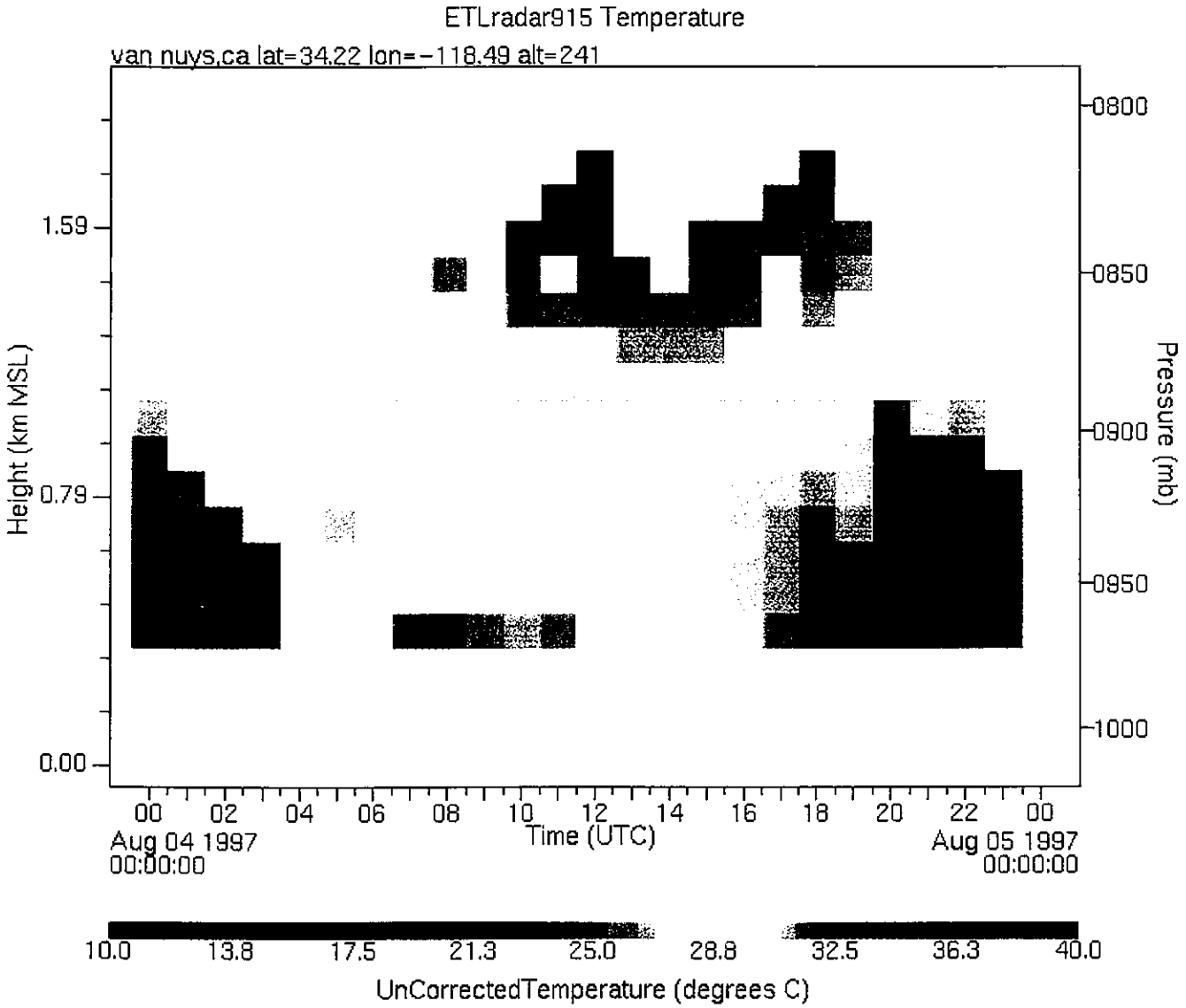


Figure 2b: Level 0 temperature color contour profiles off web page. Van Nuys, CA August 4, 1997

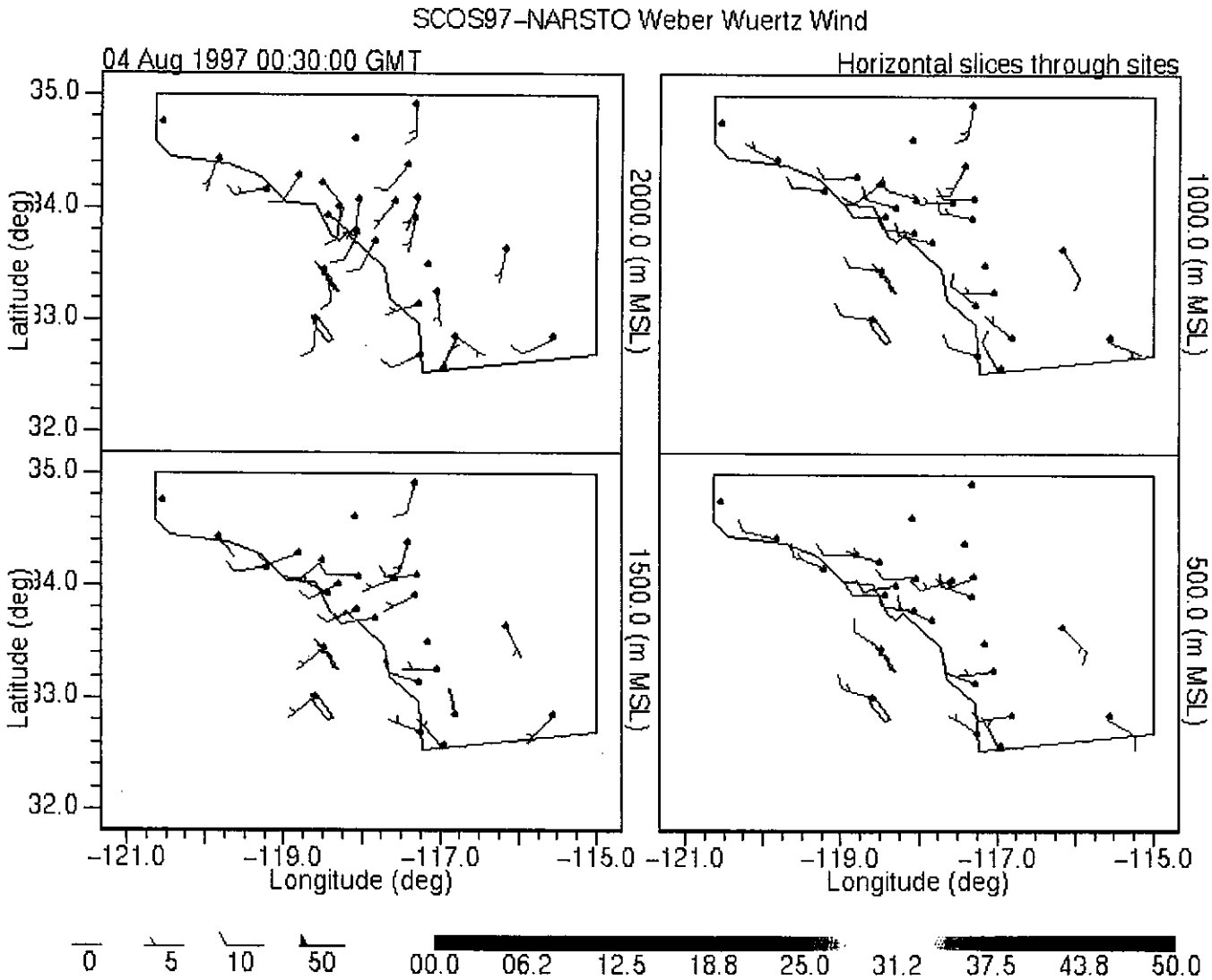


Figure 3: Example of multi-site horizontal slices at four heights. August 4, 1997

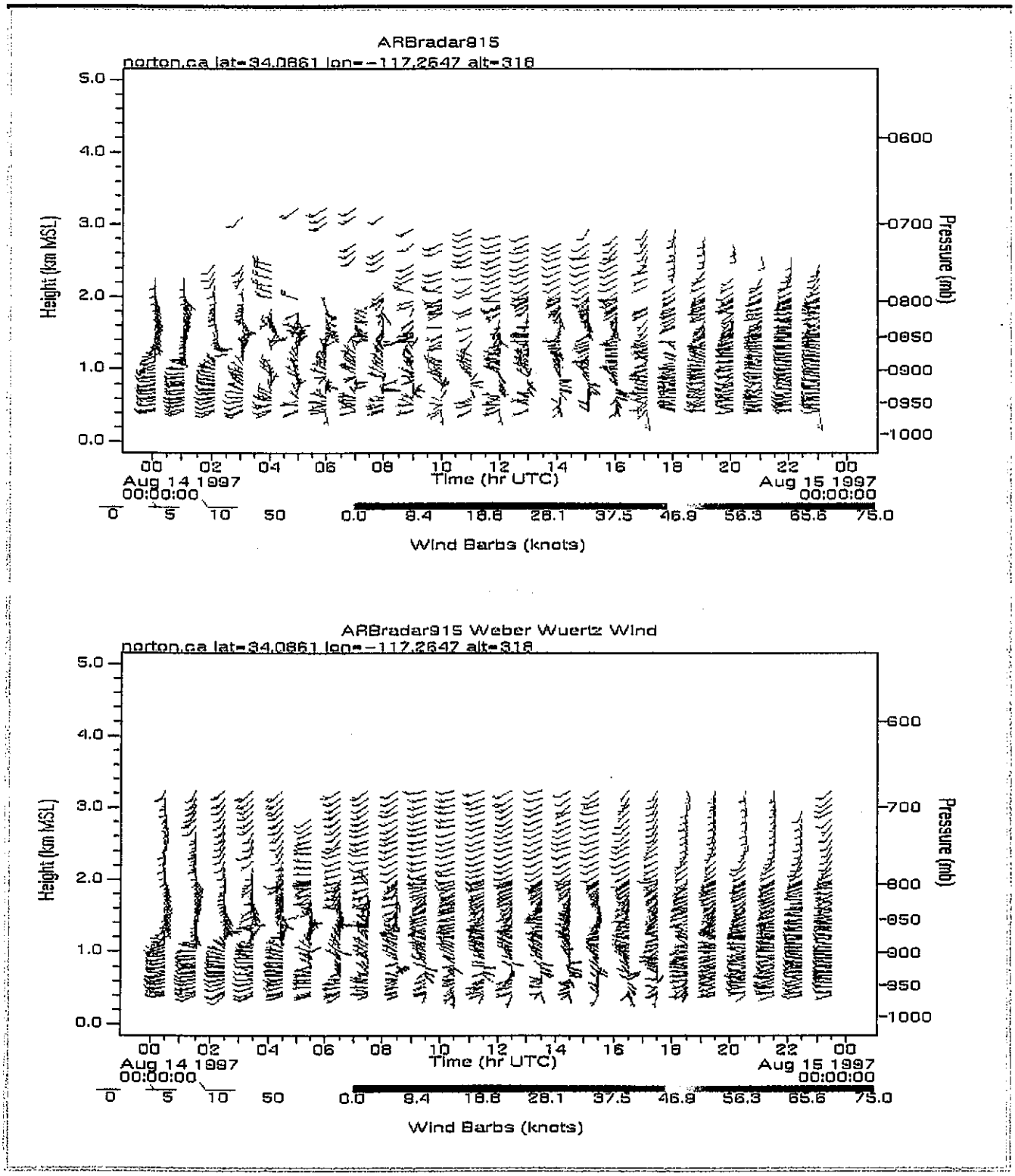


Figure 4a: Wind barb profiles on August 14, 1997. Norton CA. Level 0 (top) and Level .5 (bottom). Possible bird contamination.

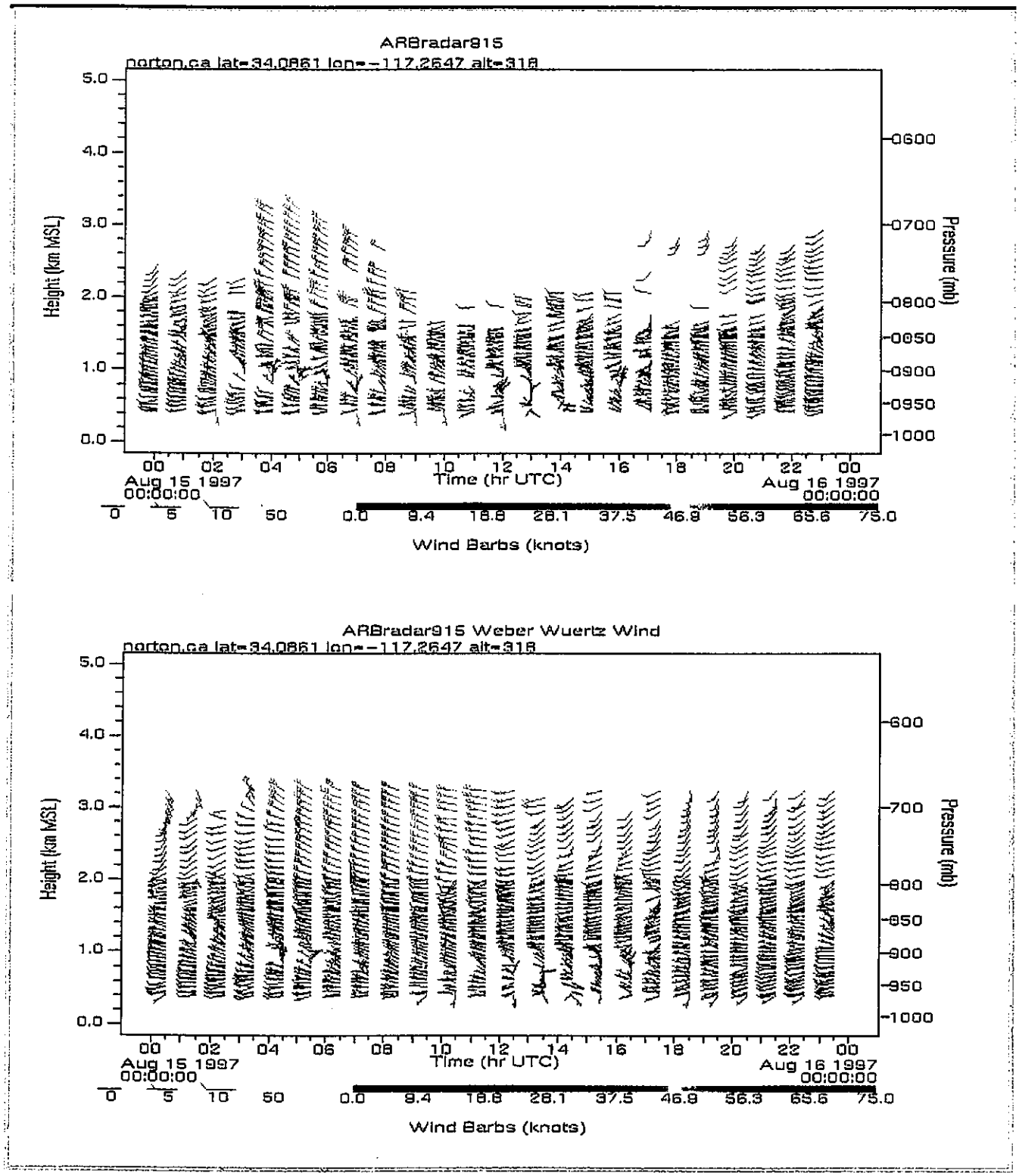


Figure 4b: Wind barb profiles on August 15, 1997. Norton CA. Level 0 (top) and Level .5 (bottom). Possible bird contamination.

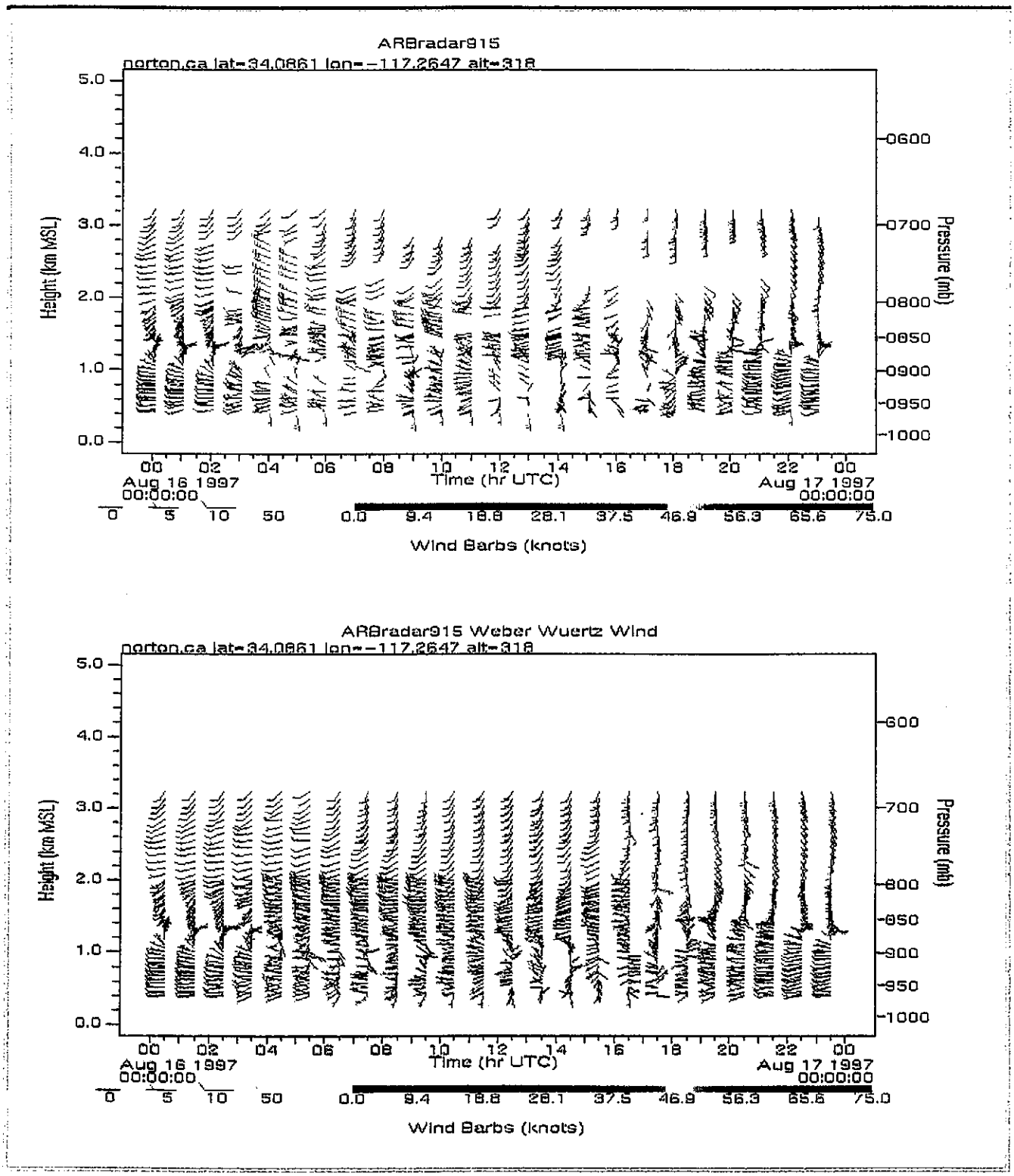


Figure 4c: Wind barb profiles on August 16, 1997. Norton CA. Level 0 (top) and Level .5 (bottom). Possible bird contamination.

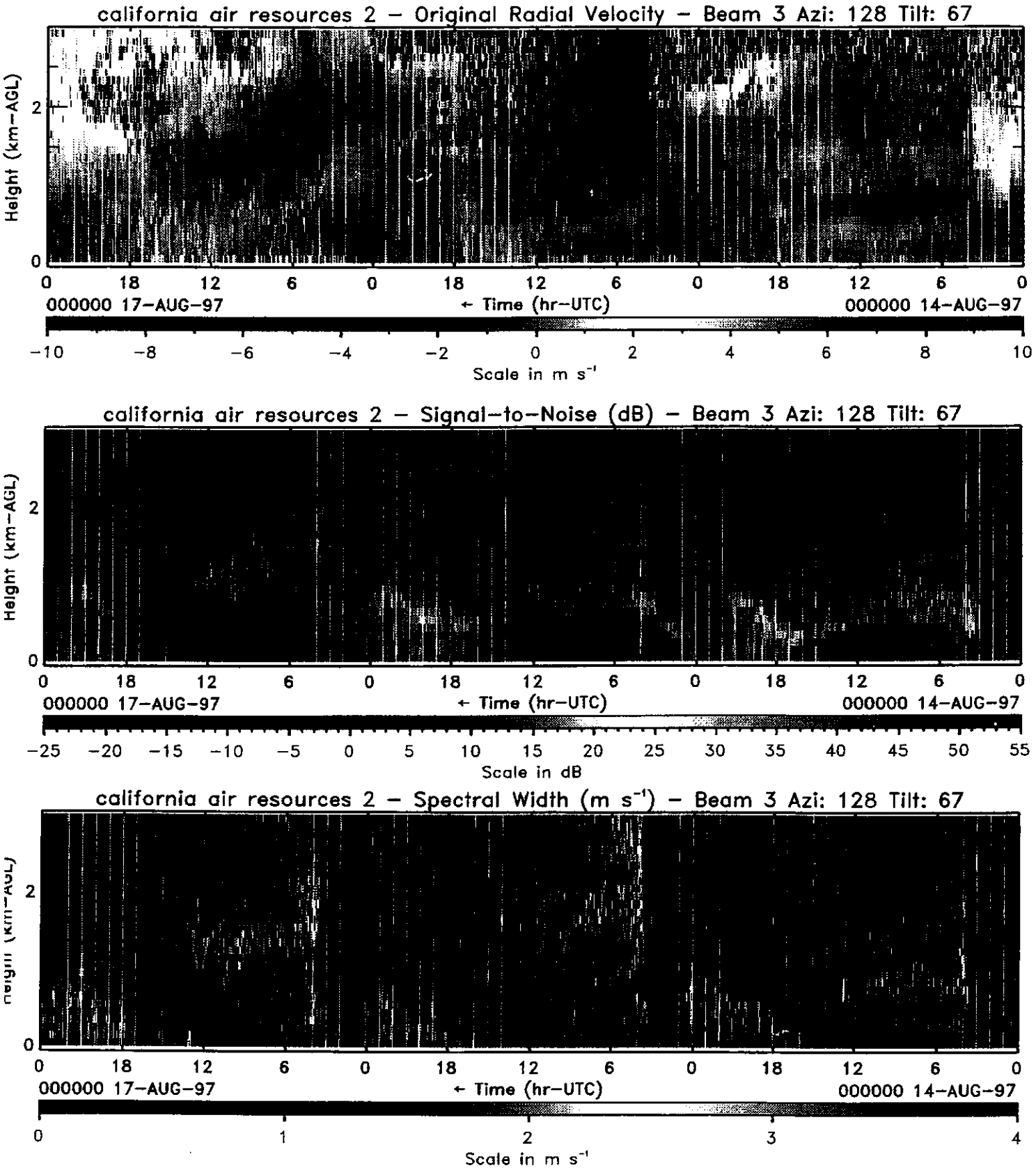


Figure 5: (a) Radial velocities (1st moment), (b) Signal to Noise Ratio (SNR), and (c) Spectral width (2nd moment) for one antenna beam on August 113-16, 1997. Level 0 data. Vertical white stripes are RASS sampling periods. Possible bird contamination.

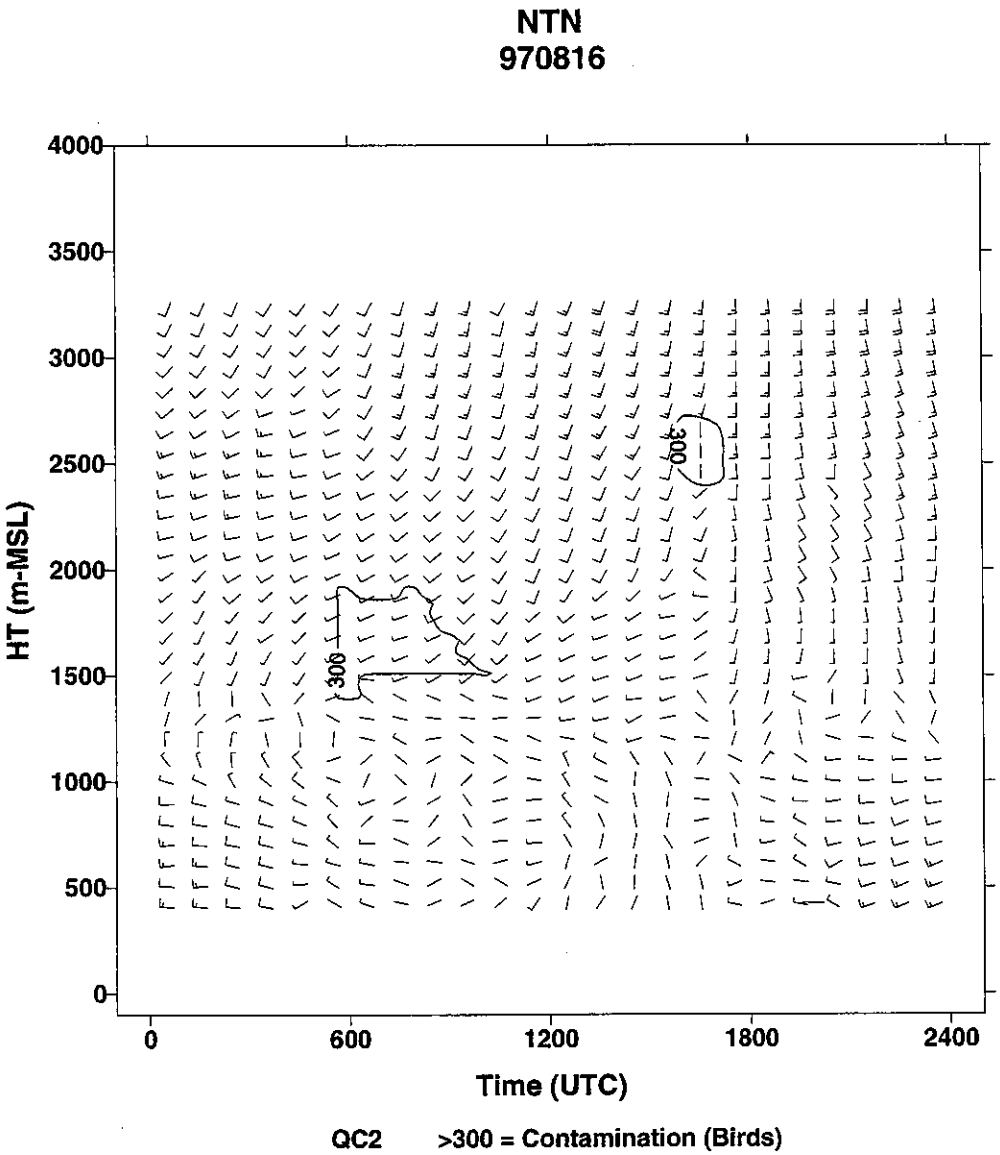


Fig 6: Wind barb and QC contour overlay. Norton, CA August 16, 1997.

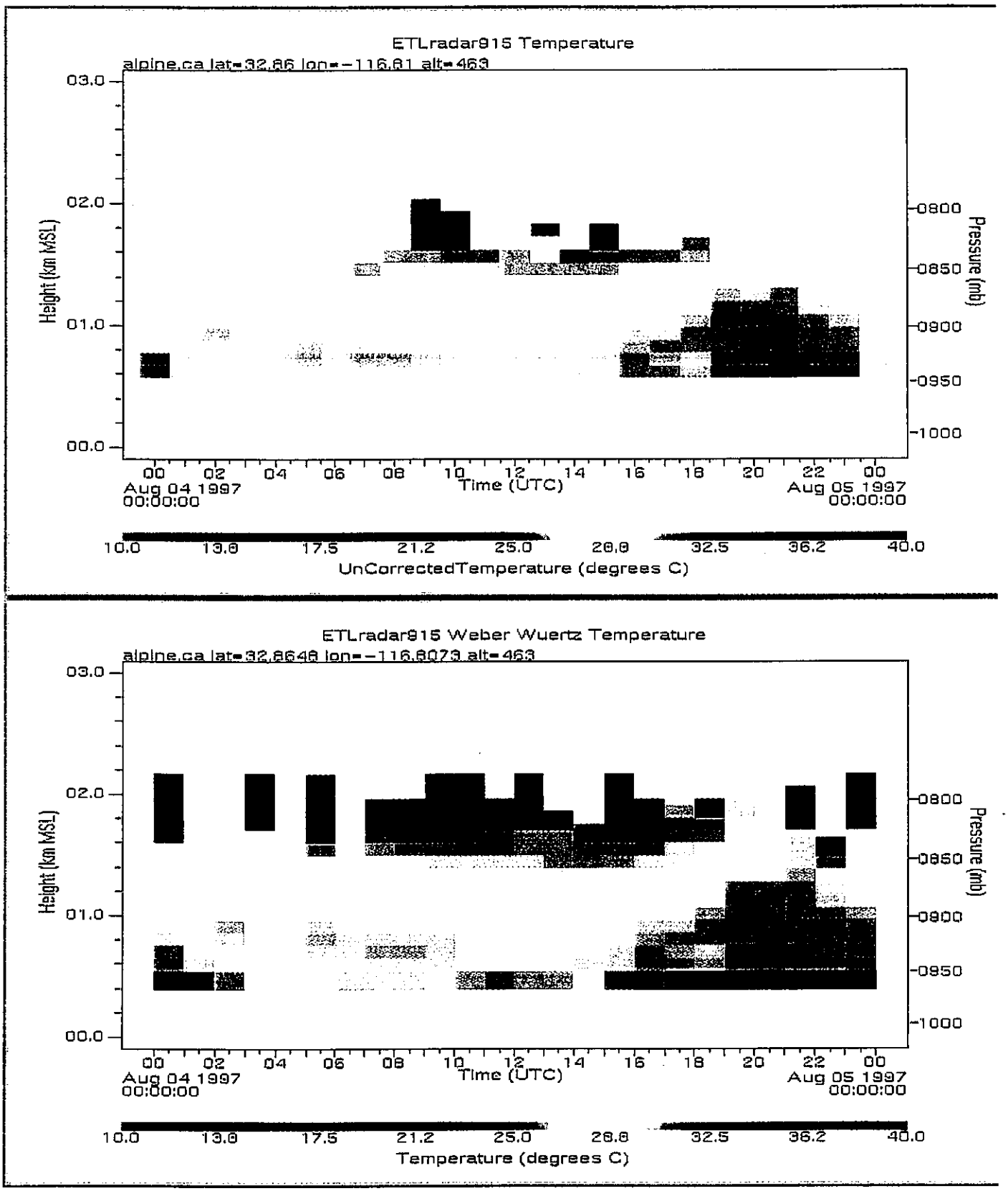
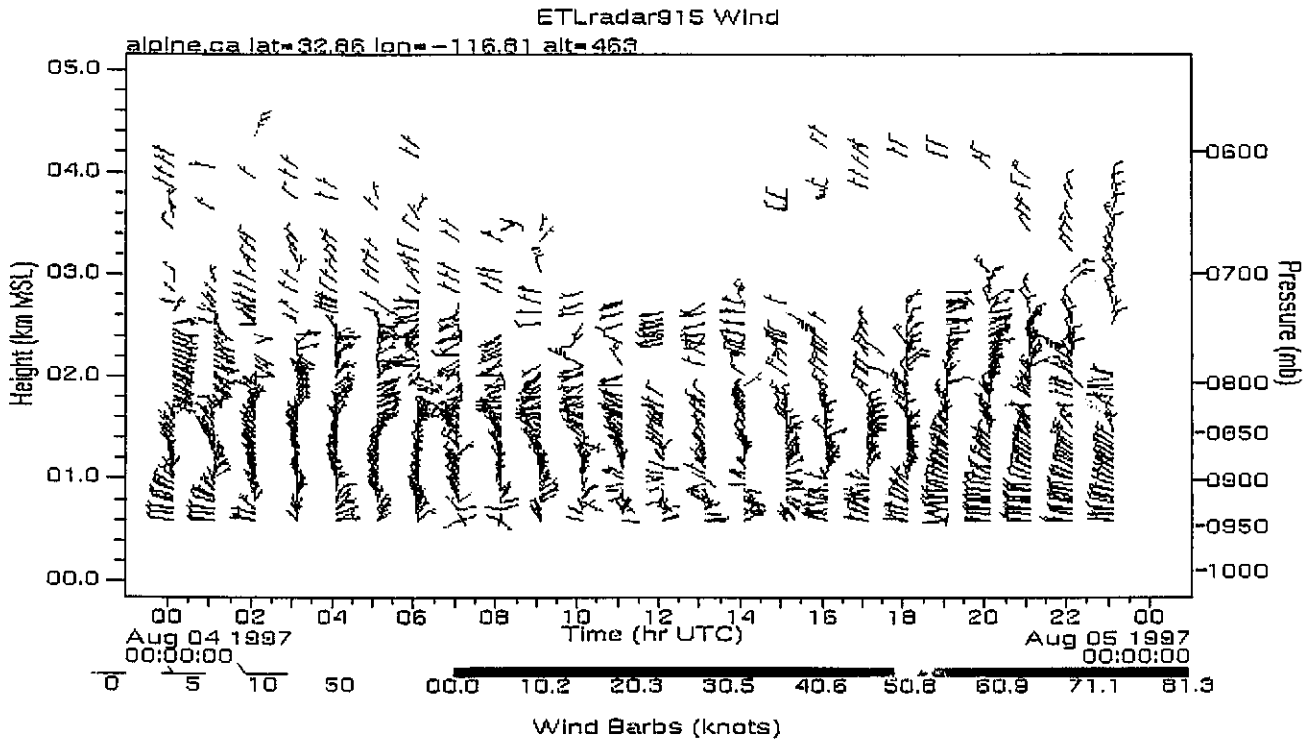


Fig 7: Level 0 (top) and Level .5 (bottom) virtual temperature color contour plots. Level .5 data include surface virtual temperature. August 4, 1997 Alpine, CA.



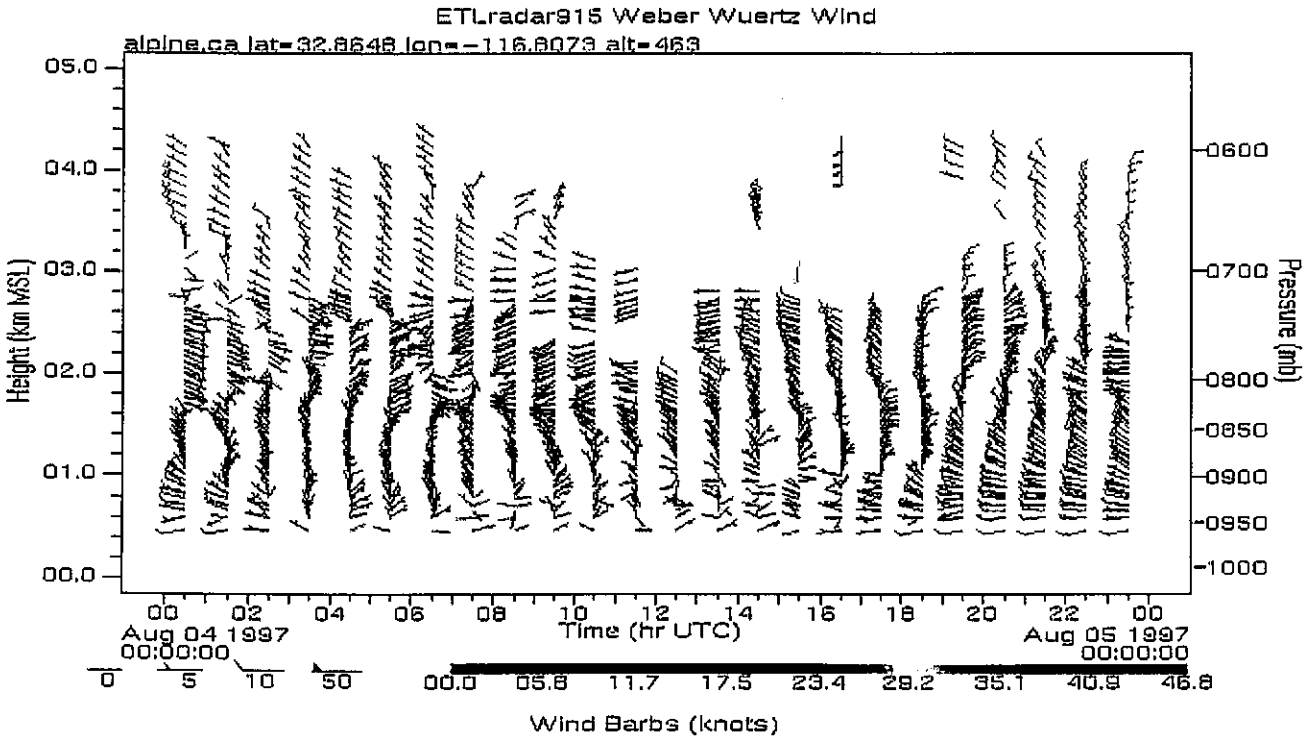


Fig 8: Level 0 (top) and Level .5 (bottom) wind barb profiles. Level .5 data include surface winds. August 4, 1997. Alpine, CA.

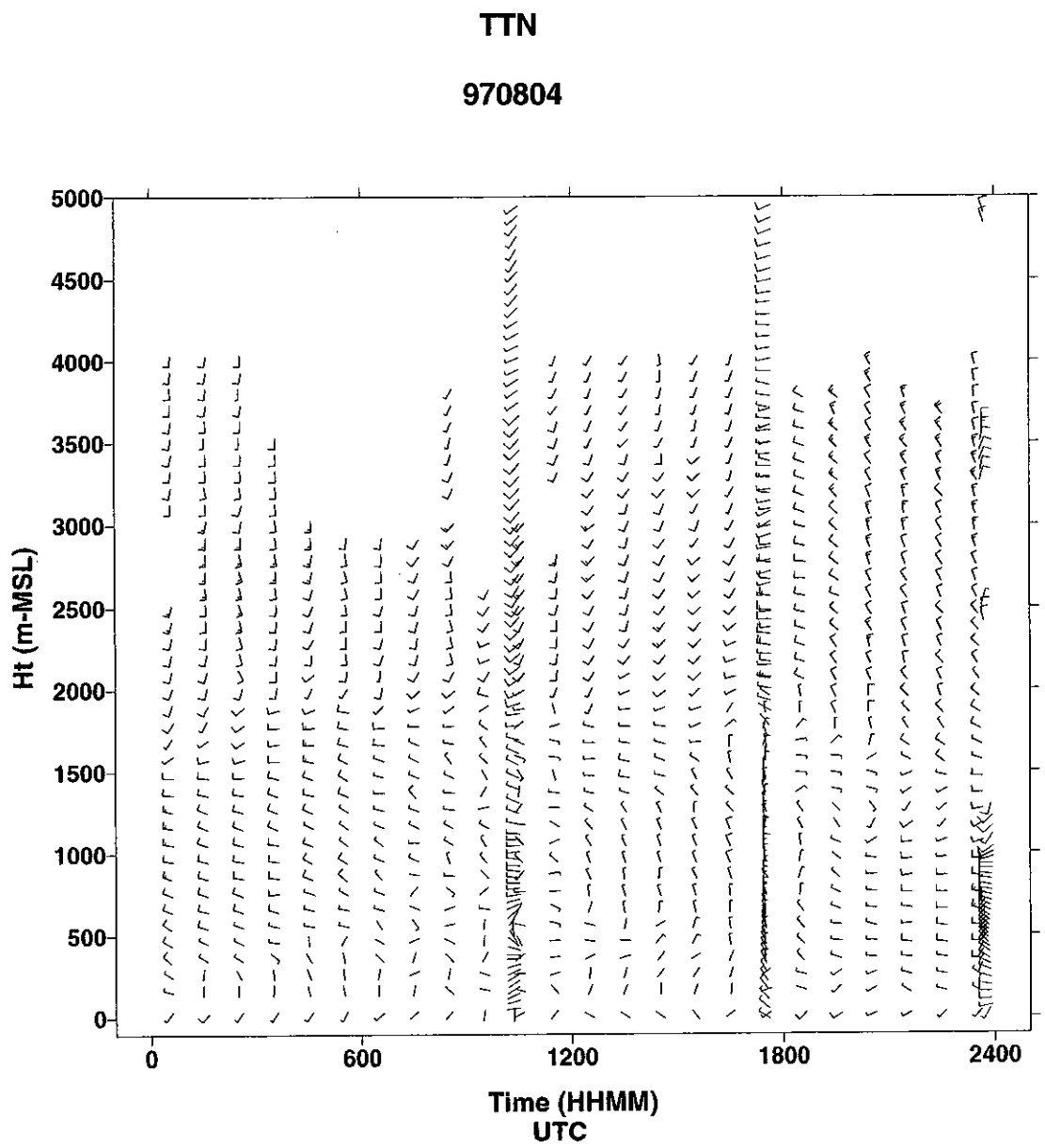


Fig 9a: RWP/rawinsonde wind comparison. RWP are hourly winds are plotted at the mid-point of the averaging period. Rawinsonde data are plotted at the time of the launch (UTC). August 4, 1997, Tustin, CA.

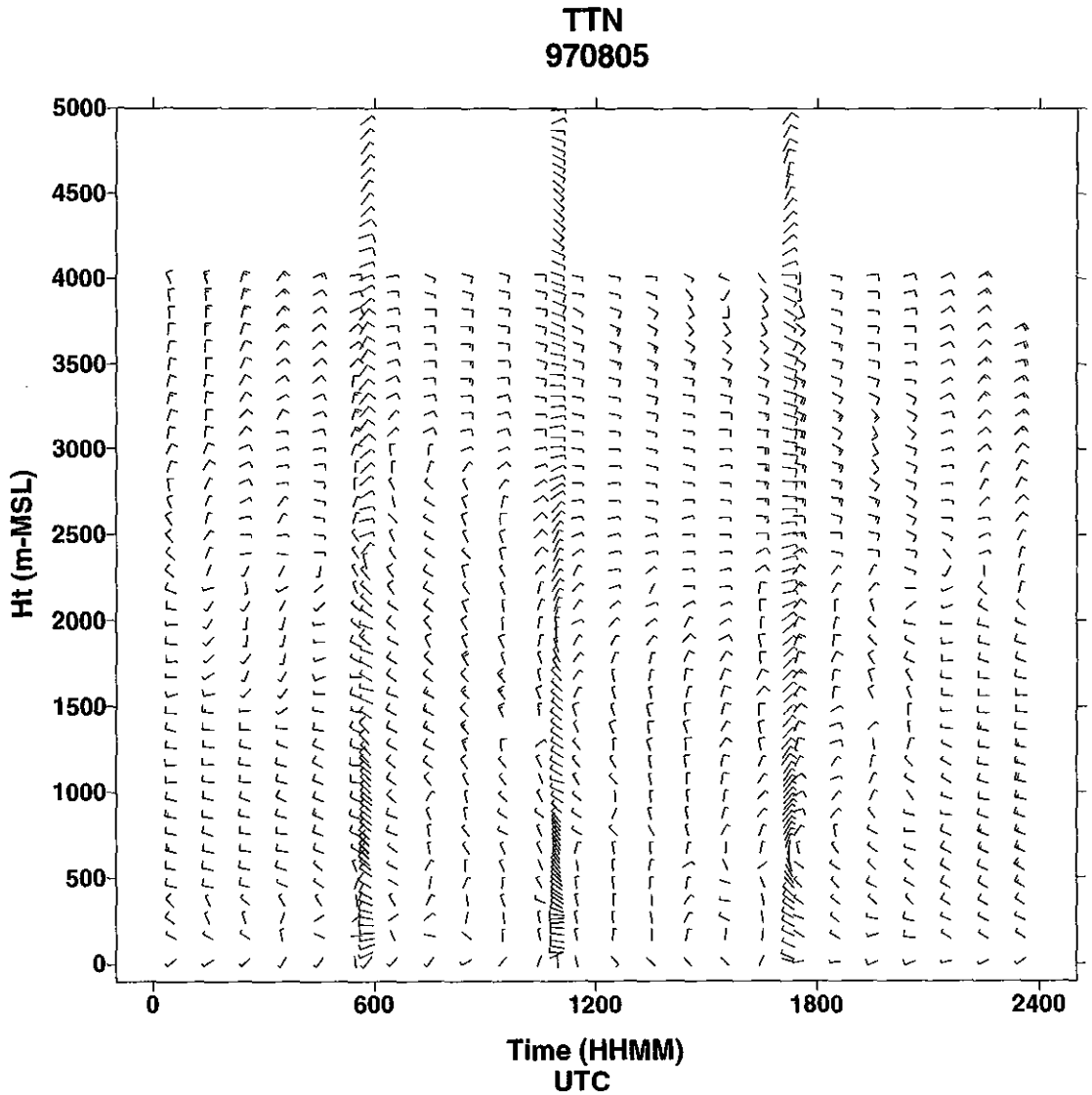


Fig 9b: RWP/rawinsonde wind comparison. RWP are hourly winds are plotted at the mid-point of the averaging period. Rawinsonde data are plotted at the time of the launch (UTC). August 5, 1997, Tustin, CA.

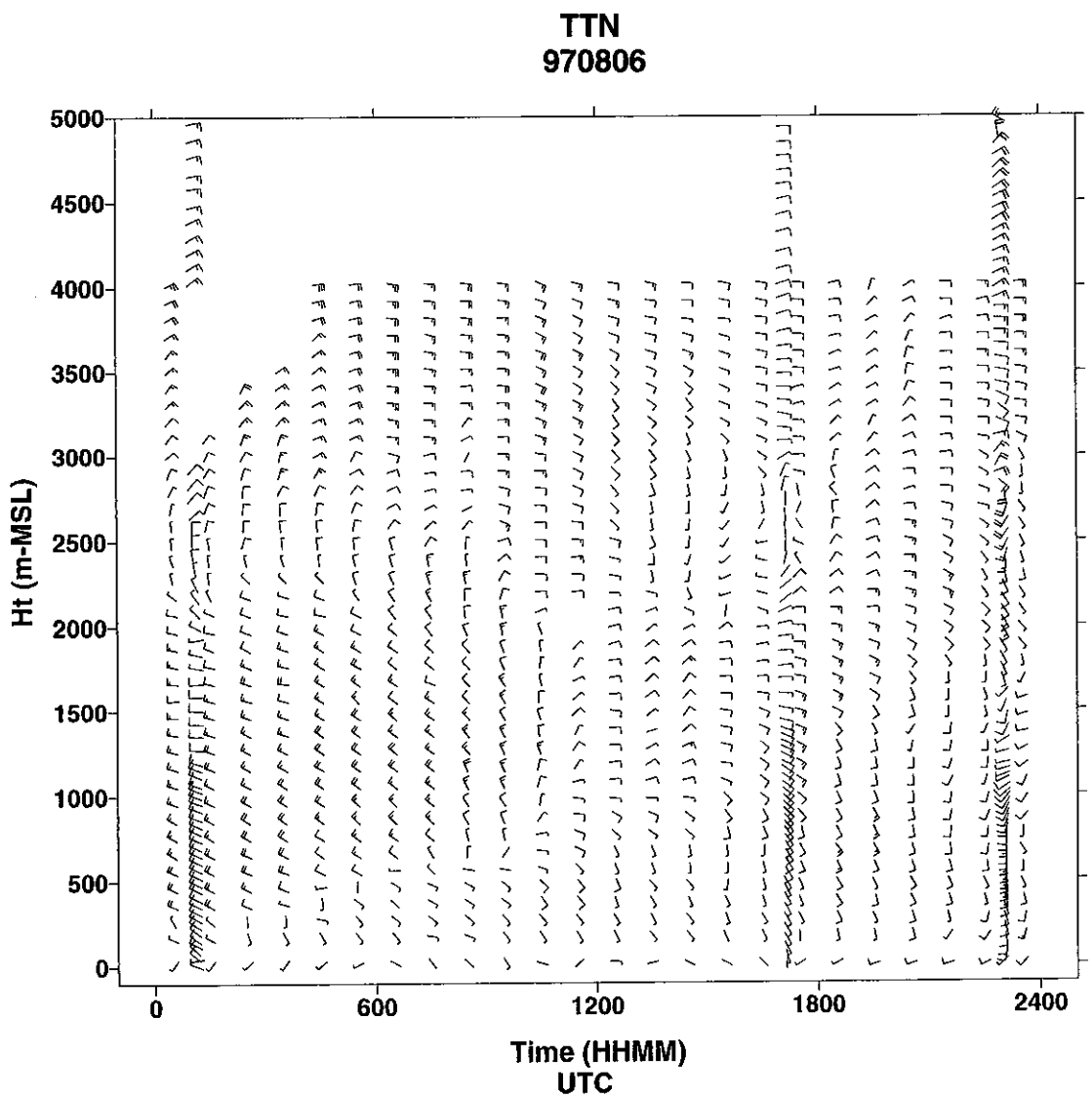


Fig 9c: RWP/rawinsonde wind comparison. RWP are hourly winds are plotted at the mid-point of the averaging period. Rawinsonde data are plotted at the time of the launch (UTC). August 6, 1997, Tustin, CA.

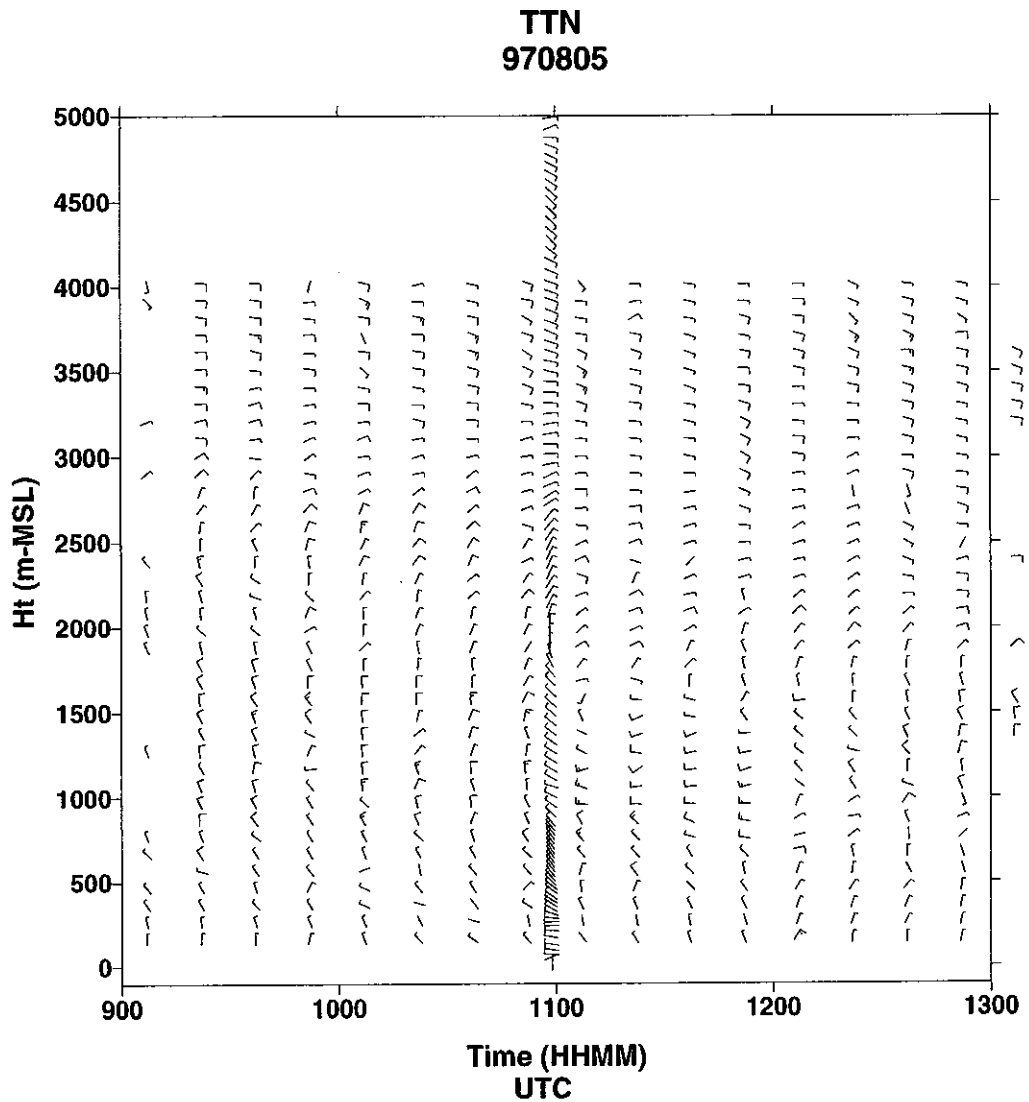


Fig 10 RWP/rawinsonde comparison. RWP are 15-min winds are plotted at the mid-point of the averaging period. Rawinsonde data are plotted at the time of the launch (UTC). August 5, 1997, Tustin, CA.

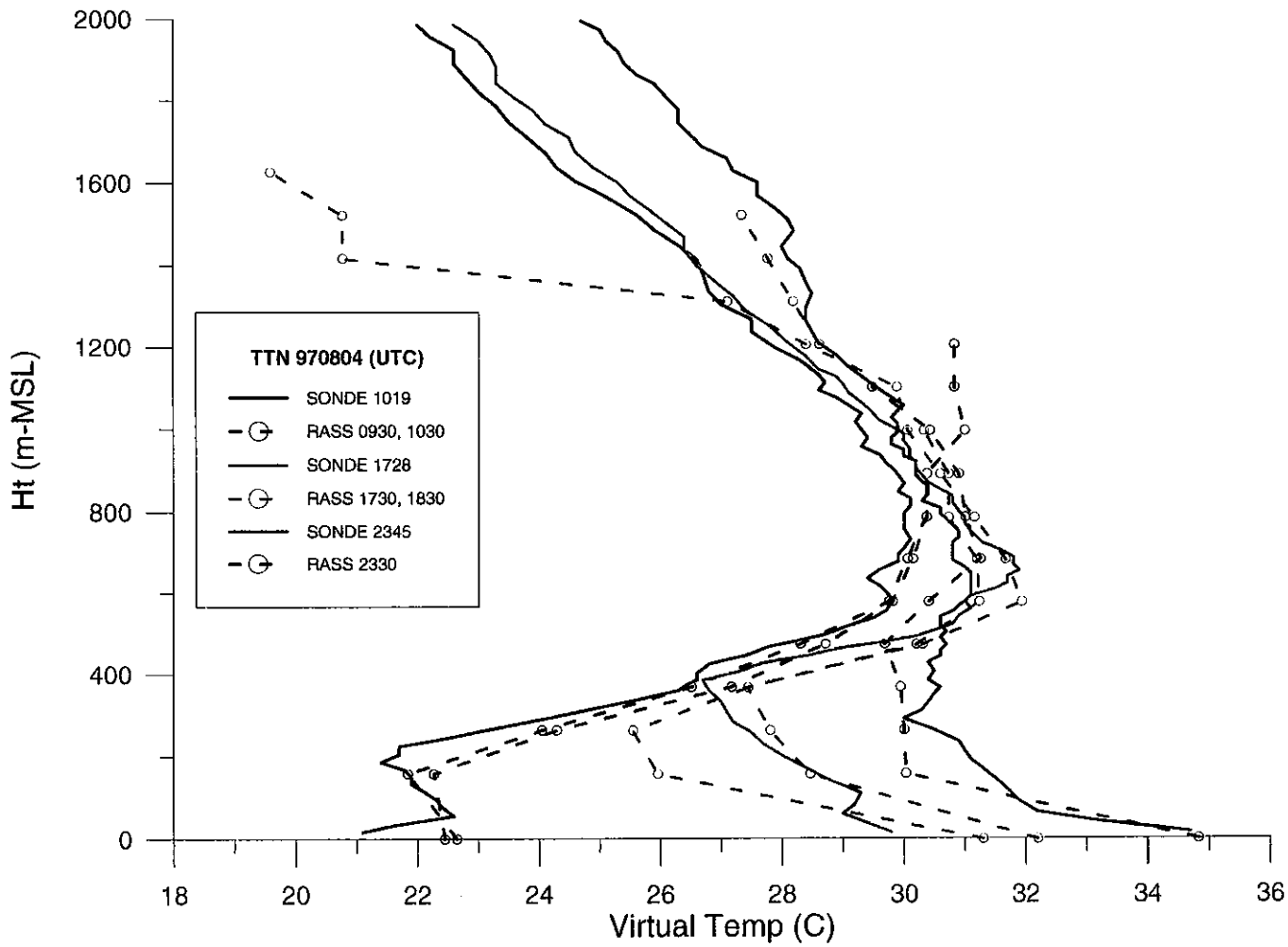


Fig. 11 a: RASS/rawinsonde virtual temperature comparisons. RASS data are a 5-min period just after the top of the hour. August 4, 1997, Tustin, CA.

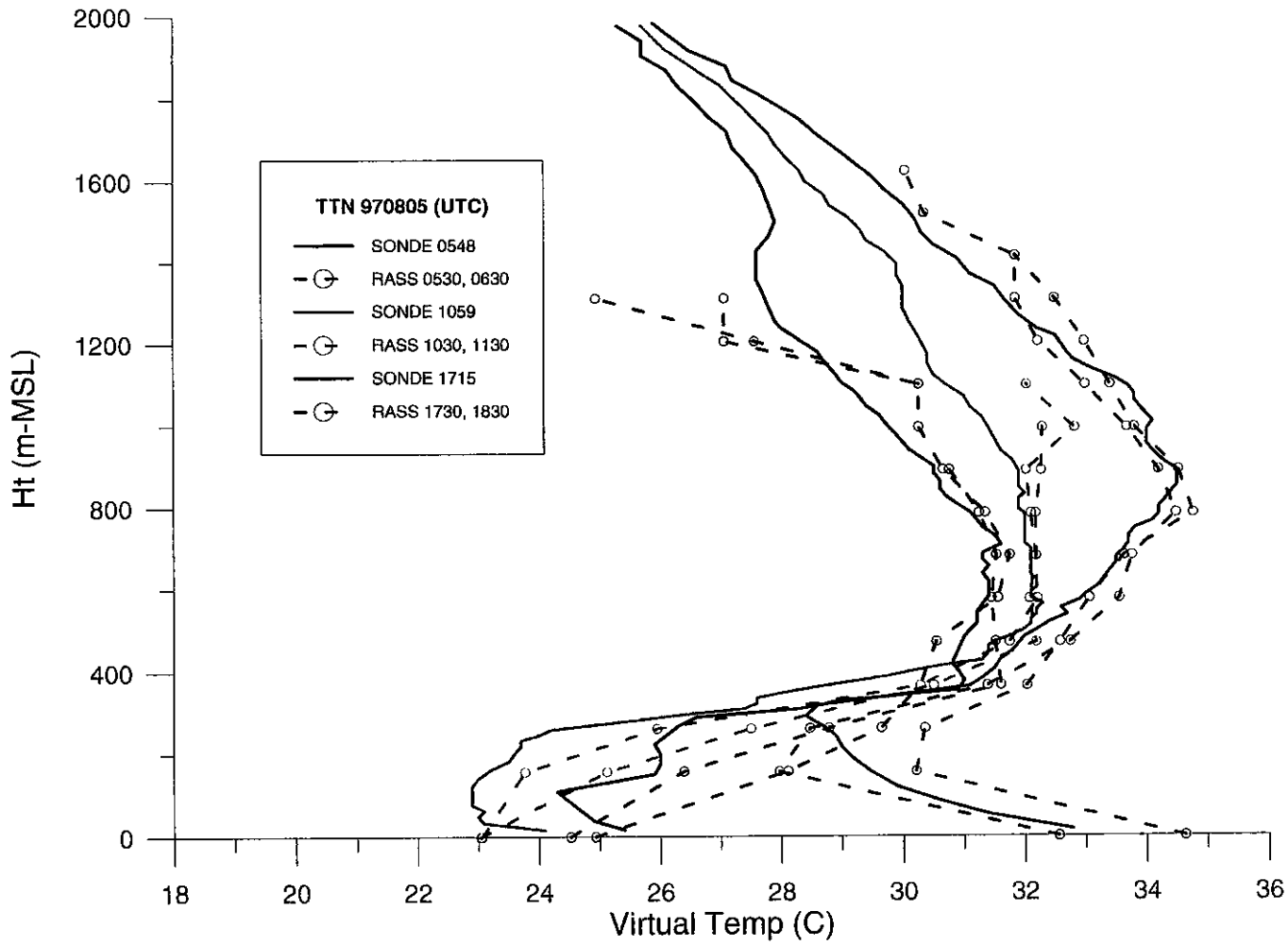


Fig. 11 b: RASS/rawinsonde virtual temperature comparisons. RASS data are a 5-min period just after the top of the hour. August 5, 1997, Tustin, CA.

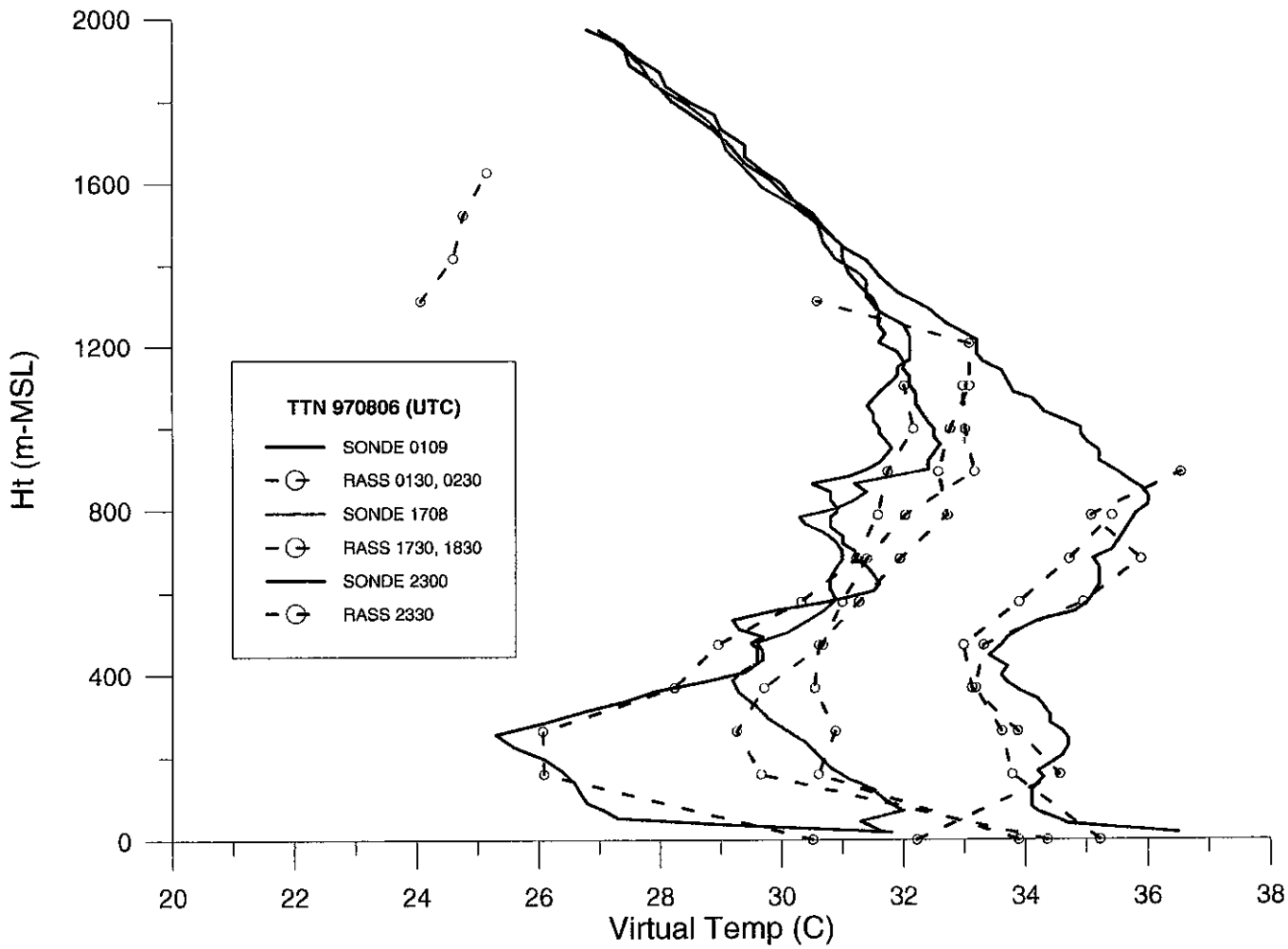


Fig. 11 c: RASS/rawinsonde virtual temperature comparisons. RASS data are a 5-min period just after the top of the hour. August 6, 1997, Tustin, CA.

Table IIa RWP/RASS Organizations (SCOS97-NARSTO)

ORGANIZATION (TIME)	RWP/RASS
NOAA	APE, BFD, CBD, ECO*, GLA, LAS, PDE, PHE, SCE, SCL, TTN, USC, VNS
STI	BTW, HPA, RSD, TCL, TML
ARB	EMT, NTN
SDAPCD	PLM, VLC
SCAQMD	LAX, ONT
VCAPCD	SMI
USAF	VAFB*

*449 MHz (All other sites 915 MHz)

Table IIb RWP/RASS Time stamps/offsets to UTC

ORGANIZATION	TIME OFFSET to UTC Recorded in POP data files
NOAA (UTC)	All sites 0 hrs
STI (PST)	BTW set to 8 hrs 15 Jun-7 Aug Changed to 0 hrs after 7 Aug All other sites 8 hrs
ARB (PST)	All sites 0 hrs
SDAPCD (PST)	PLM 7 hrs, VLC 0 hrs

SCAQMD	(PST)	All sites 8 hrs
VCAPCD	(PST)	All sites 0 hrs
USAF	(UTC)	All sites 0 hr

Table IIc. Audits Summary (RWP parameter changes)

Site Id	Audit Date	Date Corrected	RWP antenna level	RWP antenna orientation
RSD	6/17/97	8/17/97		
HPA	6/18/97	6/18/97		-5.0°
TML	6/19/97	6/19/97		
NTN	6/20/97		0.9°	
TCL	6/21/97			
SMI	6/23/97			
PHE	6/30/97	6/30/97		
PDE	7/1/97	7/1/97		5.0°
USC	7/2/97	7/2/97		19.0°
SCE	7/3/97	7/3/97		3.0°
VNS	7/10/97	7/10/97		6.0°
LAX	7/11/97	7/11/97		-2.0°
SCL	7/11/97	7/11/97		-4.0°
SCA	7/12/97	7/12/97		
LAS	7/16/97	7/16/97		
PLM	7/17/97	7/19/97		-7.0°
VLC	7/19/97			-3.0°
BFD	7/21/97		0.5°, 0.9°	
APE	7/23/97		-0.7°, -1.2°	4.0°, 3.0°
TTN	7/24/97		0.5°, 0.5°	0.0°, -2.0°
CBD	7/25-27/97	7/26/97		0.0°, 3.0°
EMT	7/28/97			-5.0°
ONT	11/21/97			-1.0°
ECO	No audit			
VAFB	No audit			

TABLE IId. Alpine RWP/RASS Operation Parameters (POP 4.13)

Parameter	WIND Mode 1/ Mode 2	RASS
IPP (ns)	25000/50000	25000
PW (ns)	400/700	700
PULSE CODE	0/4	0
No. of Heights	38/38	15
DELAY (ns)	1800/2000	2100
GATE SPACING (ns)	400/700	700
COH	320/160	8
SPECTRAL AVERAGES	100/100	25
FFT	64/64	2048
DWELL	57	24
FIRST GATE (km AGL)	.14/.14	.16
LAST GATE (km AGL)	2.28/3.89	1.63
IPP (km AGL)	3.41	3.45
NYQUIST VELOCITY	+/-10.2 ms^{-1}	+/-10.0 ms^{-1} (atmospheric) 10-40°C (acoustic)
SPECTRAL RESOLUTION	.32 ms^{-1}	.4 ms^{-1} (atmospheric) .6°C (acoustic)
SPECIAL SETTINGS	ICRA MODE	% min sampling
CONSENSUS PERIOD	60 min	60 min

IPP = Inter Pulse Period, PW = Pulse Width, COH = Coherent Integration or Time Domain Averaging,
FFT = No. of Fast Fourier Transform points, Pulse Code 0 = off, IPP (km AGL) = maximum (un-aliased) height.

Beam sampling sequence S-E-V (mode 1) S-E-V (mode 2)
S = south pointed beam, E = east pointed beam, V = vertically pointed beam

For more information on radar terminology see:
Introduction to Radar Systems, Skolnik, M.L. McGraw-Hill, 1980.

TABLE IIIa		SURFACE		SCOS97
ORGANIZATION	SITE	LATITUDE	LONGITUDE	ELEVATION (m)
ARB	emt (El Monte)	34.09N	118.03W	95+
	ntn (Norton)	34.09N	117.26W	328, 320
NOAA	ape (Alpine)	32.86N	116.81W	473
	azs (Azusa)	34.16N	117.90W	240, 232
	bfd (Brown Field)	32.57N	116.99W	161, 160
	cbd (Carlsbad)	33.14N	117.27W	120, 111.5
	eco (El Centro)	32.83N	115.57W	-11
	gla (Goleta)	34.43N	119.85W	4+
	las (Los Alamitos)	33.79N	118.05W	17, 9
	pde (Palmdale)	34.61N	118.09W	787, 779
	phe (Port Hueneme	34.17N	119.22W	12, 4
	sca (Santa Clarita)	34.43N	118.54W	364, 356
	sce (San Clemente Island)	33.02N	118.59W	63, 55
	scl (Santa Catalina Island)	33.45N	118.48W	47, 39
	ttn (Tustin)	33.71N	117.84W	26, 17.5, 19
	usc (Central Los Angeles)	34.02N	118.28W	77, 85, 69
	vns (Van Nays)	34.22N	118.49W	251,243
SCAQMD	ont (Ontario)	34.06N	117.58W	290
STI	btw (Barstow)	34.92N	117.31W	694+
	hpa (Hesperia)	34.39N	117.40W	985
	rsd (Riverside)	33.92N	117.31W	498
	tcl (Temecula)	33.5N	117.16W	245, 237
	tml Thermal)	33.64N	116.16W	-26

TABLE IIIb			SODAR	SCOS97
SITE NAME	LATITUDE	LONGITUDE	FILE NAME	ELEVATION
azs (Azusa)	34.16N	117.9W	azs.sdr	232
			c97jjjhh.sod	
eaf (29 Palms)			mmdddopp.dat	
las (Las Alamitos)	33.79	118.05	las.sdr	7
			las97jjj.hhs	
sca (Santa Clarita)	34.42N	118.53W	sca.sdr	354
			c97jjjhh.sod	
tur (29 Palms)			mmdddopp.dat	
			mmddws.dat	
wsp (Warner Springs)	33.32N	116.69W	wsp.sdr	
			mmdddopp.dat	

TABLE IIIc.1		PROFILER		SCOS97
ORGANIZATION	SITE	LATITUDE	LONGITUDE	ELEVATION (m)
ARB	emt (El Monte)	34.09N	118.03W	95
	ntn (Norton)	34.09N	117.26W	318
NOAA	ape (Alpine)	32.86N	116.81W	463
	bfd (Brown Field)	32.57N	116.99W	158
	cbd (Carlsbad)	33.14N	117.27W	110
	eco (El Centro)	32.83N	115.57W	-18
	gla (Goleta)	34.43N	119.85W	4
	las (Los Alamitos)	33.79N	118.05W	7
	pde (Palmdale)	34.61N	118.09W	777
	phe (Port Hueneme	34.17N	119.22W	2
	sce (San Clemente Island)	33.02N	118.59W	53
	scl (Santa Catalina Island)	33.45N	118.48W	37
	ttn (Tustin)	33.71N	117.84W	16
	usc (Central Los Angeles)	34.02N	118.28W	67
	vns (Van Nays)	34.22N	118.49W	241
SCAQMD	lax (Los Angeles Airport)	33.94N	118.44W	47
	ont (Ontario)	34.06N	117.58W	280
SDAPCD	plm (Point Loma)	32.70N	117.25W	23
	vlc (Valley Center)	33.26N	117.04W	415
STI	btw (Barstow)	34.92N	117.31W	694
	hpa (Hesperia)	34.39N	117.40W	975
	rsd (Riverside)	33.92N	117.31W	488
	tcl (Temecula)	33.5N	117.16W	335
	tml (Thermal)	33.64N	116.16W	-36
USAF	vafb (Vandenburg AFB)	34.77N	120.53W	149
VCAPCD	smi (Simi Valley)	34.29N	118.80W	279

TABLE IIIc.2	PROFILER	SCOS97						
parameters for various steps in data processing/quality control of spectral moments								
	WI-0	WI-1	WII-0	WII-1	TI-0	TI-1	TII-0	TII-1
jin	0	1	0	1	0	1	0	1
jout	1	2	1	2	1	2	1	2
jwc	-1	0	1	-1	-1	-1	1	-1
ind	-3	-3	-3	-3	-3	-3	-3	-3
delt	3600	86400	3600	86400	3600	86400	3600	86400
jnoz	1	1	1	0	1	1	1	0
cmbp	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8
jrej	0	1	0	1	0	1	0	1
jsig(1)	0	1	0	1	0	1	0	1
jsig(2)	0	1	0	1	0	0	0	0
jsig(3)	0	1	0	1	0	1	0	1
trej(1)	0	0	0	0	0	0	0	0
trej(2)	24	24	24	24	24	24	24	24
hrej(1)	0	0	0	0	0	0	0	0
hrej(2)	10000	10000	10000	10000	10000	10000	10000	10000
srej(1,1)	-100	-30	-100	-30	-100	-30	-100	-30
srej(2,1)	100	10	100	10	100	10	100	10
srej(1,2)	-100	-8	-100	-8	-100	-8	-100	-8
srej(2,2)	100	8	100	8	100	8	100	8
srej(1,3)	-100	0	-100	0	-100	0	-100	0
srej(2,3)	100	2	100	2	100	2	100	2
jqc	1	1	1	1	1	1	1	1
qct	10	10	10	10	10	10	10	10
nminqc	8	8	8	8	8	8	8	8
dtqc	2.1	2.1	2.1	2.1	1.1	1.1	1.1	1.1
drqc	2.1	2.1	2.1	2.1	1.1	1.1	1.1	1.1
dvqc	1.2	1.2	1.2	1.2	1.3	1.2	1.3	1.2
alf	100	100	100	100	100	100	100	100
fcnqc	0.5	0.5	0.1	0	0.5	0.5	0.3	0

TABLE IIId		RAWINSONDE		SCOS97
SITE NAME	LATITUDE	LONGITUDE	FILE NAME	ELEVATION (m)
bkr (Bakersfield)	35.35N	118.97W	smmddhh.dat	99
btw (Barstow)	34.96N	117.30W	btwmddhh.dat	670
ce (Rice)	34.00N	117.36W	cemmddhh.dat	302
eco (Imperial Airport)	32.90N	115.52W	ecomddhh.dat	-39
edw (Edwards AFB)	34.9N	117.92W	97mmddhh.edw	723
hpa (Hesperia)	34.34N	117.34W	hpamddhh.dat	1128
mtx (Point Mugu)	34.11N	119.2W	97mmddhh.mtx	2
nid (China Lake)	35.75N	117.68W	97mmddhh.nid	665
nkx (San Diego)	32.8N	117.1W	sssss97m.mnn	134
nsi (San Nicolas Island)	33.28N	119.52W	97mmddhh.nsi	14
ntd (Point Mugu)	34.11N	119.2W	97mmddhh.ntd	2
ntk (Tustin)	33.7N	117.83W	97mmddhh.ntk	17
ntn (Norton AFB)	34.09N	117.27W	ntnmddhh.dat	311
nxp (29 Palms)	34.3N	116.15W	97mmddhh.nxp	611
nxx (Imperial Beach)	32.63N	117.13W	97mmddhh.nxx	2
nzj (El Toro)	33.68N	117.72W	97mmddhh.nzj	117
nzy (North Island)	32.71N	117.2W	97mmddhh.nzy	2
po (Pomona)	34.07N	117.75W	pommddhh.dat	274
rsd (Riverside)	33.93N	117.33W	rsdmddhh.dat	450
ship	32.3N	118.3W	ship_ua.a	
	37.3N	124.3W	ship_ua.b	
tml (Thermal)	33.64N	116.18W	tml92319.dat	-42
	33.18N	116.18W	tml92408.dat	-42
vafb (Vandenberg AFB)	34.7N	120.5W	1997mmmhhmmss.raw	100
wnx (Point Mugu)	34.11N	119.2W	97mmddhh.wnx	2
ww (Westwood)	34.06N	118.45W	wwmmddhh.dat	149

Appendix A: RWP Data Inventory

RWP data are provided in several different forms, each in a different "tar" file. Each "tar" file was created on a Unix computer as follows:

>tar cvf Dir.tar Dir

where *Dir* is one of the following data directories: *Met_0, Met_0c, Met_1, Met_1c* which may be recovered as follows:

>tar xvf Dir.tar

Each of these directories contains ASCII data files for winds and temperatures derived from RWP spectral moment binary data, which are provided in "tar" files *sss.popmom.tar* where *sss* indicates the station (Table IIIc.1). So-called consensus winds and temperatures are provided in the "tar" files *sss.popcns.tar*.

The data directories *Met_0* and *Met_0c* contain data derived using the processing WPI (Table IIIc.2). The data directory *Met_0* includes only RWP data. The data directory *Met_0c* includes RWP and surface met combined for all NOAA sites except El Centro. The directories *Met_1* and *Met_1c* contain data derived using the processing WPII (Table IIIc.2). The data directory *Met_1* includes only RWP data. The data directory *Met_1c* includes RWP and surface met combined for all NOAA sites except El Centro.

RWP wind and virtual temperature estimates are provided in ASCII daily files. The file name convention is:

sss97jjj.miw (wind)
sss97jjj.mit (temperature)

where *sss* is the site abbreviation (e.g., *ape, bfd, cbd*) and where *jjj* is the Julian day (e.g., 192). Data for an entire day is contained in each of these files.

Daily files for all days are listed below with site abbreviated names (Table IIIc.1) in alphabetical order. This list applies to all four data directories *Met_0, Met_0c, Met_1, Met_1c*. Hence, care must be used not to mix the data files from these different directories because there is no indication in the file names to distinguish the different data contained therein.

ape97163.mit ape97186.mit ape97209.mit ape97232.mit ape97255.mit ape97278.mit
ape97163.miw ape97186.miw ape97209.miw ape97232.miw ape97255.miw ape97278.miw
ape97164.mit ape97187.mit ape97210.mit ape97233.mit ape97256.mit ape97279.mit
ape97164.miw ape97187.miw ape97210.miw ape97233.miw ape97256.miw ape97279.miw
ape97165.mit ape97188.mit ape97211.mit ape97234.mit ape97257.mit ape97280.mit
ape97165.miw ape97188.miw ape97211.miw ape97234.miw ape97257.miw ape97280.miw
ape97166.mit ape97189.mit ape97212.mit ape97235.mit ape97258.mit ape97281.mit
ape97166.miw ape97189.miw ape97212.miw ape97235.miw ape97258.miw ape97281.miw
ape97167.mit ape97190.mit ape97213.mit ape97236.mit ape97259.mit ape97282.mit
ape97167.miw ape97190.miw ape97213.miw ape97236.miw ape97259.miw ape97282.miw
ape97168.mit ape97191.mit ape97214.mit ape97237.mit ape97260.mit ape97283.mit
ape97168.miw ape97191.miw ape97214.miw ape97237.miw ape97260.miw ape97283.miw
ape97169.mit ape97192.mit ape97215.mit ape97238.mit ape97261.mit ape97284.mit
ape97169.miw ape97192.miw ape97215.miw ape97238.miw ape97261.miw ape97284.miw
ape97170.mit ape97193.mit ape97216.mit ape97239.mit ape97262.mit ape97285.mit
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vafb97175.mit vafb97193.mit vafb97215.mit vafb97236.miw vafb97257.mit
vafb97175.miw vafb97193.miw vafb97215.miw vafb97237.mit vafb97257.miw
vafb97176.mit vafb97194.mit vafb97217.mit vafb97237.miw vafb97258.mit
vafb97176.miw vafb97194.miw vafb97217.miw vafb97238.mit vafb97259.mit
vafb97177.mit vafb97195.mit vafb97218.mit vafb97238.miw vafb97259.miw
vafb97177.miw vafb97195.miw vafb97218.miw vafb97239.mit vafb97260.mit
vafb97178.mit vafb97196.mit vafb97219.mit vafb97239.miw vafb97260.miw
vafb97178.miw vafb97196.miw vafb97219.miw vafb97240.mit vafb97261.miw
vafb97179.mit vafb97197.mit vafb97220.mit vafb97240.miw vafb97262.mit
vafb97179.miw vafb97197.miw vafb97220.miw vafb97241.mit vafb97262.miw
vafb97180.mit vafb97198.mit vafb97221.mit vafb97241.miw vafb97263.mit
vafb97180.miw vafb97198.miw vafb97221.miw vafb97242.mit vafb97263.miw
vafb97181.mit vafb97199.mit vafb97222.mit vafb97242.miw vafb97264.mit
vafb97181.miw vafb97199.miw vafb97222.miw vafb97243.mit vafb97264.miw
vafb97182.mit vafb97200.mit vafb97223.mit vafb97243.miw vafb97265.mit
vafb97182.miw vafb97200.miw vafb97223.miw vafb97245.mit vafb97266.mit
vafb97183.mit vafb97201.mit vafb97224.mit vafb97246.mit vafb97266.miw
vafb97183.miw vafb97201.miw vafb97224.miw vafb97246.miw vafb97267.mit
vafb97184.mit vafb97202.mit vafb97225.mit vafb97247.mit vafb97267.miw
vafb97184.miw vafb97202.miw vafb97225.miw vafb97247.miw vafb97268.mit
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vafb97187.mit vafb97205.mit vafb97229.miw vafb97250.mit

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vlc97177.miw vlc97195.miw vlc97213.miw vlc97236.miw vlc97254.miw vlc97272.miw
vlc97178.mit vlc97196.mit vlc97214.mit vlc97237.mit vlc97255.mit vlc97273.mit
vlc97178.miw vlc97196.miw vlc97214.miw vlc97237.miw vlc97255.miw vlc97273.miw
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vlc97180.miw vlc97198.miw vlc97216.miw vlc97239.miw vlc97257.miw vlc97275.miw
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vlc97181.miw vlc97199.miw vlc97217.miw vlc97240.miw vlc97258.miw vlc97276.miw
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vlc97184.mit vlc97202.mit vlc97225.mit vlc97243.mit vlc97261.mit vlc97279.mit
vlc97184.miw vlc97202.miw vlc97225.miw vlc97243.miw vlc97261.miw vlc97279.miw
vlc97185.mit vlc97203.mit vlc97226.mit vlc97244.mit vlc97262.mit vlc97280.mit
vlc97185.miw vlc97203.miw vlc97226.miw vlc97244.miw vlc97262.miw vlc97280.miw
vlc97186.mit vlc97204.mit vlc97227.mit vlc97245.mit vlc97263.mit vlc97281.mit
vlc97186.miw vlc97204.miw vlc97227.miw vlc97245.miw vlc97263.miw vlc97281.miw
vlc97187.mit vlc97205.mit vlc97228.mit vlc97246.mit vlc97264.mit vlc97282.mit
vlc97187.miw vlc97205.miw vlc97228.miw vlc97246.miw vlc97264.miw vlc97282.miw
vlc97188.mit vlc97206.mit vlc97229.mit vlc97247.mit vlc97265.mit vlc97283.mit
vlc97188.miw vlc97206.miw vlc97229.miw vlc97247.miw vlc97265.miw vlc97283.miw
vlc97189.mit vlc97207.mit vlc97230.mit vlc97248.mit vlc97266.mit vlc97284.mit
vlc97189.miw vlc97207.miw vlc97230.miw vlc97248.miw vlc97266.miw vlc97284.miw
vlc97190.mit vlc97208.mit vlc97231.mit vlc97249.mit vlc97267.mit vlc97285.mit
vlc97190.miw vlc97208.miw vlc97231.miw vlc97249.miw vlc97267.miw vlc97285.miw
vlc97191.mit vlc97209.mit vlc97232.mit vlc97250.mit vlc97268.mit vlc97286.mit
vlc97191.miw vlc97209.miw vlc97232.miw vlc97250.miw vlc97268.miw vlc97286.miw
vlc97192.mit vlc97210.mit vlc97233.mit vlc97251.mit vlc97269.mit vlc97287.mit
vlc97192.miw vlc97210.miw vlc97233.miw vlc97251.miw vlc97269.miw vlc97287.miw
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vlc97193.miw vlc97211.miw vlc97234.miw vlc97252.miw vlc97270.miw vlc97288.miw
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vlc97194.miw vlc97212.miw vlc97235.miw vlc97253.miw vlc97271.miw vlc97289.miw

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vns97166.miw vns97189.mit vns97211.miw vns97234.mit vns97256.miw vns97282.mit
vns97167.mit vns97189.miw vns97212.mit vns97234.miw vns97257.mit vns97282.miw
vns97167.miw vns97190.mit vns97212.miw vns97235.mit vns97257.miw vns97283.mit
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vns97174.mit vns97196.miw vns97219.mit vns97241.miw vns97264.mit vns97289.miw
vns97174.miw vns97197.mit vns97219.miw vns97242.mit vns97264.miw vns97290.mit
vns97175.mit vns97197.miw vns97220.mit vns97242.miw vns97265.mit vns97290.miw
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vns97176.miw vns97199.mit vns97221.miw vns97244.mit vns97266.miw vns97292.mit
vns97177.mit vns97199.miw vns97222.mit vns97244.miw vns97267.mit vns97292.miw
vns97177.miw vns97200.mit vns97222.miw vns97245.mit vns97267.miw vns97293.mit
vns97178.mit vns97200.miw vns97223.mit vns97245.miw vns97268.mit vns97293.miw
vns97178.miw vns97201.mit vns97223.miw vns97246.mit vns97268.miw vns97294.mit
vns97179.mit vns97201.miw vns97224.mit vns97246.miw vns97269.mit vns97294.miw
vns97179.miw vns97202.mit vns97224.miw vns97247.mit vns97269.miw vns97295.mit
vns97180.mit vns97202.miw vns97225.mit vns97247.miw vns97270.mit vns97295.miw
vns97180.miw vns97203.mit vns97225.miw vns97248.mit vns97270.miw vns97296.mit
vns97181.mit vns97203.miw vns97226.mit vns97248.miw vns97271.mit vns97296.miw
vns97181.miw vns97204.mit vns97226.miw vns97249.mit vns97271.miw vns97297.mit
vns97182.mit vns97204.miw vns97227.mit vns97249.miw vns97275.mit vns97297.miw
vns97182.miw vns97205.mit vns97227.miw vns97250.mit vns97275.miw vns97298.mit
vns97183.mit vns97205.miw vns97228.mit vns97250.miw vns97276.mit vns97298.miw
vns97183.miw vns97206.mit vns97228.miw vns97251.mit vns97276.miw vns97299.mit
vns97184.mit vns97206.miw vns97229.mit vns97251.miw vns97277.mit vns97299.miw
vns97184.miw vns97207.mit vns97229.miw vns97252.mit vns97277.miw vns97300.mit
vns97185.mit vns97207.miw vns97230.mit vns97252.miw vns97278.mit vns97300.miw
vns97185.miw vns97208.mit vns97230.miw vns97253.mit vns97278.miw vns97301.mit
vns97186.mit vns97208.miw vns97231.mit vns97253.miw vns97279.mit vns97301.miw
vns97186.miw vns97209.mit vns97231.miw vns97254.mit vns97279.miw vns97302.mit
vns97187.mit vns97209.miw vns97232.mit vns97254.miw vns97280.mit vns97302.miw

Appendix A1: RWP Wind

All processed RWP wind data are provided in daily ASCII data files with the name convention: *sss97jjj.miw*
where *sss* is the 3-letter abbreviation for the station name (Table IIIc.1) and where *jjj* is the Julian day. All of these data files end with the extension *miw*.

These data files are found the four data directories, Met_0, Met_1, Met_0c, and Met_1c. The data files in Met_0 and Met_1 contain RWP data only. The data files in Met_0c and Metr_1c include surface met with the RWP data, but not for all RWP stations. There was insufficient time to reformat all data. All NOAA stations, except El Centro, have RWP data and surface data combined. The data directories Met_0 and Met_0c contain wind data processed in scenario WPI, while the data directories Met_1 and Met_1c contain wind data processed in scenario WPII (Table IIIc.2).

The file begins with wind data for the first hour of the day, with wind data for subsequent hours following in chronological order. Below is an excerpt from the wind data file *bfd97240.miw* for the Brown Field site on 28 August (Stella's birthday). These data are from data directory Met_1c.

```
bfd
 32.57 -116.99    158
  97    8   28    0   30    0
 1440  400   39
   M-AGL   SPD DIR  U   V
   0  3.40 269.00  3.40   .06 999.00 999.00 999.00   .00
 152  3.16 300.00  2.74 -1.58   .00  3.23  10.00 333.00
 210  2.90 305.99  2.35 -1.71  -.02  6.00  10.00  20.00
 268  2.91 306.49  2.34 -1.73   .01  6.20  10.00  20.00
 326  3.32 319.74  2.14 -2.53   .05  6.39  10.00  20.00
 384  2.95 329.85  1.48 -2.55   .06  5.68  10.00  20.00
 442  3.01 330.56  1.48 -2.62   .00  5.09  10.00  10.00
 500  4.07 342.95  1.19 -3.89  -.09  5.69  10.00    .00
 558  3.20 339.13  1.14 -2.99  -.10  5.82    .00    .00
 616  2.93 333.67  1.30 -2.63  -.19  7.21    .00    .00
 674  3.44 329.26  1.76 -2.96   .09  7.03    .00    .00
 732  2.78 329.83  1.40 -2.41   .15  5.21    .00    .00
 790  2.93 344.59   .78 -2.82   .20  5.19    .00    .00
 848  2.33 333.17  1.05 -2.08   .10  4.90    .00    .00
 906  2.31 326.56  1.27 -1.93   .17  4.42    .00    .00
 964  2.82 322.63  1.71 -2.24   .27  4.49    .00    .00
1022  3.85 314.85  2.73 -2.72  -.11  4.98    .00    .00
1080  2.03 297.17  1.80  -.93  -.13  5.01    .00    .00
1138  2.47 289.71  2.32  -.83  -.20  5.04    .00    .00
```

1196	2.84	305.34	2.31	-1.64	-.25	4.45	.00	.00
1254	2.06	274.25	2.05	-.15	-.22	4.60	.00	.00
1312	2.26	283.75	2.20	-.54	-.32	3.69	.00	.00
1370	2.94	283.55	2.85	-.69	-.16	4.34	.00	.00
1428	2.93	273.94	2.92	-.20	-.14	4.63	2.00	.00
1486	3.18	277.86	3.15	-.43	-.44	3.54	2.00	.00
1544	3.73	276.07	3.70	-.39	-.41	3.58	4.00	.00
1602	3.51	258.37	3.44	.71	-.60	4.44	3.00	.00
1660	3.36	269.06	3.36	.06	-.81	5.00	3.00	.00
1718	3.61	264.75	3.59	.33	-.88	3.91	3.00	.00
1776	4.69	242.59	4.17	2.16	-.88	4.14	3.00	.00
1834	4.06	244.38	3.66	1.75	-.86	4.31	5.00	.00
1892	7.59	227.44	5.59	5.13	-.86	4.86	5.00	.00
1950	8.03	221.06	5.27	6.05	-.83	3.48	4.00	.00
2008	6.59	218.92	4.14	5.13	-.84	5.10	3.00	1.00
2066	7.57	211.07	3.91	6.48	-.49	4.56	1.00	1.00
2124	7.16	198.24	2.24	6.80	-.68	3.69	1.00	2.00
2182	6.70	198.47	2.12	6.35	-.33	4.42	2.00	2.00
2240	6.59	190.40	1.19	6.48	-.14	4.20	3.00	1.00
2298	6.07	193.09	1.37	5.91	-.29	3.92	4.00	1.00

$

The explanation for each line of this data files is provided next.

Line 0: "blank"

Line 1: Profiler station location supplied by the data provider, which may be an abreviated name and/or a complete name, e.g., city and state.

Line 2: Profiler radar site latitude (degrees North), longitude (degrees West), and elevation (mean sea level).

Line 3: Year, month, day, hour, minutes, seconds (UTC) of the data. Generally, the first set of data will be at 00:30:00 (UTC) and the last set of data will be at 23:30:00 (UTC).

Line 4: The third number gives the number of sample heights in this profile.

Line 5: Header information

Lines 6 to (5+nh): Data

Altitude (meters above ground level), wind speed (m/s), wind direction (degrees clockwise fromm True North), East wind component (m/s), North wind component (m/s), vertical wind component (m/s), uncertainty in wind (m/s), quality index for wind, quality index for vertical wind component.

Line 6+nh: "$"

When surface wind speed and direction from the surface met observations are included with RWP observations, the first level is reported at 0 meters. The actual elevation of the surface met station should be the level of the met tower (Table IIIa).

The uncertainty in the wind (m/s) is the root-mean-square (rms) uncertainty due to contributions from all antenna beams, including both radar instrument measurement errors and meteorological noise. Meteorological noise is caused by natural variability in the atmosphere within the radar backscattering pulse volume (hundreds to thousands of cubic meters), across the different antenna beams which observe different regions of the atmosphere (separated by up to a few kilometers), and over the time period of data collection (1 hour). Larger uncertainties may indicate unreliable wind measurements, but they may also merely indicate large temporal variability in the winds over the averaging interval of an hour.

The quality indices are explained in Section IIIc in the main body of the report. Data with quality indicators of 10 or less exhibit acceptable temporal and spatial consistency. Data with larger quality indicators exhibit less consistency and may suspect. On the other hand, temporal and spatial consistency are not in themselves sufficient to ensure accurate measurements of atmospheric winds. A combination of large uncertainty and large quality indicator generally indicates an unreliable wind.

The flag value 999 indicates that measurements were either unavailable or meaningless.

Appendix A2: RWP/RASS Temperature

All processed RWP/RASS temperature data are provided in daily ASCII data files with the name convention: *sss97jjj.mit*
where *sss* is the 3-letter abbreviation for the station name (Table IIIc.1) and where *jjj* is the Julian day. All of these data files end with the extension *mit*.

These data files are found the four data directories, Met_0, Met_1, Met_0c, and Met_1c. The data files in Met_0 and Met_1 contain RWP data only. The data files in Met_0c and Metr_1c include surface met with the RWP data, but not for all RWP stations. There was insufficient time to reformat all data. All NOAA stations, except El Centro, have RWP data and surface data combined. The data directories Met_0 and Met_0c contain temperature data processed in scenario WPI, while the data directories Met_1 and Met_1c contain temperature data processed in scenario WPII (Table IIIc.2).

The file begins with temperature data for the first hour of the day, with temperature data for subsequent hours following in chronological order. Below is an excerpt from the temperature data file *bfd97240.mit* for the Brown Field station on 28 Auguast (Stella's birthday). These data are from data directory Met_1c.

```
bfd
 32.57 -116.99    158
  97    8   28    0   30    0
 1440  700   16
   M-AGL    T    W
   0  28.76 999.00 999.00 999.00    .00 999.00
  158  24.68    .00   2.33   2.25    .00  10.00
  263  24.48    .00   2.31   2.10   2.00  10.00
  368  25.35    .00   1.54   2.17    .00    .00
  473  26.52    .00   1.76   2.50    .00    .00
  578  27.66    .00   1.52   2.50    .00    .00
  683  27.57    .00   1.01   1.93  10.00    .00
  788  28.13    .00   1.19   1.57 303.00    .00
  893  28.72    .00   1.13   1.69 303.00    .00
  998  30.20    .00    .61   1.91 303.00    .00
 1103  30.37    .00    .72   1.65 303.00  10.00
 1208  30.94    .00    .81    .70 303.00  10.00
 1313  31.39    .00   2.05    .00 303.00 333.00
 1418  39.21    .00    .00    .00 303.00 333.00
 1523  22.54    .00    .00    .00 303.00 333.00
 1628  16.53    .00    .00    .00 303.00 333.00
$
```

The explanation for each line of this data files is provided next.

Line 0: "blank"

Line 1: Profiler station location supplied by the data provider, which may be an abreviated name and/or a complete name, e.g., city and state.

Line 2: Profiler radar site latitude (degrees North), longitude (degrees West), and elevation (mean sea level).

Line 3: Year, month, day, hour, minutes, seconds (UTC) of the data. Generally, the first set of data will be at 00:30:00 (UTC) and the last set of data will be at 23:30:00 (UTC).

Line 4: The third number gives the number of sample heights in this profile.

Line 5: Header information

Lines 6 to (5+nh): Data

Altitude (meters above ground level), virtual temperature (degrees C), vertical wind component (m/s), uncertainty in virtual temperature (degrees C), uncertainty in vertical wind component (m/s), quality of temperature, quality of vertical wind component.

Line 6+nh: "$"

When surface temperature from the surface met observations are included with RWP observations, the first level is reported at 0 meters. The actual elevation of the surface met station should be the level of the met tower (Table IIIa). The temperatures from the surface meet are converted to the virtual temperatures presented here.

NOTE: The vertical velocities are reported as 0 in the temperature data files in data directories Met_1 and Met_1c. The actual vertical velocity estimates are reported in the temperature data files in data directories Met_0 and Met_0c.

The uncertainty in the temperature (degrees C) is the root-mean-square (rms) uncertainty, including the uncertainty in the vertical velocity measurement when the temperature is corrected for vertical motion. The uncertainty includes both radar instrument measurement errors and meteorological noise. Meteorological noise is caused by natural variability in the atmosphere within the radar backscattering pulse volume (hundreds to thousands of cubic meters), across the different antenna beams which observe different regions of the atmosphere (separated by up to a few kilometers), and over the time period of data collection (1 hour). Larger uncertainties may indicate unreliable wind measurements, but they may also merely indicate large temporal variability in the temperatures over the averaging interval of an hour.

The quality indices are explained in Section IIIc in the main body of the report. Data with quality indicators of 10 or less exhibit acceptable temporal and spatial consistency. Data with larger quality indicators exhibit less consistency and may suspect. On the other hand, temporal and spatial consistency are not in themselves sufficient to ensure accurate measurements of atmospheric temperature. A combination of large uncertainty and large quality indicator generally indicates an unreliable temperature.

The flag value 999 indicates that measurements were either unavailable or meaningless.

Appendix A3: RWP Operations Changes

Data providers did not follow uniform operating procedures. Different time conventions were used at different sites, and the POP time offset convention was not followed. Also, radar operations were altered during the coarse of the study without notification or approval. Thus operation parameters supplied by the data providers at the beginning of the study became useless and data had to be re-processed. This involved developing programs to detect the changes and then to automatically adjust the processing accordingly, wherever possible. Site information (Table IIIc.1) had to be corrected earlier. In addition, recorded data times had to be corrected (Table IIb). Simi Valley, El Monte, Norton, Valley Center, and Barstow (on/after Julian day 243) had to be corrected +8 hours to UTC. Before Julian day 243, Barstow required no time correction. Point Loma required correction of +1 hour to UTC. All other sites appeared to be on UTC.

Every detected change in an operational parameter is listed here. Operational changes can be any number of things with any number of affects. A change may be as simple as changing the number of range gates to changing an antenna pointing angle or the sampling sequence. The possible combinations are too numerous to list or describe. This listing is in alphabetical order by site abbreviation. NOTE: There are inconsistencies in the site names (due to entries by operators during radar setup) compared with the abbreviations used throughout this report (Table IIIc). (That is, *platteville* is *eco*, *el monte airport* is *emt*, *hesperia* is *hpa*, *california air resources 2* is *ntn*, *ptl*, *san diego* is *plm*, *riverside* is *rsd*, *test parameter set* is *rsd*, *simi valley upper air* is *smi*, *temecula* is *tcl*, *tamu* and *thermal* are *tml*, *vandenberg* is *vafb*, and *vlc*, *valley center* is *vlc*.)

For the most part changes made in conjunction with the initial setup and fine tuning of the RWP/RASS at the beginning of the study should not affect the overall data processing. It is the changes later on in the study that can potentially have the greatest impact. The length of the list and resources didn't permit NOAA to identify the impact of each change. Therefore, this list is provided to users as a reference when analyzing the data and a question arises. Users should be aware that changes may only affect one day, especially since the processing is done on 24 hr blocks, or it could affect all data after the date of the change.

The following list is in alphabetical order for the site abbreviations (Table 3.a). Note that several changes were made at numerous sites. Each change in operating parameters generates 5 output lines. The first line identifies the site. The next two lines are the beam information and times before and after the change (Beam no, Beam tilt, Beam azimuth, year, Julian day, hr, min, sec). These are followed by two lines with the operating parameters before and after the change. The parameters are: radar transmitter inter-pulse period in microseconds, transmitter pulse-width in nanoseconds, height above ground level (m) to first range gate, range gate interval (m), number of range gates, number of time samples used in the time domain integration, number of Doppler spectra averaged, and number of points per spectrum.

Changes in the clock used on the RWP system are not identified in this list.

```
ape                                    3286 -11680   463 91500
   0   75  173   97  164    3    5   28
   0   75  173   97  164    3   16   48
  25  400  138   58   38  320  100   64
  25  400  138   58   38  320   25   64
ape                                    3286 -11680   463 91500
   1   75   84   97  164    3    6   35
   1   75   84   97  164    3   18   57
  25  400  138   58   38  320  100   64
  25  400  138   58   38  320   25   64
ape                                    3286 -11680   463 91500
   2   90    0 1997  164    0   30    0
   2   90    0 1997  164    3   30    0
  25  400  143   60   38  320  100   64
  25  400  143   60   38  320   25   64
ape                                    3286 -11680   463 91500
   3   75  173 1997  164    0   30    0
   3   75  173 1997  164    3   30    0
  50  700  138  101   38  160  100   64
  50  700  138  101   38  160   25   64
ape                                    3286 -11680   463 91500
   4   75   84 1997  164    0   30    0
   4   75   84 1997  164    3   30    0
  50  700  138  101   38  160  100   64
  50  700  138  101   38  160   25   64
ape                                    3286 -11680   463 91500
   5   90    0 1997  164    0   30    0
   5   90    0 1997  164    3   30    0
  50  700  143  105   38  160  100   64
  50  700  143  105   38  160   25   64
bfd                                    3257 -11699   158 91500
   0   75  285 1997  202    0   30    0
   0   75  284 1997  202   18   30    0
  25  400  152   58   38  320  100   64
  25  400  152   58   38  320  100   64
bfd                                    3257 -11699   158 91500
   1   75    7 1997  202    0   30    0
   1   75    5 1997  202   18   30    0
  25  400  152   58   38  320  100   64
  25  400  152   58   38  320  100   64
bfd                                    3257 -11699   158 91500
   3   75  285 1997  202    0   30    0
   3   75  284 1997  202   18   30    0
  50  700  152  101   38  160  100   64
  50  700  152  101   38  160  100   64
bfd                                    3257 -11699   158 91500
   4   75    7 1997  202    0   30    0
   4   75    5 1997  202   19   30    0
  50  700  152  101   38  160  100   64
  50  700  152  101   38  160  100   64
btw (barstow, ca)                      3491 -11730   694 91500
   0   90  124   97  163   19    5   16
   0   90  124   97  163   19   52   39
  20  400  120   60   25  380   36   64
  20  400  135   60   25  380   36   64
btw (barstow, ca)                      3491 -11730   694 91500
   1   66  214   97  163   19    5   39
   1   66  214   97  163   19   53    2
  20  400  110   55   25  380   36   64
  20  400  123   55   25  380   36   64
btw (barstow, ca)                      3491 -11730   694 91500
   2   66  124   97  163   19    6    2
   2   66  124   97  163   19   53   24
  20  400  110   55   25  380   36   64
  20  400  123   55   25  380   36   64
```

```
btw (barstow, ca)                    3491 -11730    694 91500
   0    90   124  1997   163     0    30     0
   0    90   124  1997   163    18    30     0
  23   400   120    60    25   340    42    64
  20   400   120    60    25   380    36    64
btw (barstow, ca)                    3491 -11730    694 91500
   1    66   214  1997   163     0    30     0
   1    66   214  1997   163    18    30     0
  23   400   110    55    25   340    42    64
  20   400   110    55    25   380    36    64
btw (barstow, ca)                    3491 -11730    694 91500
   2    66   124  1997   163     0    30     0
   2    66   124  1997   163    18    30     0
  23   400   110    55    25   340    42    64
  20   400   110    55    25   380    36    64
btw (barstow, ca)                    3491 -11730    694 91500
   3    66   124  1997   163     0    30     0
   3    66   124  1997   163    18    30     0
  40   700   144    96    35   200    42    64
  40   700   254    96    35   200    34    64
btw (barstow, ca)                    3491 -11730    694 91500
   4    66   214  1997   163     0    30     0
   4    66   214  1997   163    18    30     0
  40   700   144    96    35   200    42    64
  40   700   254    96    35   200    34    64
btw (barstow, ca)                    3491 -11730    694 91500
   5    90   124  1997   163     0    30     0
   5    90   124  1997   163    18    30     0
  40   700   158   105    35   200    42    64
  40   700   278   105    35   200    34    64
btw (barstow, ca)                    3491 -11730    694 91500
   0    90   214  1997   182     0    30     0
   0    90   214  1997   182    23    30     0
  20   400   120    60    12    10    20  2048
  20   400   135    60    20    10    20  2048
btw (barstow, ca)                    3491 -11730    694 91500
   1    90   214  1997   182     0    30     0
   1    90   214  1997   182    23    30     0
  20   400   120    60    12    10    20  2048
  20   400   135    60    20    10    20  2048
btw (barstow, ca)                    3491 -11730    694 91500
   3    66   124    97   217    17     6    40
   3    66   124    97   217    17    10    30
  40   700   254    96    35   200    34    64
  40  1400   247    96    40   200    40    64
btw (barstow, ca)                    3491 -11730    694 91500
   4    66   214    97   217    17     7     8
   4    66   214    97   217    17    11     2
  40   700   254    96    35   200    34    64
  40  1400   247    96    40   200    40    64
btw (barstow, ca)                    3491 -11730    694 91500
   5    90   124    97   217    17     7    36
   5    90   124    97   217    17    11    35
  40   700   278   105    35   200    34    64
  40  1400   270   105    40   200    40    64
btw (barstow, ca)                    3491 -11730    694 91500
   3    66   124    97   217    22     6    39
   3    66   124    97   217    22    14    58
  40  1400   247    96    40   200    40    64
  40   700   254    96    35   200    34    64
btw (barstow, ca)                    3491 -11730    694 91500
   4    66   214    97   217    22     7    11
   4    66   214    97   217    22    15    25
  40  1400   247    96    40   200    40    64
  40   700   254    96    35   200    34    64
```

```
btw (barstow, ca)                    3491 -11730    694 91500
    5    90   124    97   217    22     7    44
    5    90   124    97   217    22    15    53
   40  1400   270   105    40   200    40    64
   40   700   278   105    35   200    34    64
btw (barstow, ca)                    3491 -11730    694 91500
    3    66   124  1997   219     0    30     0
    3    90   214  1997   219     1    30     0
   40   700   254    96    35   200    34    64
   40  2800   345   210    20   200    40    64
btw (barstow, ca)                    3491 -11730    694 91500
    4    66   214  1997   219     0    30     0
    4    90   124  1997   219     1    30     0
   40   700   254    96    35   200    34    64
   40  2800   345   210    20   200    40    64
btw (barstow, ca)                    3491 -11730    694 91500
    5    90   124  1997   219     0    30     0
    5    66   214  1997   219     1    30     0
   40   700   278   105    35   200    34    64
   40  2800   315   192    20   200    40    64
btw (barstow, ca)                    3491 -11730    694 91500
    0    90   124    97   220    18     5    22
    0    90   214    97   220    18    31    35
   20   400   135    60    25   380    36    64
   20   400   135    60    25   380    36    64
btw (barstow, ca)                    3491 -11730    694 91500
    3    90   214    97   220    18     6    45
    3    66    34    97   220    18    32    57
   40  2800   345   210    20   200    40    64
   20   400   123    55    25   380    36    64
btw (barstow, ca)                    3491 -11730    694 91500
    5    66   214    97   220    18     7    46
    5    66   304    97   220    18    33    53
   40  2800   315   192    20   200    40    64
   20   400   123    55    25   380    36    64
btw (barstow, ca)                    3491 -11730    694 91500
    1    66     0    97   234    13     5    53
    1    66   180    97   234    13    54    32
   23   400   110    55    25   340    42    64
   23   400   110    55    25   340    42    64
btw (barstow, ca)                    3491 -11730    694 91500
    3    66   270    97   234    13     6    55
    3    66   180    97   234    13    55    32
   43  2800   315   192    22   180    42    64
   43  2800   315   192    22   180    42    64
btw (barstow, ca)                    3491 -11730    694 91500
    5    90     0    97   234    13     7    57
    5    66    90    97   234    13    56    32
   43  2800   345   210    22   180    42    64
   23   400   110    55    25   340    42    64
cbd                                  3313 -11726    110 91500
    0    75   187    97   175    18    24    23
    0    75   187    97   175    18    32    29
   25   400   138    58    38   320   100    64
   25   400   138    58    38   320    25    64
cbd                                  3313 -11726    110 91500
    1    75    95    97   175    18    25    48
    1    75    95    97   175    18    34    29
   25   400   138    58    38   320   100    64
   25   400   138    58    38   320    25    64
cbd                                  3313 -11726    110 91500
    2    90     0    97   175    18    27    17
    2    90     0    97   175    18    34    48
   25   400   143    60    38   320   100    64
   25   400   143    60    38   320    25    64
```

```
cbd                                   3313 -11726   110 91500
    3    75   187    97   175    18    28    23
    3    75   187    97   175    18    35     7
   50   700   138   101    38   160   100    64
   50   700   138   101    38   160    25    64
cbd                                   3313 -11726   110 91500
    4    75    95    97   175    18    29    29
    4    75    95    97   175    18    35    26
   50   700   138   101    38   160   100    64
   50   700   138   101    38   160    25    64
cbd                                   3313 -11726   110 91500
    5    90     0    97   175    18    35    46
    5    90     0    97   175    18    50    13
   50   700   143   105    38   160    25    64
   50   700   143   105    38   160   100    64
cbd                                   3313 -11726   110 91500
    0    75   187    97   175    20     5    31
    0    75   187    97   175    20     8    26
   25   400   138    58    38   320   100    64
   25   400   138    58    38   320    25    64
cbd                                   3313 -11726   110 91500
    0    75   187    97   175    21     5    52
    0    75   187    97   175    21    10    47
   25   400   138    58    38   320    25    64
   25   400   138    58    38   320   100    64
cbd                                   3313 -11726   110 91500
    1    75    95    97   175    21     6    18
    1    75    95    97   175    21    11    54
   25   400   138    58    38   320    25    64
   25   400   138    58    38   320   100    64
cbd                                   3313 -11726   110 91500
    2    90     0    97   175    21     6    37
    2    90     0    97   175    21    13     0
   25   400   143    60    38   320    25    64
   25   400   143    60    38   320   100    64
cbd                                   3313 -11726   110 91500
    3    75   187    97   175    21     6    56
    3    75   187    97   175    21    14     6
   50   700   138   101    38   160    25    64
   50   700   138   101    38   160   100    64
cbd                                   3313 -11726   110 91500
    4    75    95    97   175    21     7    16
    4    75    95    97   175    21    15    12
   50   700   138   101    38   160    25    64
   50   700   138   101    38   160   100    64
cbd                                   3313 -11726   110 91500
    5    90     0    97   175    21     7    35
    5    90     0    97   175    21    16    18
   50   700   143   105    38   160    25    64
   50   700   143   105    38   160   100    64
cbd                                   3313 -11726   110 91500
    5    90     0  1997   175     0    30     0
    5    90     0  1997   175    18    30     0
   50   700   143   105    38   160   100    64
   50   700   143   105    38   160    25    64
cbd                                   3313 -11726   110 91500
    0    75   187    97   207     0     7    23
    0    75   185    97   207     0    18    53
   25   400   138    58    38   320   100    64
   25   400   138    58    38   320   100    64
platteville                           3283 -11557   -18 44900
    0    90   357  1997   274    16    30     0
    0    90   303  1997   274    18    30     0
   45  1200   150   150    24   284    32    64
   47   700   150    75    32   284    32    64
```

```
platteville                    3283 -11557    -18 44900
    1    75   357  1997   274    16    30     0
    1    75   303  1997   274    18    30     0
   45  1200   145   145    24   284    32    64
   47   700   145    72    32   284    32    64
platteville                    3283 -11557    -18 44900
    2    75   177  1997   274    16    30     0
    2    75   123  1997   274    18    30     0
   45  1200   145   145    24   284    32    64
   47   700   145    72    32   284    32    64
platteville                    3283 -11557    -18 44900
    3    75    87  1997   274    16    30     0
    3    75    33  1997   274    18    30     0
   45  1200   145   145    24   284    32    64
   47   700   145    72    32   284    32    64
el monte airport               3409 -11802     95 91500
    0     0     0  1997   166     7    30     0
    0    90   255  1997   166     8    30     0
    0     0     0     0     0     0     0     0
   23   400   120    60    25   340    48    64
el monte airport               3409 -11802     95 91500
    0    90   255    97   176     0     5    14
    0    90   255    97   176     0    26    18
   23   400   120    60    25   340    48    64
   35   700   128   105    38   340   100    64
el monte airport               3409 -11802     95 91500
    0    90   255    97   176     0     5    14
    0    90   255    97   176     0    36    39
   23   400   120    60    25   340    48    64
   35   700   128   105    38   340    35    64
el monte airport               3409 -11802     95 91500
    0    90   255    97   176     0     5    14
    0    90   255    97   176     0    51    37
   23   400   120    60    25   340    48    64
   35  1400   120   105    38   340    35    64
el monte airport               3409 -11802     95 91500
    1    67   255    97   176     0     5    42
    1    67   255    97   176     0    27    41
   23   400   110    55    25   340    48    64
   35   700   117    97    38   340   100    64
el monte airport               3409 -11802     95 91500
    1    67   255    97   176     0     5    42
    1    67   255    97   176     0    39    18
   23   400   110    55    25   340    48    64
   35   700   117    97    38   340    35    64
el monte airport               3409 -11802     95 91500
    1    67   255    97   176     0     5    42
    1    67   255    97   176     0    52     8
   23   400   110    55    25   340    48    64
   35  1400   110    97    38   340    35    64
el monte airport               3409 -11802     95 91500
    2    67   345    97   176     0     6     9
    2    67   345    97   176     0    32    55
   23   400   110    55    25   340    48    64
   35   700   117    97    38   340   100    64
el monte airport               3409 -11802     95 91500
    2    67   345    97   176     0     6     9
    2    67   345    97   176     0    39    48
   23   400   110    55    25   340    48    64
   35   700   117    97    38   340    35    64
el monte airport               3409 -11802     95 91500
    2    67   345    97   176     0     6     9
    2    67   345    97   176     0    52    38
   23   400   110    55    25   340    48    64
   35  1400   110    97    38   340    35    64
```

```
el monte airport                    3409 -11802     95 91500
   3    67   345    97   176    0    6    35
   3    67   345    97   176    0   34    15
  41  2800   318   193    20  190   48    64
  23   400   110    55    25  340  100    64
el monte airport                    3409 -11802     95 91500
   3    67   345    97   176    0    6    35
   3    67   345    97   176    0   40    16
  41  2800   318   193    20  190   48    64
  23   400   110    55    25  340   35    64
el monte airport                    3409 -11802     95 91500
   4    67   255    97   176    0    7     2
   4    67   255    97   176    0   40    37
  41  2800   318   193    20  190   48    64
  23   400   110    55    25  340   35    64
el monte airport                    3409 -11802     95 91500
   5    90   255    97   176    0    7    29
   5    90   255    97   176    0   40    57
  41  2800   345   210    20  190   48    64
  23   400   120    60    25  340   35    64
el monte airport                    3409 -11802     95 91500
   0    90   255    97   176    1   17     1
   0    90   255    97   176    1   37    48
  35  1400   120   105    38  340   35    64
  50   700   128   105    38  160   35    64
el monte airport                    3409 -11802     95 91500
   1    67   255    97   176    1   17    32
   1    67   255    97   176    1   38    10
  35  1400   110    97    38  340   35    64
  50   700   117    97    38  160   35    64
el monte airport                    3409 -11802     95 91500
   2    67   345    97   176    1   18     2
   2    67   345    97   176    1   38    31
  35  1400   110    97    38  340   35    64
  50   700   117    97    38  160   35    64
el monte airport                    3409 -11802     95 91500
   0    90   255  1997   176    0   30     0
   0    90   255  1997   176    2   30     0
  23   400   120    60    25  340   48    64
  50   700   128   105    38  160   35    64
el monte airport                    3409 -11802     95 91500
   1    67   255  1997   176    0   30     0
   1    67   255  1997   176    2   30     0
  23   400   110    55    25  340   48    64
  50   700   117    97    38  160   35    64
el monte airport                    3409 -11802     95 91500
   2    67   345  1997   176    0   30     0
   2    67   345  1997   176    2   30     0
  23   400   110    55    25  340   48    64
  50   700   117    97    38  160   35    64
el monte airport                    3409 -11802     95 91500
   3    67   345  1997   177    0   30     0
   3    67   345  1997   177   18   30     0
  23   400   110    55    25  340   35    64
  41  2800   318   193    20  190   48    64
el monte airport                    3409 -11802     95 91500
   4    67   255  1997   177    0   30     0
   4    67   255  1997   177   18   30     0
  23   400   110    55    25  340   35    64
  41  2800   318   193    20  190   48    64
el monte airport                    3409 -11802     95 91500
   5    90   255  1997   177    0   30     0
   5    90   345  1997   177   18   30     0
  23   400   120    60    25  340   35    64
  41  2800   345   210    20  190   48    64
```

```
el monte airport                    3409 -11802     95 91500
   0    90   255    97   190    21     8    16
   0    90   255    97   190    21    22    12
  50   700   128   105    38   160    35    64
  50   700   128   105    34   160    35    64
el monte airport                    3409 -11802     95 91500
   0    90   255    97   190    21     8    16
   0    90   255    97   190    21    45    48
  50   700   128   105    38   160    35    64
  50   700   128   105    34   160    48    64
el monte airport                    3409 -11802     95 91500
   1    67   255    97   190    21     8    38
   1    67   255    97   190    21    22    35
  50   700   117    97    38   160    35    64
  50   700   117    97    34   160    35    64
el monte airport                    3409 -11802     95 91500
   1    67   255    97   190    21     8    38
   1    67   255    97   190    21    46    17
  50   700   117    97    38   160    35    64
  50   700   117    97    34   160    48    64
el monte airport                    3409 -11802     95 91500
   2    67   345    97   190    21     8    58
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el monte airport                    3409 -11802     95 91500
   2    67   345    97   190    21     8    58
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el monte airport                    3409 -11802     95 91500
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   3    67   345    97   190    21    17     7
  41  2800   318   193    20   190    48    64
  23   400   110    55    25   340    35    64
el monte airport                    3409 -11802     95 91500
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   4    67   255    97   190    21    17    28
  41  2800   318   193    20   190    48    64
  23   400   110    55    25   340    35    64
el monte airport                    3409 -11802     95 91500
   5    90   345    97   190    21    10    10
   5    90   345    97   190    21    17    48
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  23   400   120    60    25   340    35    64
el monte airport                    3409 -11802     95 91500
   0    90   345    97   191    18     0    26
   0    90   345    97   191    18    28    23
  20   700   113   105    14    10    32  2048
  20   700   113   105    14   350    15  2048
el monte airport                    3409 -11802     95 91500
   0    90   255    97   191    18     5    13
   0    90   255    97   191    18    37    39
  50   700   128   105    34   160    48    64
  50   700   128   105    34   350    15    64
el monte airport                    3409 -11802     95 91500
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   1    67   255    97   191    18    37    50
  50   700   117    97    34   160    48    64
  50   700   117    97    34   346    15    64
el monte airport                    3409 -11802     95 91500
   2    67   345    97   191    18     6    10
   2    67   345    97   191    18    38     0
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  50   700   117    97    34   200    15    64
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el monte airport                    3409 -11802     95 91500
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el monte airport                    3409 -11802     95 91500
   5    90   345  1997   191     0    30     0
   5    90   345  1997   191    19    30     0
  23   400   120    60    25   340    35    64
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el monte airport                    3409 -11802     95 91500
   0    90   345  1997   210     0    30     0
   0    90   350  1997   210    19    30     0
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  20   700   113   105    14    10    32  2048
el monte airport                    3409 -11802     95 91500
   1    90   345  1997   210     0    30     0
   1    90   350  1997   210    19    30     0
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  20   700   113   105    14    10    32  2048
el monte airport                    3409 -11802     95 91500
   0    90   255  1997   210     0    30     0
   0    90   260  1997   210    18    30     0
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el monte airport                    3409 -11802     95 91500
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   1    67   260  1997   210    18    30     0
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el monte airport                    3409 -11802     95 91500
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   2    67   350  1997   210    18    30     0
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  50   700   117    97    34   160    48    64
el monte airport                    3409 -11802     95 91500
   3    67   345  1997   210     0    30     0
   3    67   350  1997   210    19    30     0
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el monte airport                    3409 -11802     95 91500
   4    67   255  1997   210     0    30     0
   4    67   260  1997   210    19    30     0
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el monte airport                    3409 -11802     95 91500
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el monte airport                    3409 -11802     95 91500
   0    90   350  1997   216     0    30     0
   0    90   350  1997   216     2    30     0
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  20   700   113   105    14    10    25  2048
el monte airport                    3409 -11802     95 91500
   1    90   350  1997   216     0    30     0
   1    90   350  1997   216     2    30     0
  20   700   113   105    14    10    32  2048
  20   700   113   105    14    10    25  2048
```

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el monte airport                    3409 -11802     95 91500
   0    90   260    97   216     1     5    19
   0    90   350    97   216     1    39    53
  50   700   128   105    34   160    48    64
  40   700   113   105    30   200    42    64
el monte airport                    3409 -11802     95 91500
   1    67   260    97   216     1     5    48
   1    67   350    97   216     1    40    19
  50   700   117    97    34   160    48    64
  40   700   104    97    30   200    42    64
el monte airport                    3409 -11802     95 91500
   2    67   350    97   216     1     6    16
   2    67   260    97   216     1    40    44
  50   700   117    97    34   160    48    64
  40   700   104    97    30   200    42    64
el monte airport                    3409 -11802     95 91500
   3    67   350    97   216     1     6    42
   3    67   260    97   216     1    41     7
  23   400   110    55    25   340    35    64
  40   400    83    55    30   200    42    64
el monte airport                    3409 -11802     95 91500
   4    67   260    97   216     1     7     3
   4    67   350    97   216     1    41    32
  23   400   110    55    25   340    35    64
  40   400    83    55    30   200    42    64
el monte airport                    3409 -11802     95 91500
   5    90   350    97   216     1     7    23
   5    90   260    97   216     1    41    57
  23   400   120    60    25   340    35    64
  40   400    90    60    30   200    42    64
hpa                                 3439 -11740    975 91500
   0    90     0    97   167     9     0    22
   0    90   247    97   167     9    30    31
  20   400   120    60    25    10    20  2048
  20   400   120    60    25    10    20  2048
hpa                                 3439 -11740    975 91500
   1    90     0    97   167     9     0    22
   1    90   247    97   167     9    30    31
  20   400   120    60    25    10    20  2048
  20   400   120    60    25    10    20  2048
hpa                                 3439 -11740    975 91500
   0    90     0  1997   167     9    30     0
   0    90   247  1997   167    11    30     0
  20   400   120    60    25    10    20  2048
  20   400   120    60    12    10    20  2048
hpa                                 3439 -11740    975 91500
   0    90     0  1997   167     9    30     0
   0    90   242  1997   167    14    30     0
  20   400   120    60    25    10    20  2048
  20   400   120    60    12    10    20  2048
hpa                                 3439 -11740    975 91500
   1    90     0  1997   167     9    30     0
   1    90   247  1997   167    11    30     0
  20   400   120    60    25    10    20  2048
  20   400   120    60    12    10    20  2048
hpa                                 3439 -11740    975 91500
   1    90     0  1997   167     9    30     0
   1    90   242  1997   167    14    30     0
  20   400   120    60    25    10    20  2048
  20   400   120    60    12    10    20  2048
hpa                                 3439 -11740    975 91500
   1    66     0    97   167     8    37    34
   1    90   270    97   167     8    48    27
  23   400   110    55    25   340    42    64
  23   400   120    60    25   340    42    64
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hpa				3439	-11740	975	91500
4	66	0	97	167	8	38	46
4	66	180	97	167	8	49	41
43	2800	315	192	22	180	42	64
23	400	110	55	25	340	42	64
hpa				3439	-11740	975	91500
5	90	0	97	167	8	39	11
5	66	90	97	167	8	50	6
43	2800	345	210	22	180	42	64
23	400	110	55	25	340	42	64
hpa				3439	-11740	975	91500
0	90	0	97	167	9	5	7
0	90	247	97	167	9	9	12
23	400	120	60	25	340	42	64
23	400	120	60	25	340	42	64
hpa				3439	-11740	975	91500
0	90	247	97	167	13	5	8
0	90	242	97	167	13	51	31
23	400	120	60	25	340	42	64
23	400	120	60	25	340	42	64
hpa				3439	-11740	975	91500
1	66	247	97	167	13	5	35
1	66	242	97	167	13	52	4
23	400	110	55	25	340	42	64
23	400	110	55	25	340	42	64
hpa				3439	-11740	975	91500
2	66	337	97	167	13	6	0
2	66	332	97	167	13	52	30
23	400	110	55	25	340	42	64
23	400	110	55	25	340	42	64
hpa				3439	-11740	975	91500
3	66	337	97	167	13	6	25
3	66	332	97	167	13	52	54
41	700	254	96	35	340	42	64
41	700	254	96	35	340	42	64
hpa				3439	-11740	975	91500
4	66	247	97	167	13	7	8
4	66	242	97	167	13	53	37
41	700	254	96	35	340	42	64
41	700	254	96	35	340	42	64
hpa				3439	-11740	975	91500
5	90	247	97	167	13	7	52
5	90	242	97	167	13	54	20
41	700	278	105	35	340	42	64
41	700	278	105	35	340	42	64
hpa				3439	-11740	975	91500
0	90	0	1997	167	8	30	0
0	90	247	1997	167	10	30	0
23	400	120	60	25	340	42	64
23	400	120	60	25	340	42	64
hpa				3439	-11740	975	91500
0	90	0	1997	167	8	30	0
0	90	242	1997	167	14	30	0
23	400	120	60	25	340	42	64
23	400	120	60	25	340	42	64
hpa				3439	-11740	975	91500
1	66	0	1997	167	8	30	0
1	90	157	1997	167	9	30	0
23	400	110	55	25	340	42	64
23	700	128	105	25	340	42	64
hpa				3439	-11740	975	91500
1	66	0	1997	167	8	30	0
1	66	247	1997	167	10	30	0
23	400	110	55	25	340	42	64
23	400	110	55	25	340	42	64

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hpa                                 3439 -11740   975 91500
   1    66     0  1997   167     8   30     0
   1    66   242  1997   167    14   30     0
  23   400   110    55    25   340   42    64
  23   400   110    55    25   340   42    64
hpa                                 3439 -11740   975 91500
   2    66   270  1997   167     8   30     0
   2    66   337  1997   167    10   30     0
  23   400   110    55    25   340   42    64
  23   400   110    55    25   340   42    64
hpa                                 3439 -11740   975 91500
   2    66   270  1997   167     8   30     0
   2    66   332  1997   167    14   30     0
  23   400   110    55    25   340   42    64
  23   400   110    55    25   340   42    64
hpa                                 3439 -11740   975 91500
   3    66   270  1997   167     8   30     0
   3    66   247  1997   167     9   30     0
  43  2800   315   192    22   180   42    64
  23   700   116    96    25   340   42    64
hpa                                 3439 -11740   975 91500
   3    66   270  1997   167     8   30     0
   3    66   337  1997   167    10   30     0
  43  2800   315   192    22   180   42    64
  41   700   254    96    35   340   42    64
hpa                                 3439 -11740   975 91500
   3    66   270  1997   167     8   30     0
   3    66   332  1997   167    14   30     0
  43  2800   315   192    22   180   42    64
  41   700   254    96    35   340   42    64
hpa                                 3439 -11740   975 91500
   4    66     0  1997   167     8   30     0
   4    66   157  1997   167     9   30     0
  43  2800   315   192    22   180   42    64
  23   400   110    55    25   340   42    64
hpa                                 3439 -11740   975 91500
   4    66     0  1997   167     8   30     0
   4    66   247  1997   167    10   30     0
  43  2800   315   192    22   180   42    64
  41   700   254    96    35   340   42    64
hpa                                 3439 -11740   975 91500
   4    66     0  1997   167     8   30     0
   4    66   242  1997   167    14   30     0
  43  2800   315   192    22   180   42    64
  41   700   254    96    35   340   42    64
hpa                                 3439 -11740   975 91500
   5    90     0  1997   167     8   30     0
   5    66   157  1997   167     9   30     0
  43  2800   345   210    22   180   42    64
  23   700   116    96    25   340   42    64
hpa                                 3439 -11740   975 91500
   5    90     0  1997   167     8   30     0
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  43  2800   345   210    22   180   42    64
  41   700   278   105    35   340   42    64
hpa                                 3439 -11740   975 91500
   5    90     0  1997   167     8   30     0
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  43  2800   345   210    22   180   42    64
  41   700   278   105    35   340   42    64
hpa                                 3439 -11740   975 91500
   6  hesperia                                   3439 -11740   975 91500
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   0    90   247    97   171    21   30    28
  20   400   120    60    20    10   20  2048
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  20  400  120   60   20   10   20  2048
hesperia                 3439 -11740   975 91500
   1   90  242   97  171   21    0    41
   1   90  247   97  171   21   30    28
  20  400  120   60   20   10   20  2048
  20  400  120   60   20   10   20  2048
hesperia                 3439 -11740   975 91500
   0   90  242   97  171   21    5     7
   0   90  247   97  171   21   22    59
  20  400  120   60   25  400   42    64
  20  400  120   60   25  400   42    64
hesperia                 3439 -11740   975 91500
   1   66  242   97  171   21    5    34
   1   66  247   97  171   21   23    31
  20  400  110   55   25  400   42    64
  20  400  110   55   25  400   42    64
hesperia                 3439 -11740   975 91500
   2   66  332   97  171   21    6     1
   2   66  337   97  171   21   23    57
  20  400  110   55   25  400   42    64
  20  400  110   55   25  400   42    64
hesperia                 3439 -11740   975 91500
   3   66  332   97  171   21    6    26
   3   66  337   97  171   21   24    22
  40  700  254   96   40  200   42    64
  40  700  254   96   40  200   42    64
hesperia                 3439 -11740   975 91500
   4   66  242   97  171   21    6    53
   4   66  247   97  171   21   24    50
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hesperia                 3439 -11740   975 91500
   5   90  242   97  171   21    7    21
   5   90  247   97  171   21   25    18
  40  700  278  105   40  200   42    64
  40  700  278  105   40  200   42    64
hesperia                 3439 -11740   975 91500
   0   90  242 1997  171    7   30     0
   0   90  242 1997  171   15   30     0
  23  400  120   60   25  340   42    64
  20  400  120   60   25  400   42    64
hesperia                 3439 -11740   975 91500
   1   66  242 1997  171    7   30     0
   1   66  242 1997  171   15   30     0
  23  400  110   55   25  340   42    64
  20  400  110   55   25  400   42    64
hesperia                 3439 -11740   975 91500
   2   66  332 1997  171    7   30     0
   2   66  332 1997  171   15   30     0
  23  400  110   55   25  340   42    64
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hesperia                 3439 -11740   975 91500
   3   66  332 1997  171    7   30     0
   3   66  332 1997  171   15   30     0
  41  700  254   96   35  340   42    64
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hesperia                 3439 -11740   975 91500
   4   66  242 1997  171    7   30     0
   4   66  242 1997  171   15   30     0
  41  700  254   96   35  340   42    64
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hesperia                 3439 -11740   975 91500
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  41  700  278  105   35  340   42    64
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   40   700   278   105    40   200    42    64
las                              3379 -11805     7 92400
    0    90   272    97   175    20     6    21
    0    90   272    97   175    20    33    56
   50   700   203   105    30   160   100    64
   45   700   203   105    30   160   100    64
las                              3379 -11805     7 92400
    0    90   272    97   175    20     6    21
    0    90   272    97   175    20    41    43
   50   700   203   105    30   160   100    64
   35   700   203   105    30   226   100    64
las                              3379 -11805     7 92400
    1    66   272    97   175    20     7    24
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   50   700   185    96    30   160   100    64
   45   700   185    96    30   160   100    64
las                              3379 -11805     7 92400
    1    66   272    97   175    20     7    24
    1    66   272    97   175    20    44    22
   50   700   185    96    30   160   100    64
   35   700   185    96    30   226   100    64
las                              3379 -11805     7 92400
    2    66     2    97   175    20     8    26
    2    66     2    97   175    20    36     7
   50   700   185    96    30   160   100    64
   45   700   185    96    30   160   100    64
las                              3379 -11805     7 92400
    2    66     2    97   175    20     8    26
    2    66     2    97   175    20    45    24
   50   700   185    96    30   160   100    64
   35   700   185    96    30   226   100    64
las                              3379 -11805     7 92400
    3    66     2    97   175    20     9    27
    3    66     2    97   175    20    56    20
   20   400   178    55    38   400   100    64
   20   700   171    55    38   400   100    64
las                              3379 -11805     7 92400
    4    66   272    97   175    20    10    39
    4    66   272    97   175    20    57    24
   20   400   178    55    38   400   100    64
   20   700   171    55    38   400   100    64
las                              3379 -11805     7 92400
    5    90   272    97   175    20    11    51
    5    90   272    97   175    20    58    28
   20   400   195    60    38   400   100    64
   20   700   188    60    38   400   100    64
las                              3379 -11805     7 91500
    0    90     0  1997   196     0    30     0
    0    90     0  1997   196     9    30     0
   35   700   203   105    30   226   100    64
   35   700   188   105    30   226   100    64
las                              3379 -11805     7 91500
    0    90     0  1997   196     0    30     0
    0    90     0  1997   196    11    30     0
   35   700   203   105    30   226   100    64
   35   700   158   105    38   226   100    64
las                              3379 -11805     7 91500
    1    66     0  1997   196     0    30     0
    1    66     0  1997   196     9    30     0
   35   700   185    96    30   226   100    64
   35   700   171    96    30   226   100    64
las                              3379 -11805     7 91500
    1    66     0  1997   196     0    30     0
    1    66     0  1997   196    11    30     0
   35   700   185    96    30   226   100    64
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   35   700   144    96    38   226   100    64
las                              3379 -11805     7 91500
    2    66    90  1997   196     0    30     0
    2    66   270  1997   196     9    30     0
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   35   700   171    96    30   226   100    64
las                              3379 -11805     7 91500
    2    66    90  1997   196     0    30     0
    2    66   270  1997   196    11    30     0
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las                              3379 -11805     7 91500
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    3    66   270  1997   196     9    30     0
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   20   400   151    55    38   400   100    64
las                              3379 -11805     7 91500
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    3    66   270  1997   196    11    30     0
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   20   400   110    55    38   400   100    64
las                              3379 -11805     7 91500
    4    66     0  1997   196     0    30     0
    4    66     0  1997   196     9    30     0
   20   700   171    55    38   400   100    64
   20   400   151    55    38   400   100    64
las                              3379 -11805     7 91500
    4    66     0  1997   196     0    30     0
    4    66     0  1997   196    11    30     0
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   20   400   110    55    38   400   100    64
las                              3379 -11805     7 91500
    5    90     0  1997   196     0    30     0
    5    90     0  1997   196     9    30     0
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las                              3379 -11805     7 91500
    5    90     0  1997   196     0    30     0
    5    90     0  1997   196    11    30     0
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las                              3379 -11805     7 91500
    0    90     0  1997   197     0    30     0
    0    90   272  1997   197    17    30     0
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   20   400   135    60    26    10    20  2048
las                              3379 -11805     7 91500
    1    90     0  1997   197     0    30     0
    1    90   272  1997   197    17    30     0
   20   400   135    60    26    10    20  2048
   20   400   135    60    26    10    20  2048
las                              3379 -11805     7 91500
    0    90     0    97   197    16     5    26
    0    90   272    97   197    16    17    32
   35   700   158   105    38   226   100    64
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las                              3379 -11805     7 91500
    1    66     0    97   197    16     6    30
    1    66   272    97   197    16    18    37
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las                              3379 -11805     7 91500
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    2    66   182  1997   197    16    30     0
   35   700   144    96    38   226   100    64
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las                            3379 -11805     7 91500
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las                            3379 -11805     7 91500
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las                            3379 -11805     7 91500
    5    90     0  1997   197     0    30     0
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lax                            3393 -11843    47 91500
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    1    69   307    97   192    17     5    48
    1    90   127    97   192    17    51    29
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lax                            3393 -11843    47 91500
    2    69   217    97   192    17     6    19
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lax                            3393 -11843    47 91500
    3    69   217    97   192    17     6    48
    3    69   127    97   192    17    52    29
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lax                            3393 -11843    47 91500
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lax                            3393 -11843    47 91500
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    5    69   307    97   192    17    53    29
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   23   700   147    98    20   340    48    64
lax                            3393 -11843    47 91500
    0    90   217    97   192    18     5    20
    0    90   217    97   192    18    21     6
   23   700   158   105    20   340    48    64
   20   400   120    60    25   400    48    64
lax                            3393 -11843    47 91500
    1    90   127    97   192    18     5    50
    1    69   307    97   192    18    21    43
   23   700   158   105    20   340    48    64
   20   400   112    56    25   400    48    64
lax                            3393 -11843    47 91500
    2    69   217    97   192    18     6    20
    2    69   217    97   192    18    22    15
   23   700   147    98    20   340    48    64
   20   400   112    56    25   400    48    64
lax                            3393 -11843    47 91500
    3    69   127    97   192    18     6    50
    3    69   217    97   192    18    22    44
   23   700   147    98    20   340    48    64
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   41   700   147    98    40   200    48    64
lax                              3393 -11843    47 91500
    4    69    37    97   192    18     7    20
    4    69   307    97   192    18    23    17
   23   700   147    98    20   340    48    64
   41   700   147    98    40   200    48    64
lax                              3393 -11843    47 91500
    5    69   307    97   192    18     7    50
    5    90   217    97   192    18    23    50
   23   700   147    98    20   340    48    64
   41   700   158   105    40   200    48    64
lax                              3393 -11843    47 91500
    0    90   217    97   228    21    30    39
    0    90   217    97   228    21    43    37
   20   400   120    60    25   400    48    64
   20   400   135    60    25   400    48    64
lax                              3393 -11843    47 91500
    0    90   217    97   228    21    30    39
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   20   400   120    60    25   400    48    64
   20   400   150    60    25   400    48    64
lax                              3393 -11843    47 91500
    1    69   307    97   228    21    31    11
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   20   400   112    56    25   400    48    64
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lax                              3393 -11843    47 91500
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lax                              3393 -11843    47 91500
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   20   400   112    56    25   400    48    64
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lax                              3393 -11843    47 91500
    2    69   217    97   228    21    31    41
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   20   400   140    56    25   400    48    64
california air resources 2       3408 -11726   318 91500
    3    67   128    97   171    18     8    28
    3    67   128    97   171    18    25    34
   41  2800   318   193    20    64    48    64
   41  2800   318   193    20   190    48    64
california air resources 2       3408 -11726   318 91500
    4    67   218    97   171    18     8    39
    4    67   218    97   171    18    26     1
   41  2800   318   193    20    64    48    64
   41  2800   318   193    20   190    48    64
california air resources 2       3408 -11726   318 91500
    5    90   128    97   171    18     8    50
    5    90   128    97   171    18    26    29
   41  2800   345   210    20    64    48    64
   41  2800   345   210    20   190    48    64
california air resources 2       3408 -11726   318 91500
    0    90   218  1997   211     0    30     0
    0    90   218  1997   211    18    30     0
   20  1400   285   210    10    10    25  2048
   20   700   128   105    14    10    25  2048
california air resources 2       3408 -11726   318 91500
    1    90   218  1997   211     0    30     0
    1    90   218  1997   211    18    30     0
   20  1400   285   210    10    10    25  2048
```

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   20   700   128   105    14    10    25  2048
california air resources 2    3408 -11726   318 91500
    3    67   128    97   211    17     6    34
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   40   700   145    97    30   200    42    64
california air resources 2    3408 -11726   318 91500
    4    67   218    97   211    17     7     0
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   41  2800   318   193    20   190    48    64
   40   700   145    97    30   200    42    64
california air resources 2    3408 -11726   318 91500
    5    90   128    97   211    17     7    27
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   41  2800   345   210    20   190    48    64
   40   700   158   105    30   200    42    64
california air resources 2    3408 -11726   318 91500
    0    90   218  1997   216     0    30     0
    0    90   218  1997   216     2    30     0
   20   700   128   105    14    10    25  2048
   20   700   113   105    14    10    25  2048
california air resources 2    3408 -11726   318 91500
    1    90   218  1997   216     0    30     0
    1    90   218  1997   216     2    30     0
   20   700   128   105    14    10    25  2048
   20   700   113   105    14    10    25  2048
california air resources 2    3408 -11726   318 91500
    0    90   218    97   216     1     5    24
    0    90   218    97   216     1    43    50
   20   400   120    60    30   400    42    64
   23   400   120    60    25   340    45    64
california air resources 2    3408 -11726   318 91500
    1    67    38    97   216     1     5    49
    1    67    38    97   216     1    44    17
   20   400   110    55    30   400    42    64
   23   400   110    55    25   340    45    64
california air resources 2    3408 -11726   318 91500
    2    67   308    97   216     1     6    14
    2    67   308    97   216     1    44    42
   20   400   110    55    30   400    42    64
   23   400   110    55    25   340    45    64
california air resources 2    3408 -11726   318 91500
    3    67   128    97   216     1     6    38
    3    67   128    97   216     1    45     8
   40   700   145    97    30   200    42    64
   40   700   104    97    30   200    42    64
california air resources 2    3408 -11726   318 91500
    4    67   218    97   216     1     7     4
    4    67   218    97   216     1    45    33
   40   700   145    97    30   200    42    64
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california air resources 2    3408 -11726   318 91500
    5    90   128    97   216     1     7    28
    5    90   128    97   216     1    45    57
   40   700   158   105    30   200    42    64
   40   700   113   105    30   200    42    64
california air resources 2    3408 -11726   318 91500
    0    90   218    97   218    23     5    27
    0    90   218    97   218    23    45     1
   23   400   120    60    25   340    45    64
   40   400    90    60    30   200    42    64
california air resources 2    3408 -11726   318 91500
    1    67    38    97   218    23     5    53
    1    67    38    97   218    23    45    27
   23   400   110    55    25   340    45    64
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40	400	83	55	30	200	42	64
california	air	resources	2	3408	-11726	318	91500
2	67	308	97	218	23	6	19
2	67	308	97	218	23	45	52
23	400	110	55	25	340	45	64
40	400	83	55	30	200	42	64
california	air	resources	2	3408	-11726	318	91500
0	90	218	97	233	21	5	19
0	90	218	97	233	21	52	19
40	400	90	60	30	200	42	64
23	400	120	60	25	340	45	64
california	air	resources	2	3408	-11726	318	91500
1	67	38	97	233	21	5	45
1	67	38	97	233	21	52	46
40	400	83	55	30	200	42	64
23	400	110	55	25	340	45	64
california	air	resources	2	3408	-11726	318	91500
2	67	308	97	233	21	6	10
2	67	308	97	233	21	53	11
40	400	83	55	30	200	42	64
23	400	110	55	25	340	45	64
california	air	resources	2	3408	-11726	318	91500
0	90	218	97	236	15	5	7
0	90	218	97	236	15	54	25
23	400	120	60	25	340	45	64
40	400	90	60	30	200	42	64
california	air	resources	2	3408	-11726	318	91500
1	67	38	97	236	15	5	33
1	67	38	97	236	15	54	51
23	400	110	55	25	340	45	64
40	400	83	55	30	200	42	64
california	air	resources	2	3408	-11726	318	91500
2	67	308	97	236	15	5	59
2	67	308	97	236	15	55	16
23	400	110	55	25	340	45	64
40	400	83	55	30	200	42	64
california	air	resources	2	3408	-11726	318	91500
0	90	218	97	239	21	5	11
0	90	218	97	239	21	22	30
40	400	90	60	30	200	42	64
23	400	120	60	25	340	45	64
california	air	resources	2	3408	-11726	318	91500
1	67	38	97	239	21	5	36
1	67	38	97	239	21	22	57
40	400	83	55	30	200	42	64
23	400	110	55	25	340	45	64
california	air	resources	2	3408	-11726	318	91500
2	67	308	97	239	21	6	1
2	67	308	97	239	21	23	23
40	400	83	55	30	200	42	64
23	400	110	55	25	340	45	64
california	air	resources	2	3408	-11726	318	91500
0	90	218	97	241	14	5	28
0	90	218	97	241	14	42	56
23	400	120	60	25	340	45	64
40	400	90	60	30	200	42	64
california	air	resources	2	3408	-11726	318	91500
1	67	38	97	241	14	5	53
1	67	38	97	241	14	43	21
23	400	110	55	25	340	45	64
40	400	83	55	30	200	42	64
california	air	resources	2	3408	-11726	318	91500
2	67	308	97	241	14	6	19
2	67	308	97	241	14	43	46
23	400	110	55	25	340	45	64

40	400	83	55	30	200	42	64
california air resources 2				3408	-11726	318	91500
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0	90	218	97	246	22	26	15
40	400	90	60	30	200	42	64
23	400	120	60	25	340	45	64
california air resources 2				3408	-11726	318	91500
1	67	38	97	246	22	5	38
1	67	38	97	246	22	26	42
40	400	83	55	30	200	42	64
23	400	110	55	25	340	45	64
california air resources 2				3408	-11726	318	91500
2	67	308	97	246	22	6	3
2	67	308	97	246	22	27	8
40	400	83	55	30	200	42	64
23	400	110	55	25	340	45	64
california air resources 2				3408	-11726	318	91500
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0	90	218	97	251	14	40	18
23	400	120	60	25	340	45	64
40	400	90	60	30	200	42	64
california air resources 2				3408	-11726	318	91500
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1	67	38	97	251	14	40	44
23	400	110	55	25	340	45	64
40	400	83	55	30	200	42	64
california air resources 2				3408	-11726	318	91500
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2	67	308	97	251	14	41	9
23	400	110	55	25	340	45	64
40	400	83	55	30	200	42	64
california air resources 2				3408	-11726	318	91500
0	90	218	97	252	23	5	9
0	90	218	97	252	23	22	54
40	400	90	60	30	200	42	64
23	400	120	60	25	340	45	64
california air resources 2				3408	-11726	318	91500
1	67	38	97	252	23	5	34
1	67	38	97	252	23	23	21
40	400	83	55	30	200	42	64
23	400	110	55	25	340	45	64
california air resources 2				3408	-11726	318	91500
2	67	308	97	252	23	5	59
2	67	308	97	252	23	23	47
40	400	83	55	30	200	42	64
23	400	110	55	25	340	45	64
california air resources 2				3408	-11726	318	91500
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0	90	218	97	255	14	32	53
23	400	120	60	25	340	45	64
40	400	90	60	30	200	42	64
california air resources 2				3408	-11726	318	91500
1	67	38	97	255	14	5	30
1	67	38	97	255	14	33	18
23	400	110	55	25	340	45	64
40	400	83	55	30	200	42	64
california air resources 2				3408	-11726	318	91500
2	67	308	97	255	14	5	56
2	67	308	97	255	14	33	43
23	400	110	55	25	340	45	64
40	400	83	55	30	200	42	64
california air resources 2				3408	-11726	318	91500
0	90	218	1997	269	0	30	0
0	90	218	1997	269	23	30	0
40	400	90	60	30	200	42	64

23	400	120	60	25	340	45	64
california air resources 2				3408	-11726	318	91500
1	67	38	1997	269	0	30	0
1	67	38	1997	269	23	30	0
40	400	83	55	30	200	42	64
23	400	110	55	25	340	45	64
california air resources 2				3408	-11726	318	91500
2	67	308	1997	269	0	30	0
2	67	308	1997	269	23	30	0
40	400	83	55	30	200	42	64
23	400	110	55	25	340	45	64
california air resources 2				3408	-11726	318	91500
0	90	218	97	273	19	5	8
0	90	218	97	273	19	31	19
23	400	120	60	25	340	45	64
40	400	90	60	30	200	42	64
california air resources 2				3408	-11726	318	91500
1	67	38	97	273	19	5	35
1	67	38	97	273	19	31	45
23	400	110	55	25	340	45	64
40	400	83	55	30	200	42	64
california air resources 2				3408	-11726	318	91500
2	67	308	97	273	19	6	0
2	67	308	97	273	19	32	10
23	400	110	55	25	340	45	64
40	400	83	55	30	200	42	64
california air resources 2				3408	-11726	318	91500
0	90	218	97	275	20	5	21
0	90	218	97	275	20	38	2
40	400	90	60	30	200	42	64
23	400	120	60	25	340	45	64
california air resources 2				3408	-11726	318	91500
1	67	38	97	275	20	5	46
1	67	38	97	275	20	38	29
40	400	83	55	30	200	42	64
23	400	110	55	25	340	45	64
california air resources 2				3408	-11726	318	91500
2	67	308	97	275	20	6	11
2	67	308	97	275	20	38	55
40	400	83	55	30	200	42	64
23	400	110	55	25	340	45	64
california air resources 2				3408	-11726	318	91500
0	90	218	97	279	14	5	10
0	90	218	97	279	14	44	20
23	400	120	60	25	340	45	64
40	400	90	60	30	200	42	64
california air resources 2				3408	-11726	318	91500
1	67	38	97	279	14	5	37
1	67	38	97	279	14	44	45
23	400	110	55	25	340	45	64
40	400	83	55	30	200	42	64
california air resources 2				3408	-11726	318	91500
2	67	308	97	279	14	6	2
2	67	308	97	279	14	45	10
23	400	110	55	25	340	45	64
40	400	83	55	30	200	42	64
ont				3406	-11758	280	91500
0	90	147	97	206	23	5	14
0	90	147	97	206	23	42	25
20	400	120	60	25	400	48	64
23	700	158	105	20	340	48	64
ont				3406	-11758	280	91500
1	66	147	97	206	23	5	46
1	90	57	97	206	23	42	56
20	400	110	55	25	400	48	64

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   23   700   158   105    20   340    48    64
ont                             3406 -11758   280 91500
    2    66   237    97   206    23     6    16
    2    66   147    97   206    23    43    25
   20   400   110    55    25   400    48    64
   23   700   144    96    20   340    48    64
ont                             3406 -11758   280 91500
    3    66   237    97   206    23     6    46
    3    66    57    97   206    23    43    55
   41   700   144    96    40   200    48    64
   23   700   144    96    20   340    48    64
ont                             3406 -11758   280 91500
    4    66   147    97   206    23     7    20
    4    66   327    97   206    23    44    24
   41   700   144    96    40   200    48    64
   23   700   144    96    20   340    48    64
ont                             3406 -11758   280 91500
    5    90   147    97   206    23     7    54
    5    66   237    97   206    23    44    54
   41   700   158   105    40   200    48    64
   23   700   144    96    20   340    48    64
ont                             3406 -11758   280 91500
    0    90   147    97   207     0     5    18
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   23   700   158   105    20   340    48    64
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ont                             3406 -11758   280 91500
    1    90    57    97   207     0     5    48
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   23   700   158   105    20   340    48    64
   20   400   110    55    25   400    48    64
ont                             3406 -11758   280 91500
    2    66   147    97   207     0     6    18
    2    66   237    97   207     0    21     3
   23   700   144    96    20   340    48    64
   20   400   110    55    25   400    48    64
ont                             3406 -11758   280 91500
    3    66    57    97   207     0     6    48
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   23   700   144    96    20   340    48    64
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ont                             3406 -11758   280 91500
    4    66   327    97   207     0     7    18
    4    66   147    97   207     0    22    10
   23   700   144    96    20   340    48    64
   41   700   144    96    40   200    48    64
ont                             3406 -11758   280 91500
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    5    90   147    97   207     0    22    43
   23   700   144    96    20   340    48    64
   41   700   158   105    40   200    48    64
ont                             3406 -11758   280 91500
    0    90   147    97   230    21     5    15
    0    90   147    97   230    21    39    55
   20   400   120    60    25   400    48    64
   20   400   135    60    25   400    48    64
ont                             3406 -11758   280 91500
    0    90   147    97   230    21     5    15
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   20   400   120    60    25   400    48    64
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ont                             3406 -11758   280 91500
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1	66	147	97	230	21	47	47	
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20	400	137	55	25	400	48	64	
ont					3406	-11758	280	91500
2	66	237	97	230	21	6	17	
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ont					3406	-11758	280	91500
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ont					3406	-11758	280	91500
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41	700	144	96	40	200	48	64	
41	700	158	96	40	200	48	64	
ont					3406	-11758	280	91500
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41	700	144	96	40	200	48	64	
41	700	158	96	40	200	48	64	
ont					3406	-11758	280	91500
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41	700	173	105	40	200	48	64	
phe					3416	-11921	2	91500
0	75	147	97	171	21	5	24	
0	90	0	97	171	21	24	50	
25	400	152	58	38	320	100	64	
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phe					3416	-11921	2	91500
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phe                                3416 -11921     2 91500
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ptl,san diego                      3270 -11725    23 91500
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ptl,san diego                      3270 -11725    23 91500
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ptl,san diego                      3270 -11725    23 91500
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ptl,san diego                      3270 -11725    23 91500
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ptl,san diego                      3270 -11725    23 91500
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ptl,san diego                      3270 -11725    23 91500
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ptl,san diego                      3270 -11725    23 91500
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   20   400   120    60    25    10    20  2048
ptl,san diego                      3270 -11725    23 91500
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ptl,san diego                      3270 -11725    23 91500
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ptl,san diego                      3270 -11725    23 91500
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ptl,san diego                      3270 -11725    23 91500
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ptl,san diego                 3270 -11725     23 91500
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ptl,san diego                 3270 -11725     23 91500
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ptl,san diego                 3270 -11725     23 91500
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   39  2800   345   210    20   206    42    64
ptl,san diego                 3270 -11725     23 91500
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   23   700   143   105    26   350    42    64
ptl,san diego                 3270 -11725     23 91500
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ptl,san diego                 3270 -11725     23 91500
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ptl,san diego                 3270 -11725     23 91500
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ptl,san diego                 3270 -11725    23 91500
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   39  2800   345   210    20   206    42    64
ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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   43  2800   345   210    22   180    42    64
ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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   20   700   143   105    14    10    24  2048
```

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ptl,san diego                3270 -11725    23 91500
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ptl,san diego                3270 -11725    23 91500
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ptl,san diego                3270 -11725    23 91500
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ptl,san diego                3270 -11725    23 91500
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ptl,san diego                3270 -11725    23 91500
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ptl,san diego                3270 -11725    23 91500
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ptl,san diego                3270 -11725    23 91500
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ptl,san diego                3270 -11725    23 91500
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ptl,san diego                 3270 -11725     23 91500
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ptl,san diego                 3270 -11725     23 91500
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ptl,san diego                 3270 -11725     23 91500
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ptl,san diego                 3270 -11725     23 91500
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ptl,san diego                 3270 -11725     23 91500
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   46   700   130    96    38   174    42    64
ptl,san diego                 3270 -11725     23 91500
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ptl,san diego                 3270 -11725     23 91500
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ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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ptl,san diego                 3270 -11725    23 91500
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ptl, san diego                3270 -11725    23 91500
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ptl, san diego                3270 -11725    23 91500
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   20   400   105    60    20    10    24  2048
   20   400   120    60    25    10    20  2048
ptl, san diego                3270 -11725    23 91500
    1    90    33    97   260    17    38    42
    1    90     0    97   260    11     0    54
   20   400   105    60    20    10    24  2048
   20   400   120    60    25    10    20  2048
plm                           3270 -11725    23 91500
    0    90     0  1997   260    10    30     0
    0    90    33  1997   260    18    30     0
   23   400   120    60    25   340    42    64
   23   400   105    60    35   350    42    64
plm                           3270 -11725    23 91500
    1    66     0  1997   260    10    30     0
    1    66   303  1997   260    18    30     0
   23   400   110    55    25   340    42    64
   23   400    96    55    35   350    42    64
plm                           3270 -11725    23 91500
    2    66   270  1997   260    10    30     0
    2    66   213  1997   260    18    30     0
   23   400   110    55    25   340    42    64
   23   400    96    55    35   350    42    64
plm                           3270 -11725    23 91500
    3    66   270  1997   260    10    30     0
    3    66   213  1997   260    18    30     0
   43  2800   315   192    22   180    42    64
   46   700   130    96    38   174    42    64
plm                           3270 -11725    23 91500
    4    66     0  1997   260    10    30     0
    4    66   303  1997   260    18    30     0
   43  2800   315   192    22   180    42    64
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   46   700   130    96    38   174    42    64
plm                        3270 -11725    23 91500
    5    90     0  1997   260    10    30     0
    5    90    33  1997   260    18    30     0
   43  2800   345   210    22   180    42    64
   46   700   143   105    38   174    42    64
ptl, san diego                3270 -11725    23 91500
    0    90    33  1997   282     0    30     0
    0    90    31  1997   282    20    30     0
   20   400   105    60    20    10    24  2048
   20   400   105    60    25    10    24  2048
ptl, san diego                3270 -11725    23 91500
    1    90    33  1997   282     0    30     0
    1    90    31  1997   282    20    30     0
   20   400   105    60    20    10    24  2048
   20   400   105    60    25    10    24  2048
ptl, san diego                3270 -11725    23 91500
    0    90    33    97   282    19     5    32
    0    90    31    97   282    19    45    32
   23   400   105    60    35   350    42    64
   23   400   105    60    35   350    42    64
ptl, san diego                3270 -11725    23 91500
    1    66   303    97   282    19     6     2
    1    66    31    97   282    19    46     3
   23   400    96    55    35   350    42    64
   23   400    96    55    35   350    42    64
ptl, san diego                3270 -11725    23 91500
    2    66   213    97   282    19     6    32
    2    66   121    97   282    19    46    33
   23   400    96    55    35   350    42    64
   23   400    96    55    35   350    42    64
ptl, san diego                3270 -11725    23 91500
    3    66   213    97   282    19     7     1
    3    66   121    97   282    19    47     1
   46   700   130    96    38   174    42    64
   46   700   130    96    38   174    42    64
ptl, san diego                3270 -11725    23 91500
    4    66   303    97   282    19     7    31
    4    66    31    97   282    19    47    31
   46   700   130    96    38   174    42    64
   46   700   130    96    38   174    42    64
ptl, san diego                3270 -11725    23 91500
    5    90    33    97   282    19     8     1
    5    90    31    97   282    19    48     1
   46   700   143   105    38   174    42    64
   46   700   143   105    38   174    42    64
ptl, san diego                3270 -11725    23 91500
    0    90    31    97   282    21     5    14
    0    90    31    97   282    21    12    21
   23   400   105    60    35   350    42    64
   23   400   105    60    35   351    47    64
ptl, san diego                3270 -11725    23 91500
    1    66    31    97   282    21     5    45
    1    66    31    97   282    21    12    55
   23   400    96    55    35   350    42    64
   23   400    96    55    35   351    47    64
ptl, san diego                3270 -11725    23 91500
    2    66   121    97   282    21     6    15
    2    66   121    97   282    21    13    28
   23   400    96    55    35   350    42    64
   23   400    96    55    35   351    47    64
ptl, san diego                3270 -11725    23 91500
    3    66   121    97   282    21     6    43
    3    66   121    97   282    21    13    59
   46   700   130    96    38   174    42    64
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   46   700   130    96    38   174    47    64
ptl, san diego                 3270 -11725    23 91500
    4    66    31    97   282    21     7    14
    4    66    31    97   282    21    14    32
   46   700   130    96    38   174    42    64
   46   700   130    96    38   174    47    64
ptl, san diego                 3270 -11725    23 91500
    5    90    31    97   282    21     7    44
    5    90    31    97   282    21    15     5
   46   700   143   105    38   174    42    64
   46   700   143   105    38   174    47    64
ptl, san diego                 3270 -11725    23 91500
    0    90    33  1997   282     0    30     0
    0    90    31  1997   282    22    30     0
   23   400   105    60    35   350    42    64
   23   400   105    60    35   351    47    64
ptl, san diego                 3270 -11725    23 91500
    1    66   303  1997   282     0    30     0
    1    66    31  1997   282    22    30     0
   23   400    96    55    35   350    42    64
   23   400    96    55    35   351    47    64
ptl, san diego                 3270 -11725    23 91500
    2    66   213  1997   282     0    30     0
    2    66   121  1997   282    22    30     0
   23   400    96    55    35   350    42    64
   23   400    96    55    35   351    47    64
ptl, san diego                 3270 -11725    23 91500
    3    66   213  1997   282     0    30     0
    3    66   121  1997   282    22    30     0
   46   700   130    96    38   174    42    64
   46   700   130    96    38   174    47    64
ptl, san diego                 3270 -11725    23 91500
    4    66   303  1997   282     0    30     0
    4    66    31  1997   282    22    30     0
   46   700   130    96    38   174    42    64
   46   700   130    96    38   174    47    64
ptl, san diego                 3270 -11725    23 91500
    5    90    33  1997   282     0    30     0
    5    90    31  1997   282    22    30     0
   46   700   143   105    38   174    42    64
   46   700   143   105    38   174    47    64
ptl, san diego                 3270 -11725    23 91500
    0    90    31  1997   286     8    30     0
    0    90    31  1997   286    16    30     0
   20   400   105    60    14    10    24  2048
   20   400   105    60    20    10    24  2048
ptl, san diego                 3270 -11725    23 91500
    1    90    31  1997   286     8    30     0
    1    90    31  1997   286    16    30     0
   20   400   105    60    14    10    24  2048
   20   400   105    60    20    10    24  2048
riverside                      3391 -11730   488 91500
    3    66   123  1997   163     0    30     0
    3    66   123  1997   163    23    30     0
   23   700   116    96    25   340    42    64
   40   700   240    96    35   200    40    64
riverside                      3391 -11730   488 91500
    4    66   213  1997   163     0    30     0
    4    66   213  1997   163    23    30     0
   23   700   116    96    25   340    42    64
   40   700   240    96    35   200    40    64
riverside                      3391 -11730   488 91500
    5    90   303  1997   163     0    30     0
    5    90   303  1997   163    23    30     0
   23   700   128   105    25   340    42    64
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   40   700   263   105    35   200    40    64
riverside                    3391 -11730   488 91500
    3    66   123  1997   166     0    30     0
    3    66   123  1997   166     4    30     0
   40   700   240    96    35   200    40    64
   41   700   254    96    35   200    40    64
riverside                    3391 -11730   488 91500
    4    66   213  1997   166     0    30     0
    4    66   213  1997   166     4    30     0
   40   700   240    96    35   200    40    64
   41   700   254    96    35   200    40    64
riverside                    3391 -11730   488 91500
    5    90   303  1997   166     0    30     0
    5    90   303  1997   166     4    30     0
   40   700   263   105    35   200    40    64
   41   700   278   105    35   200    40    64
riverside                    3391 -11730   488 91500
    0    90   303  1997   169     0    30     0
    0    90   303  1997   169    21    30     0
   20   400   120    60    12    10    20  2048
   20   400   120    60    25    10    20  2048
riverside                    3391 -11730   488 91500
    0    90   303  1997   169     0    30     0
    0    90   303  1997   169    23    30     0
   20   400   120    60    12    10    20  2048
   20   400   120    60    20    10    20  2048
riverside                    3391 -11730   488 91500
    1    90   303  1997   169     0    30     0
    1    90   303  1997   169    21    30     0
   20   400   120    60    12    10    20  2048
   20   400   120    60    25    10    20  2048
riverside                    3391 -11730   488 91500
    1    90   303  1997   169     0    30     0
    1    90   303  1997   169    23    30     0
   20   400   120    60    12    10    20  2048
   20   400   120    60    20    10    20  2048
test parameter set           3391 -11730   488 91500
    0    90     0  1997   191    10    30     0
    0    90   303  1997   191    18    30     0
   40   700   113   105    25   200    16    64
   23   400   120    60    25   340    42    64
test parameter set           3391 -11730   488 91500
    1    66     0  1997   191    10    30     0
    1    66   213  1997   191    18    30     0
   40   700   103    96    25   200    16    64
   23   400   110    55    25   340    42    64
test parameter set           3391 -11730   488 91500
    2    66   270  1997   191    10    30     0
    2    66   123  1997   191    18    30     0
   40   700   103    96    25   200    16    64
   23   400   110    55    25   340    42    64
test parameter set           3391 -11730   488 91500
    3    90   270  1997   191    10    30     0
    3    66   123  1997   191    18    30     0
   60  2800   330   210    30   134    16    64
   41   700   254    96    35   200    40    64
test parameter set           3391 -11730   488 91500
    4    66   180  1997   191    10    30     0
    4    66   213  1997   191    18    30     0
   60  2800   301   192    30   134    16    64
   41   700   254    96    35   200    40    64
test parameter set           3391 -11730   488 91500
    5    66    90  1997   191    10    30     0
    5    90   303  1997   191    18    30     0
   60  2800   301   192    30   134    16    64
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   41   700   278   105    35   200    40    64
sce                            3300 -11858    53 91500
    0    75   347    97   163    15     5    12
    0    75   347    97   163    15    51     7
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320    25    64
sce                            3300 -11858    53 91500
    1    75   258    97   163    15     6    17
    1    75   258    97   163    15    51    27
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320    25    64
sce                            3300 -11858    53 91500
    2    90     0    97   163    15     7    21
    2    90     0    97   163    15    51    45
   25   400   158    60    38   320   100    64
   25   400   158    60    38   320    25    64
sce                            3300 -11858    53 91500
    3    75   347    97   163    15     8    25
    3    75   347    97   163    15    52     2
   50   700   152   101    38   160   100    64
   50   700   152   101    38   160    25    64
sce                            3300 -11858    53 91500
    4    75   258    97   163    15     9    29
    4    75   258    97   163    15    52    20
   50   700   152   101    38   160   100    64
   50   700   152   101    38   160    25    64
sce                            3300 -11858    53 91500
    5    90     0    97   163    15    10    34
    5    90     0    97   163    15    52    38
   50   700   158   105    38   160   100    64
   50   700   158   105    38   160    25    64
sce                            3300 -11858    53 91500
    0    75   347    97   163    17     5    12
    0    75   347    97   163    17    56    22
   25   400   152    58    38   320    25    64
   25   400   152    58    38   320   100    64
sce                            3300 -11858    53 91500
    1    75   258    97   163    17     5    32
    1    75   258    97   163    17    57    31
   25   400   152    58    38   320    25    64
   25   400   152    58    38   320   100    64
sce                            3300 -11858    53 91500
    2    90     0    97   163    17     5    51
    2    90     0    97   163    17    58    35
   25   400   158    60    38   320    25    64
   25   400   158    60    38   320   100    64
sce                            3300 -11858    53 91500
    3    75   347    97   163    17     6    10
    3    75   347    97   163    17    59    41
   50   700   152   101    38   160    25    64
   50   700   152   101    38   160   100    64
sce                            3300 -11858    53 91500
    0    75   347    97   163    21     5    20
    0    75   351    97   163    21    31     4
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320   100    64
sce                            3300 -11858    53 91500
    3    75   347    97   163    21    11    21
    3    75   351    97   163    21    34    20
   50   700   152   101    38   160   100    64
   50   700   152   101    38   160   100    64
sce                            3300 -11858    53 91500
    0    75   347  1997   163     5    30     0
    0    75   351  1997   163    22    30     0
   25   400   152    58    38   320   100    64
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   25   400   152    58    38   320   100    64
sce                             3300 -11858    53 91500
    3    75   347  1997   163     5    30     0
    3    75   351  1997   163    22    30     0
   50   700   152   101    38   160   100    64
   50   700   152   101    38   160   100    64
sce                             3300 -11858    53 91500
    1    75   258    97   176    23     6    21
    1    75   262    97   176    23    16    58
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320   100    64
sce                             3300 -11858    53 91500
    4    75   258    97   176    23     9    38
    4    75   262    97   176    23    20    15
   50   700   152   101    38   160   100    64
   50   700   152   101    38   160   100    64
sce                             3300 -11858    53 91500
    0    75   351    97   177     0     5    19
    0    75   351    97   177     0    21    17
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320    25    64
sce                             3300 -11858    53 91500
    1    75   262    97   177     0     6    26
    1    75   262    97   177     0    21    37
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320    25    64
sce                             3300 -11858    53 91500
    2    90     0    97   177     0     7    32
    2    90     0    97   177     0    21    56
   25   400   158    60    38   320   100    64
   25   400   158    60    38   320    25    64
sce                             3300 -11858    53 91500
    3    75   351    97   177     0     8    38
    3    75   351    97   177     0    22    16
   50   700   152   101    38   160   100    64
   50   700   152   101    38   160    25    64
sce                             3300 -11858    53 91500
    4    75   262    97   177     0     9    44
    4    75   262    97   177     0    22    35
   50   700   152   101    38   160   100    64
   50   700   152   101    38   160    25    64
sce                             3300 -11858    53 91500
    5    90     0    97   177     0    10    49
    5    90     0    97   177     0    22    54
   50   700   158   105    38   160   100    64
   50   700   158   105    38   160    25    64
sce                             3300 -11858    53 91500
    0    75   351    97   177     2     5    12
    0    75   351    97   177     2    44    14
   25   400   152    58    38   320    25    64
   25   400   152    58    38   320   100    64
sce                             3300 -11858    53 91500
    1    75   262    97   177     2     5    32
    1    75   262    97   177     2    45    23
   25   400   152    58    38   320    25    64
   25   400   152    58    38   320   100    64
sce                             3300 -11858    53 91500
    2    90     0    97   177     2     5    51
    2    90     0    97   177     2    46    27
   25   400   158    60    38   320    25    64
   25   400   158    60    38   320   100    64
sce                             3300 -11858    53 91500
    3    75   351    97   177     2     0     1
    3    75   351    97   177     2    47    32
   50   700   152   101    38   160    25    64
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   50   700   152   101    38   160   100    64
sce                              3300 -11858    53 91500
    4    75   262    97   177     2     6    29
    4    75   262    97   177     2    48    36
   50   700   152   101    38   160    25    64
   50   700   152   101    38   160   100    64
sce                              3300 -11858    53 91500
    5    90     0    97   177     2     6    49
    5    90     0    97   177     2    49    40
   50   700   158   105    38   160    25    64
   50   700   158   105    38   160   100    64
sce                              3300 -11858    53 91500
    0    75   351    97   184    19     5    25
    0    75   348    97   184    19    10    46
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320   100    64
sce                              3300 -11858    53 91500
    1    75   262  1997   184     0    30     0
    1    75   260  1997   184    19    30     0
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320   100    64
sce                              3300 -11858    53 91500
    3    75   351  1997   184     0    30     0
    3    75   348  1997   184    19    30     0
   50   700   152   101    38   160   100    64
   50   700   152   101    38   160   100    64
sce                              3300 -11858    53 91500
    4    75   262  1997   184     0    30     0
    4    75   260  1997   184    19    30     0
   50   700   152   101    38   160   100    64
   50   700   152   101    38   160   100    64
sce                              3300 -11858    53 91500
    1    75   260  1997   289     0    30     0
    1    75   264  1997   289    19    30     0
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320   100    64
sce                              3300 -11858    53 91500
    4    75   260  1997   289     0    30     0
    4    75   264  1997   289    19    30     0
   50   700   152   101    38   160   100    64
   50   700   152   101    38   160   100    64
scl                              3343 -11848    37 91500
    0    75   161    97   192    21    26    53
    0    75   163    97   192    21    42    49
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320   100    64
scl                              3343 -11848    37 91500
    3    75   161    97   192    21    30    13
    3    75   163    97   192    21    46     9
   50   700   138   101    39   160   100    64
   50   700   138   101    39   160   100    64
scl                              3343 -11848    37 91500
    0    75   163  1997   192     0    30     0
    0    75   161  1997   192    21    30     0
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320   100    64
scl                              3343 -11848    37 91500
    1    75    67  1997   192     0    30     0
    1    75    72  1997   192    21    30     0
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320   100    64
scl                              3343 -11848    37 91500
    3    75   163  1997   192     0    30     0
    3    75   161  1997   192    21    30     0
   50   700   138   101    39   160   100    64
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   50   700   138   101    39   160   100    64
scl                          3343 -11848    37 91500
    4    75    67  1997   192     0    30     0
    4    75    72  1997   192    21    30     0
   50   700   138   101    39   160   100    64
   50   700   138   101    39   160   100    64
simi valley upper air        3429 -11879   279 91500
    0    90   346  1997   177     0    30     0
    0    90   349  1997   177    19    30     0
   20   700   143   105    14    10    24  2048
   20   700   143   105    14    10    24  2048
simi valley upper air        3429 -11879   279 91500
    1    90   346  1997   177     0    30     0
    1    90   349  1997   177    19    30     0
   20   700   143   105    14    10    24  2048
   20   700   143   105    14    10    24  2048
simi valley upper air        3429 -11879   279 91500
    0    90   346    97   177    18     5    12
    0    90   349    97   177    18    54    42
   23   400   120    60    35   350    42    64
   23   400   120    60    35   350    42    64
simi valley upper air        3429 -11879   279 91500
    1    90   256    97   177    18     5    44
    1    90   259    97   177    18    55    14
   23   400   120    60    35   350    42    64
   23   400   120    60    35   350    42    64
simi valley upper air        3429 -11879   279 91500
    2    67   346    97   177    18     6    10
    2    67   349    97   177    18    55    40
   23   400   110    55    35   350    42    64
   23   400   110    55    35   350    42    64
simi valley upper air        3429 -11879   279 91500
    3    67   256    97   177    18     6    36
    3    67   259    97   177    18    56     6
   23   400   110    55    35   350    42    64
   23   400   110    55    35   350    42    64
simi valley upper air        3429 -11879   279 91500
    4    67   166    97   177    18     7     2
    4    67   169    97   177    18    56    32
   23   400   110    55    35   350    42    64
   23   400   110    55    35   350    42    64
simi valley upper air        3429 -11879   279 91500
    5    67    76    97   177    18     7    28
    5    67    79    97   177    18    56    58
   23   400   110    55    35   350    42    64
   23   400   110    55    35   350    42    64
simi valley upper air        3429 -11879   279 91500
    0    90   349    97   216    18     5    10
    0    90   256    97   216    18    32    46
   23   400   120    60    35   350    42    64
   23   400   120    60    35   350    42    64
simi valley upper air        3429 -11879   279 91500
    1    90   259    97   216    18     5    42
    1    67   346    97   216    18    36    23
   23   400   120    60    35   350    42    64
   23   400   110    55    35   350    42    64
simi valley upper air        3429 -11879   279 91500
    2    67   349    97   216    18     6     9
    2    67   256    97   216    18    36    49
   23   400   110    55    35   350    42    64
   23   400   110    55    35   350    42    64
simi valley upper air        3429 -11879   279 91500
    0     0     0  1997   259    15    30     0
    0    90   349  1997   259    16    30     0
    0     0     0     0     0     0     0     0
```

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   23   400   120    60    35   350    42    64
temecula                        3350 -11716   335 91500
    0    90   168    97   163    13     5    15
    0    90   168    97   163    13    46    53
   20   400   120    60    25   340    42    64
   20   400   120    60    25   380    46    64
temecula                        3350 -11716   335 91500
    1    66   348    97   163    13     5    39
    1    66   348    97   163    13    47    21
   20   400   110    55    25   340    42    64
   20   400   110    55    25   380    46    64
temecula                        3350 -11716   335 91500
    2    66   258    97   163    13     6     2
    2    66   258    97   163    13    48    50
   20   400   110    55    25   340    42    64
   20   400   110    55    25   380    46    64
temecula                        3350 -11716   335 91500
    3    66   258    97   163    13     6    23
    3    66   258    97   163    13    49    16
   41   700   254    96    30   340    42    64
   40   700   254    96    35   200    34    64
temecula                        3350 -11716   335 91500
    4    66   348    97   163    13     7     6
    4    66   348    97   163    13    49    39
   41   700   254    96    30   340    42    64
   40   700   254    96    35   200    34    64
temecula                        3350 -11716   335 91500
    5    90   168    97   163    13     7    49
    5    90   168    97   163    13    50     2
   41   700   278   105    30   340    42    64
   40   700   278   105    35   200    34    64
temecula                        3350 -11716   335 91500
    0    90   168  1997   172     0    30     0
    0    90   168  1997   172    16    30     0
   20   400   120    60    12    10    20  2048
   20   400   135    60    20    10    20  2048
temecula                        3350 -11716   335 91500
    1    90   168  1997   172     0    30     0
    1    90   168  1997   172    16    30     0
   20   400   120    60    12    10    20  2048
   20   400   135    60    20    10    20  2048
temecula                        3350 -11716   335 91500
    3    66   258  1997   172     0    30     0
    3    66   258  1997   172    15    30     0
   40   700   254    96    35   200    34    64
   40   700   254    96    40   200    34    64
temecula                        3350 -11716   335 91500
    4    66   348  1997   172     0    30     0
    4    66   348  1997   172    15    30     0
   40   700   254    96    35   200    34    64
   40   700   254    96    40   200    34    64
temecula                        3350 -11716   335 91500
    5    90   168  1997   172     0    30     0
    5    90   168  1997   172    15    30     0
   40   700   278   105    35   200    34    64
   40   700   278   105    40   200    34    64
tamu                            3364 -11616   -36 91500
    0    90   169  1997   164     9    30     0
    0    90   210  1997   164    15    30     0
   20   400   120    60    25    10    20  2048
   20   400   120    60    25    10    20  2048
tamu                            3364 -11616   -36 91500
    0    90   169  1997   164     9    30     0
    0    90   210  1997   164    17    30     0
   20   400   120    60    25    10    20  2048
```

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   20   400   120    60    15    10    20  2048
tamu                             3364 -11616   -36 91500
    0    90   169  1997   164     9    30     0
    0    90   210  1997   164    18    30     0
   20   400   120    60    25    10    20  2048
   20   400   120    60    12    10    20  2048
tamu                             3364 -11616   -36 91500
    1    90   169  1997   164     9    30     0
    1    90   210  1997   164    15    30     0
   20   400   120    60    25    10    20  2048
   20   400   120    60    25    10    20  2048
tamu                             3364 -11616   -36 91500
    1    90   169  1997   164     9    30     0
    1    90   210  1997   164    17    30     0
   20   400   120    60    25    10    20  2048
   20   400   120    60    15    10    20  2048
tamu                             3364 -11616   -36 91500
    1    90   169  1997   164     9    30     0
    1    90   210  1997   164    18    30     0
   20   400   120    60    25    10    20  2048
   20   400   120    60    12    10    20  2048
tamu                             3364 -11616   -36 91500
    0    90   169    97   164     9    33    55
    0    90   160    97   164     9    42    10
   23   400   120    60    25   340    42    64
   23   400   120    60    25   340    42    64
tamu                             3364 -11616   -36 91500
    1    66   169    97   164     9    34    33
    1    90    79    97   164     9    39    18
   23   400   110    55    25   340    42    64
   23   400   120    60    25   340    42    64
tamu                             3364 -11616   -36 91500
    1    66   169    97   164     9    34    33
    1    90    70    97   164     9    42    36
   23   400   110    55    25   340    42    64
   23   400   120    60    25   340    42    64
tamu                             3364 -11616   -36 91500
    2    66    79    97   164     9    34    59
    2    66   160    97   164     9    43     2
   23   400   110    55    25   340    42    64
   23   400   110    55    25   340    42    64
tamu                             3364 -11616   -36 91500
    3    66    79    97   164     9    35    24
    3    66    70    97   164     9    43    28
   43  2800   315   192    22   180    42    64
   23   400   110    55    25   340    42    64
tamu                             3364 -11616   -36 91500
    4    66   169    97   164     9    35    49
    4    66   349    97   164     9    40    36
   43  2800   315   192    22   180    42    64
   23   400   110    55    25   340    42    64
tamu                             3364 -11616   -36 91500
    4    66   169    97   164     9    35    49
    4    66   340    97   164     9    43    54
   43  2800   315   192    22   180    42    64
   23   400   110    55    25   340    42    64
tamu                             3364 -11616   -36 91500
    5    90   169    97   164     9    36    14
    5    66   250    97   164     9    44    20
   43  2800   345   210    22   180    42    64
   23   400   110    55    25   340    42    64
tamu                             3364 -11616   -36 91500
    0    90   160    97   164    10     0    34
    0    90   180    97   164    10    34    26
   23   400   120    60    25   340    42    64
```

23	400	120	60	20	340	42	64	
tamu					3364	-11616	-36	91500
0	90	160	97	164	10	0	34	
0	90	180	97	164	10	41	24	
23	400	120	60	25	340	42	64	
20	400	120	60	30	340	42	64	
tamu					3364	-11616	-36	91500
0	90	160	97	164	10	0	34	
0	66	180	97	164	10	45	11	
23	400	120	60	25	340	42	64	
20	400	110	55	30	340	42	64	
tamu					3364	-11616	-36	91500
0	90	160	97	164	10	0	34	
0	66	270	97	164	10	47	33	
23	400	120	60	25	340	42	64	
20	400	110	55	30	340	42	64	
tamu					3364	-11616	-36	91500
1	90	70	97	164	10	1	0	
1	90	90	97	164	10	34	51	
23	400	120	60	25	340	42	64	
23	400	120	60	20	340	42	64	
tamu					3364	-11616	-36	91500
1	90	70	97	164	10	1	0	
1	90	90	97	164	10	41	47	
23	400	120	60	25	340	42	64	
20	400	120	60	30	340	42	64	
tamu					3364	-11616	-36	91500
1	90	70	97	164	10	1	0	
1	66	0	97	164	10	45	51	
23	400	120	60	25	340	42	64	
20	400	110	55	30	340	42	64	
tamu					3364	-11616	-36	91500
1	90	70	97	164	10	1	0	
1	66	90	97	164	10	47	56	
23	400	120	60	25	340	42	64	
20	400	110	55	30	340	42	64	
tamu					3364	-11616	-36	91500
2	66	160	97	164	10	1	26	
2	66	180	97	164	10	35	16	
23	400	110	55	25	340	42	64	
23	400	110	55	20	340	42	64	
tamu					3364	-11616	-36	91500
3	66	70	97	164	10	1	52	
3	66	90	97	164	10	35	40	
23	400	110	55	25	340	42	64	
23	400	110	55	20	340	42	64	
tamu					3364	-11616	-36	91500
4	66	340	97	164	10	2	18	
4	66	0	97	164	10	36	5	
23	400	110	55	25	340	42	64	
23	400	110	55	20	340	42	64	
tamu					3364	-11616	-36	91500
5	66	250	97	164	10	2	44	
5	66	270	97	164	10	36	30	
23	400	110	55	25	340	42	64	
23	400	110	55	20	340	42	64	
tamu					3364	-11616	-36	91500
0	90	180	97	164	11	0	39	
0	90	210	97	164	11	21	26	
20	400	120	60	30	340	42	64	
20	400	120	60	25	340	42	64	
tamu					3364	-11616	-36	91500
1	90	90	97	164	11	1	2	
1	90	120	97	164	11	21	49	
20	400	120	60	30	340	42	64	

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   20   400   120    60    25   340    42    64
tamu                           3364 -11616   -36 91500
    1    90    90    97   164    11     1     2
    1    66   210    97   164    11    27     9
   20   400   120    60    30   340    42    64
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tamu                           3364 -11616   -36 91500
    2    66   180    97   164    11     1    25
    2    66   300    97   164    11    27    31
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   20   400   110    55    25   340    42    64
tamu                           3364 -11616   -36 91500
    3    66    90    97   164    11     1    47
    3    66   120    97   164    11    22    33
   20   400   110    55    30   340    42    64
   20   400   110    55    25   340    42    64
tamu                           3364 -11616   -36 91500
    3    66    90    97   164    11     1    47
    3    66   300    97   164    11    27    52
   20   400   110    55    30   340    42    64
   41   700   254    96    35   340    42    64
tamu                           3364 -11616   -36 91500
    4    66     0    97   164    11     2    10
    4    66    30    97   164    11    22    55
   20   400   110    55    30   340    42    64
   20   400   110    55    25   340    42    64
tamu                           3364 -11616   -36 91500
    4    66     0    97   164    11     2    10
    4    66   210    97   164    11    28    34
   20   400   110    55    30   340    42    64
   41   700   254    96    35   340    42    64
tamu                           3364 -11616   -36 91500
    5    66   270    97   164    11     2    32
    5    90   210    97   164    11    29    16
   20   400   110    55    30   340    42    64
   41   700   278   105    35   340    42    64
thermal                        3364 -11616   -36 91500
    0    90   211    97   165    14     0    23
    0    90   210    97   165    14     0    38
   20   400   120    60    12    10    20  2048
   20   400   120    60    12    10    20  2048
thermal                        3364 -11616   -36 91500
    1    90   211    97   165    14     0    23
    1    90   210    97   165    14     0    38
   20   400   120    60    12    10    20  2048
   20   400   120    60    12    10    20  2048
thermal                        3364 -11616   -36 91500
    0    90   210    97   165    15     0    37
    0    90   211    97   165    15     0    44
   20   400   120    60    12    10    20  2048
   20   400   120    60    12    10    20  2048
thermal                        3364 -11616   -36 91500
    1    90   210    97   165    15     0    37
    1    90   211    97   165    15     0    44
   20   400   120    60    12    10    20  2048
   20   400   120    60    12    10    20  2048
thermal                        3364 -11616   -36 91500
    0    90   210  1997   165     0    30     0
    0    90   211  1997   165    14    30     0
   20   400   120    60    12    10    20  2048
   20   400   120    60    12    10    20  2048
thermal                        3364 -11616   -36 91500
    1    90   210  1997   165     0    30     0
    1    90   211  1997   165    14    30     0
   20   400   120    60    12    10    20  2048
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   20   400   120    60    12    10    20  2048
thermal                        3364 -11616   -36 91500
    0    90   210    97   165    13     5    12
    0    90   211    97   165    13    34    41
   20   400   120    60    25   340    42    64
   20   400   120    60    25   340    42    64
thermal                        3364 -11616   -36 91500
    1    66   210    97   165    13     5    35
    1    66   211    97   165    13    35     5
   20   400   110    55    25   340    42    64
   20   400   110    55    25   340    42    64
thermal                        3364 -11616   -36 91500
    2    66   300    97   165    13     5    57
    2    66   301    97   165    13    35    27
   20   400   110    55    25   340    42    64
   20   400   110    55    25   340    42    64
thermal                        3364 -11616   -36 91500
    3    66   300    97   165    13     6    18
    3    66   301    97   165    13    35    48
   41   700   254    96    35   340    42    64
   41   700   254    96    35   340    42    64
thermal                        3364 -11616   -36 91500
    4    66   210    97   165    13     7     0
    4    66   211    97   165    13    36    30
   41   700   254    96    35   340    42    64
   41   700   254    96    35   340    42    64
thermal                        3364 -11616   -36 91500
    5    90   210    97   165    13     7    42
    5    90   211    97   165    13    37    12
   41   700   278   105    35   340    42    64
   41   700   278   105    35   340    42    64
thermal                        3364 -11616   -36 91500
    0    90   211    97   165    14     5    15
    0    90   210    97   165    14     5    18
   20   400   120    60    25   340    42    64
   20   400   120    60    25   340    42    64
thermal                        3364 -11616   -36 91500
    1    66   211    97   165    14     5    38
    1    66   210    97   165    14     5    41
   20   400   110    55    25   340    42    64
   20   400   110    55    25   340    42    64
thermal                        3364 -11616   -36 91500
    2    66   301    97   165    14     6     1
    2    66   300    97   165    14     6     3
   20   400   110    55    25   340    42    64
   20   400   110    55    25   340    42    64
thermal                        3364 -11616   -36 91500
    3    66   301    97   165    14     6    21
    3    66   300    97   165    14     6    24
   41   700   254    96    35   340    42    64
   41   700   254    96    35   340    42    64
thermal                        3364 -11616   -36 91500
    4    66   211    97   165    14     7     4
    4    66   210    97   165    14     7     6
   41   700   254    96    35   340    42    64
   41   700   254    96    35   340    42    64
thermal                        3364 -11616   -36 91500
    5    90   211    97   165    14     7    46
    5    90   210    97   165    14     7    49
   41   700   278   105    35   340    42    64
   41   700   278   105    35   340    42    64
thermal                        3364 -11616   -36 91500
    0    90   211    97   165    15     5    11
    0    90   210    97   165    15     5    16
   20   400   120    60    25   340    42    64
```

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   20   400   120    60    25   340    42    64
thermal                        3364 -11616   -36 91500
    1    66   211    97   165    15     5    35
    1    66   210    97   165    15     5    39
   20   400   110    55    25   340    42    64
   20   400   110    55    25   340    42    64
thermal                        3364 -11616   -36 91500
    2    66   301    97   165    15     5    57
    2    66   300    97   165    15     6     1
   20   400   110    55    25   340    42    64
   20   400   110    55    25   340    42    64
thermal                        3364 -11616   -36 91500
    3    66   301    97   165    15     6    18
    3    66   300    97   165    15     6    22
   41   700   254    96    35   340    42    64
   41   700   254    96    35   340    42    64
thermal                        3364 -11616   -36 91500
    4    66   211    97   165    15     7     0
    4    66   210    97   165    15     7     4
   41   700   254    96    35   340    42    64
   41   700   254    96    35   340    42    64
thermal                        3364 -11616   -36 91500
    5    90   211    97   165    15     7    42
    5    90   210    97   165    15     7    46
   41   700   278   105    35   340    42    64
   41   700   278   105    35   340    42    64
thermal                        3364 -11616   -36 91500
    0    90   211  1997   170     7    30     0
    0    90   211  1997   170    15    30     0
   20   400   120    60    25   340    42    64
   20   400   120    60    25   400    42    64
thermal                        3364 -11616   -36 91500
    1    66   211  1997   170     7    30     0
    1    66   211  1997   170    15    30     0
   20   400   110    55    25   340    42    64
   20   400   110    55    25   400    42    64
thermal                        3364 -11616   -36 91500
    2    66   301  1997   170     7    30     0
    2    66   301  1997   170    15    30     0
   20   400   110    55    25   340    42    64
   20   400   110    55    25   400    42    64
thermal                        3364 -11616   -36 91500
    3    66   301  1997   170     7    30     0
    3    66   301  1997   170    15    30     0
   41   700   254    96    35   340    42    64
   40   700   254    96    40   200    42    64
thermal                        3364 -11616   -36 91500
    4    66   211  1997   170     7    30     0
    4    66   211  1997   170    15    30     0
   41   700   254    96    35   340    42    64
   40   700   254    96    40   200    42    64
thermal                        3364 -11616   -36 91500
    5    90   211  1997   170     7    30     0
    5    90   211  1997   170    15    30     0
   41   700   278   105    35   340    42    64
   40   700   278   105    40   200    42    64
thermal                        3364 -11616   -36 91500
    0    90   211    97   171     1     3    53
    0    90   211    97   171     1    13    32
   20   400   120    60    25   400    42    64
   20   400   135    60    25   400    42    64
thermal                        3364 -11616   -36 91500
    1    66   211    97   171     1     4    21
    1    66   211    97   171     1    16    35
   20   400   110    55    25   400    42    64
```

20	400	123	55	25	400	42	64	
thermal					3364	-11616	-36	91500
2	66	301	97	171	1	4	47	
2	66	301	97	171	1	17	2	
20	400	110	55	25	400	42	64	
20	400	123	55	25	400	42	64	
usc					3400	-11828	67	91500
0	66	136	1997	183	0	30	0	
0	66	117	1997	183	19	30	0	
25	400	164	55	38	320	100	64	
25	400	164	55	38	320	100	64	
usc					3400	-11828	67	91500
1	66	226	1997	183	0	30	0	
1	66	207	1997	183	19	30	0	
25	400	164	55	38	320	100	64	
25	400	164	55	38	320	100	64	
usc					3400	-11828	67	91500
3	66	136	1997	183	0	30	0	
3	66	117	1997	183	19	30	0	
50	700	158	96	38	160	100	64	
50	700	158	96	38	160	100	64	
usc					3400	-11828	67	91500
4	66	226	1997	183	0	30	0	
4	66	207	1997	183	19	30	0	
50	700	158	96	38	160	100	64	
50	700	158	96	38	160	100	64	
usc					3400	-11828	67	91500
0	90	0	1997	190	1	30	0	
0	90	0	1997	190	2	30	0	
25	700	158	105	15	8	25	2048	
25	700	188	105	15	8	25	2048	
usc					3400	-11828	67	91500
1	90	0	1997	190	1	30	0	
1	90	0	1997	190	2	30	0	
25	700	158	105	15	8	25	2048	
25	700	188	105	15	8	25	2048	
usc					3400	-11828	67	91500
0	66	117	97	190	0	46	31	
0	66	117	97	190	0	51	52	
25	400	144	55	38	320	100	64	
30	400	158	55	38	268	50	64	
usc					3400	-11828	67	91500
1	66	207	97	190	0	47	42	
1	66	207	97	190	0	52	30	
25	400	144	55	38	320	100	64	
30	400	158	55	38	268	50	64	
usc					3400	-11828	67	91500
2	90	0	97	190	0	48	46	
2	90	0	97	190	0	53	3	
25	400	158	60	38	320	100	64	
30	400	173	60	38	268	50	64	
usc					3400	-11828	67	91500
0	66	117	97	190	1	7	17	
0	66	117	97	190	1	50	57	
25	400	158	55	38	320	50	64	
25	400	164	55	38	320	50	64	
usc					3400	-11828	67	91500
1	66	207	97	190	1	7	51	
1	66	207	97	190	1	52	11	
25	400	158	55	38	320	50	64	
25	400	164	55	38	320	50	64	
usc					3400	-11828	67	91500
2	90	0	97	190	1	8	23	
2	90	0	97	190	1	54	50	
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usc                              3400 -11828    67 91500
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usc                              3400 -11828    67 91500
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usc                              3400 -11828    67 91500
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usc                              3400 -11828    67 91500
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usc                              3400 -11828    67 91500
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usc                              3400 -11828    67 91500
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usc                              3400 -11828    67 91500
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usc                              3400 -11828    67 91500
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usc                              3400 -11828    67 91500
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usc                              3400 -11828    67 91500
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usc                             3400 -11828    67 91500
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usc                             3400 -11828    67 91500
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usc                             3400 -11828    67 91500
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usc                             3400 -11828    67 91500
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usc                             3400 -11828    67 91500
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usc                             3400 -11828    67 91500
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usc                             3400 -11828    67 91500
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usc                             3400 -11828    67 91500
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vandenberg                      3477 -12053   149 44900
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1	90	0	1997	174	17	30	0	
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vandenberg					3477	-12053	149	44900
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0	90	0	97	174	16	39	16	
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vandenberg					3477	-12053	149	44900
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vandenberg					3477	-12053	149	44900
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131	7100	2496	240	64	72	24	128	
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67	2000	482	230	36	155	16	128	
vandenberg					3477	-12053	149	44900
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vandenberg                      3477 -12053   149 44900
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vandenberg                      3477 -12053   149 44900
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vandenberg                      3477 -12053   149 44900
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vandenberg                     3477 -12053   149  44900
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vandenberg                     3477 -12053   149  44900
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vandenberg                     3477 -12053   149  44900
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   43  1200   281   115    44   323    15   128
vandenberg                     3477 -12053   149  44900
    2    73     0    97   226    20     4    58
    2    73     0    97   226    20    26    18
   67  2000   482   230    36   155    32   128
   67  2000   482   230    36   155    16   128
vandenberg                     3477 -12053   149  44900
    2    73     0    97   226    20     4    58
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vandenberg                     3477 -12053   149  44900
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    3    73     0    97   226    20    26    41
  131  7100  6690   230    44    72    48   128
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43	1200	281	115	44	323	15	128	
vandenberg					3477	-12053	149	44900
4	73	90	97	226	20	6	45	
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67	2000	482	230	36	155	32	128	
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vandenberg					3477	-12053	149	44900
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vandenberg					3477	-12053	149	44900
0	90	0	1997	226	0	30	0	
0	90	0	1997	226	20	30	0	
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vandenberg					3477	-12053	149	44900
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vandenberg					3477	-12053	149	44900
2	73	180	1997	226	0	30	0	
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67	2000	482	230	36	155	32	128	
vandenberg					3477	-12053	149	44900
3	73	90	1997	226	0	30	0	
3	73	0	1997	226	20	30	0	
43	1200	281	115	44	323	15	128	
131	7100	6690	230	44	72	48	128	
vandenberg					3477	-12053	149	44900
4	73	270	1997	226	0	30	0	
4	73	90	1997	226	20	30	0	
43	1200	281	115	44	323	15	128	
67	2000	482	230	36	155	32	128	
vandenberg					3477	-12053	149	44900
5	73	180	1997	226	19	30	0	
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131	7100	6690	230	44	72	30	128	
131	7100	2387	230	64	72	30	128	
vandenberg					3477	-12053	149	44900
8	73	90	1997	226	19	30	0	
8	90	0	1997	226	20	30	0	
67	2000	482	230	36	155	16	128	
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vandenberg					3477	-12053	149	44900
12	73	0	1997	226	19	30	0	
12	73	0	1997	226	20	30	0	
67	2000	482	230	36	155	16	128	
131	7100	2387	230	64	72	30	128	
vandenberg					3477	-12053	149	44900
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vandenberg					3477	-12053	149	44900
0	90	0	1997	233	0	30	0	
0	90	0	1997	233	19	30	0	
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vandenberg                     3477 -12053   149 44900
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   37  1200   234   120    26    12    12  2048
vandenberg                     3477 -12053   149 44900
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   43  1200   294   120    44   256    24   128
vandenberg                     3477 -12053   149 44900
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    1    90     0    97   233    18    48    52
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vandenberg                     3477 -12053   149 44900
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   43  1200   281   115    44   256    24   128
vandenberg                     3477 -12053   149 44900
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   81  2000  2490   230    32   124    42   128
vandenberg                     3477 -12053   149 44900
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   43  1200   281   115    44   256    24   128
vandenberg                     3477 -12053   149 44900
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    0    90     0    97   234    18    20    25
   43  1200   294   120    44   256    24   128
   43  1200   294   120    44   323    15   128
vandenberg                     3477 -12053   149 44900
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   81  2000  2604   240    32   124    42   128
   43  1200   281   115    44   323    15   128
vandenberg                     3477 -12053   149 44900
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   37  1200   234   120    26    12    12  2048
vandenberg                     3477 -12053   149 44900
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   37  1200   234   120    26    12    12  2048
vandenberg                     3477 -12053   149 44900
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   43  1200   294   120    44   323    15   128
   43  1200   294   120    44   256    24   128
vandenberg                     3477 -12053   149 44900
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   67  2000   504   240    36   155    16   128
vandenberg                     3477 -12053   149 44900
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   43  1200   281   115    44   323    15   128
```

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vandenberg                     3477 -12053   149  44900
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vandenberg                     3477 -12053   149  44900
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 131  7100  6690   230    44    72    30   128
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vandenberg                     3477 -12053   149  44900
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vandenberg                     3477 -12053   149  44900
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 131  7100  6690   230    44    72    30   128
vandenberg                     3477 -12053   149  44900
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vandenberg                     3477 -12053   149  44900
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  43  1200   281   115    44   323    15   128
  81  2000  2604   240    32   124    42   128
vandenberg                     3477 -12053   149  44900
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   2    73     0    97   237    17    28    38
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vandenberg                     3477 -12053   149  44900
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vandenberg                     3477 -12053   149  44900
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  43  1200   281   115    44   323    15   128
```

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vandenberg                     3477 -12053   149 44900
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vandenberg                     3477 -12053   149 44900
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vandenberg                     3477 -12053   149 44900
    1    73     0  1997   239    19    30     0
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   81  2000  2604   240    32   124    28   128
vandenberg                     3477 -12053   149 44900
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vandenberg                     3477 -12053   149 44900
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vandenberg                     3477 -12053   149 44900
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    0    90     0    97   268     9     1    25
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   37  1200   234   120    26     0    12  2048
vlc                            3325 -11704   415 91500
    0    90     0  1997   177     1    30     0
    0    90   359  1997   177    19    30     0
   20   400   120    60    25    10    20  2048
   20   400   120    60    25    10    20  2048
vlc                            3325 -11704   415 91500
    0    90     0  1997   177     1    30     0
    0    90   359  1997   177    20    30     0
   20   400   120    60    25    10    20  2048
   20   700   113   105    20    10    20  2048
vlc                            3325 -11704   415 91500
    1    90     0  1997   177     1    30     0
    1    90   359  1997   177    19    30     0
   20   400   120    60    25    10    20  2048
   20   400   120    60    25    10    20  2048
vlc                            3325 -11704   415 91500
    1    90     0  1997   177     1    30     0
    1    90   359  1997   177    20    30     0
   20   400   120    60    25    10    20  2048
   20   700   113   105    20    10    20  2048
vlc                            3325 -11704   415 91500
    0    90   359    97   177    21     5     7
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vlc                            3325 -11704   415 91500
    1    66   359    97   177    21     5    32
    1    66   359    97   177    21    53    36
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vlc                            3325 -11704   415 91500
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   23   400   110    55    25   340    42    64
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vlc                        3325 -11704   415 91500
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vlc                        3325 -11704   415 91500
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vlc                        3325 -11704   415 91500
    5    90   359    97   177    21     7    11
    5    90   359    97   177    21    55    14
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vlc                        3325 -11704   415 91500
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vlc                        3325 -11704   415 91500
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    1    66   359  1997   177    18    30     0
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   23   400   110    55    25   340    42    64
vlc                        3325 -11704   415 91500
    2    66   270  1997   177     0    30     0
    2    66   269  1997   177    18    30     0
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   23   400   110    55    25   340    42    64
vlc                        3325 -11704   415 91500
    3    66   270  1997   177     0    30     0
    3    66   269  1997   177    18    30     0
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   23   700   116    96    25   340    42    64
vlc                        3325 -11704   415 91500
    4    66     0  1997   177     0    30     0
    4    66   359  1997   177    18    30     0
   43  2800   315   192    22   180    42    64
   23   700   116    96    25   340    42    64
vlc                        3325 -11704   415 91500
    5    90     0  1997   177     0    30     0
    5    90   359  1997   177    18    30     0
   43  2800   345   210    22   180    42    64
   23   700   128   105    25   340    42    64
vlc, valley center         3325 -11704   415 91500
    0    90   359  1997   178     0    30     0
    0    90   359  1997   178    17    30     0
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   20   700   143   105    20    10    20  2048
vlc, valley center         3325 -11704   415 91500
    1    90   359  1997   178     0    30     0
    1    90   359  1997   178    17    30     0
   20   700   113   105    20    10    20  2048
   20   700   143   105    20    10    20  2048
vlc, valley center         3325 -11704   415 91500
    0    90   359  1997   182     0    30     0
    0    90   359  1997   182    17    30     0
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vlc, valley center         3325 -11704   415 91500
    1    90   359  1997   182     0    30     0
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   20   700   143   105    20    10    20  2048
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vlc, valley center          3325 -11704   415 91500
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vlc, valley center          3325 -11704   415 91500
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vlc, valley center          3325 -11704   415 91500
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vlc, valley center          3325 -11704   415 91500
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   23   700   144    96    25   340    42    64
vlc, valley center          3325 -11704   415 91500
    4    66   359    97   184    18     6    53
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   43  2800   315   192    22   180    42    64
   23   700   144    96    25   340    42    64
vlc, valley center          3325 -11704   415 91500
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    5    90   359    97   184    18    36    50
   43  2800   345   210    22   180    42    64
   23   700   158   105    25   340    42    64
vlc, valley center          3325 -11704   415 91500
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    0    90   356  1997   201    23    30     0
   20   700   113   105    20    10    20  2048
   20   700   113   105    20    10    20  2048
vlc, valley center          3325 -11704   415 91500
    1    90   359  1997   201     0    30     0
    1    90   356  1997   201    23    30     0
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   20   700   113   105    20    10    20  2048
vlc, valley center          3325 -11704   415 91500
    0    90   359    97   201    17     5    22
    0    90     0    97   201    17    25    26
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   23   400   120    60    25   340    42    64
vlc, valley center          3325 -11704   415 91500
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    1    66     0    97   201    17    25    52
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   23   400   110    55    25   340    42    64
vlc, valley center          3325 -11704   415 91500
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    0    90   356    97   201    22     9     3
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   23   400   150    60    25   340    42    64
vlc, valley center          3325 -11704   415 91500
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    1    66   356    97   201    22     9    29
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   23   400   137    55    25   340    42    64
vlc, valley center          3325 -11704   415 91500
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    2    66   266    97   201    22     9    54
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   23   400   137    55    25   340    42    64
vlc, valley center          3325 -11704   415 91500
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vlc, valley center          3325 -11704   415 91500
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vlc, valley center          3325 -11704   415 91500
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vlc, valley center          3325 -11704   415 91500
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vlc, valley center          3325 -11704   415 91500
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   23   400   137    55    25   340    42    64
vlc, valley center          3325 -11704   415 91500
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vlc, valley center          3325 -11704   415 91500
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vlc, valley center          3325 -11704   415 91500
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vlc, valley center          3325 -11704   415 91500
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   20   400   150    60    25    10    20  2048
vlc, valley center          3325 -11704   415 91500
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   20   400   150    60    20    10    20  2048
vlc, valley center          3325 -11704   415 91500
    1    90   356  1997   209     0    30     0
    1    90   356  1997   209    20    30     0
   20   400   150    60    25    10    20  2048
   20   400   150    60    20    10    20  2048
vlc, valley center          3325 -11704   415 91500
    3    66   266    97   227    14     6    33
    3    66   266    97   227    14    36    13
   23   700   144    96    25   340    42    64
   46   700   144    96    38   174    42    64
vlc, valley center          3325 -11704   415 91500
    4    66   356    97   227    14     6    58
    4    66   356    97   227    14    36    39
   23   700   144    96    25   340    42    64
```

```
   46   700   144    96    38   174    42    64
vlc, valley center          3325 -11704   415 91500
    5    90   356    97   227    14     7    23
    5    90   356    97   227    14    37     5
   23   700   158   105    25   340    42    64
   46   700   158   105    38   174    42    64
vns                         3421 -11849   241 91500
    0    75   134  1997   191     0    30     0
    0    75   128  1997   191    20    30     0
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320   100    64
vns                         3421 -11849   241 91500
    1    75    29  1997   191     0    30     0
    1    75    28  1997   191    20    30     0
   25   400   152    58    38   320   100    64
   25   400   152    58    38   320   100    64
vns                         3421 -11849   241 91500
    3    75   134  1997   191     0    30     0
    3    75   128  1997   191    20    30     0
   50   700   152   101    38   160   100    64
   50   700   152   101    38   160   100    64
vns                         3421 -11849   241 91500
    4    75    29  1997   191     0    30     0
    4    75    28  1997   191    20    30     0
   50   700   152   101    38   160   100    64
   50   700   152   101    38   160   100    64
```

Appendix B: Rawinsonde Data Inventory

ASCII data files containing rawinsonde data are listed according to station, whose abbreviated name is given in Table IIId.

bkr

s071405.dat	s080523.dat	s082311.dat	s090523.dat	s092805.dat
s071411.dat	s080605.dat	s082317.dat	s090605.dat	s092811.dat
s071417.dat	s080611.dat	s082323.dat	s090611.dat	s092817.dat
s080405.dat	s080617.dat	s090405.dat	s090617.dat	s092823.dat
s080411.dat	s080623.dat	s090411.dat	s090623.dat	s092905.dat
s080417.dat	s082205.dat	s090417.dat	s092705.dat	s092911.dat
s080423.dat	s082211.dat	s090423.dat	s092711.dat	s092917.dat
s080505.dat	s082217.dat	s090505.dat	s092717.dat	
s080511.dat	s082223.dat	s090511.dat	s092723.dat	
s080517.dat	s082305.dat	s090517.dat	s092802.dat	

btw

btw92510.dat	btw92511.dat	readme.txt

ce

ce101908.dat	ce101917.dat	ce103013.dat	ce103110.dat	ce110107.dat
ce101911.dat	ce103007.dat	ce103016.dat	ce103113.dat	ce110110.dat
ce101914.dat	ce103010.dat	ce103107.dat	ce103116.dat	ce110113.dat

eco

eco92411.dat	eco92412.dat	readme.txt

edw

97071413.edw	97080606.edw	97090412.edw	97090706.edw	97093006.edw
97071418.edw	97080612.edw	97090419.edw	97092711.edw	97100317.edw
97071423.edw	97080705.edw	97090500.edw	97092718.edw	97100323.edw
97071506.edw	97082212.edw	97090506.edw	97092723.edw	97100406.edw
97080412.edw	97082215.edw	97090512.edw	97092806.edw	97100411.edw
97080418.edw	97082218.edw	97090518.edw	97092818.edw	97100418.edw
97080500.edw	97082300.edw	97090600.edw	97092823.edw	97100423.edw
97080506.edw	97082306.edw	97090606.edw	97092906.edw	97100506.edw
97080512.edw	97082312.edw	97090612.edw	97092912.edw	
97080518.edw	97082400.edw	97090618.edw	97092918.edw	
97080600.edw	97082406.edw	97090700.edw	97092923.edw	

hpa

hpa92312.dat	hpa92508.dat	readme.txt

mtx

97080414.mtx	97080715.mtx	97090503.mtx	97092803.mtx	97100403.mtx
97080420.mtx	97080721.mtx	97090509.mtx	97092809.mtx	97100409.mtx
97080503.mtx	97080803.mtx	97090515.mtx	97092815.mtx	97100415.mtx
97080515.mtx	97082215.mtx	97090521.mtx	97092821.mtx	97100422.mtx
97080521.mtx	97082221.mtx	97090603.mtx	97092903.mtx	97100500.mtx
97080602.mtx	97082302.mtx	97090609.mtx	97092909.mtx	97100503.mtx
97080608.mtx	97082315.mtx	97090615.mtx	97092915.mtx	97100506.mtx
97080615.mtx	97082320.mtx	97090621.mtx	97092921.mtx	97100512.mtx
97080621.mtx	97082403.mtx	97090703.mtx	97093003.mtx	97100518.mtx
97080703.mtx	97090415.mtx	97092323.mtx	97100315.mtx	97100600.mtx
97080708.mtx	97090421.mtx	97092721.mtx	97100321.mtx	97100606.mtx

nid

97071411.nid	97080512.nid	97082212.nid	97092915.nid	97100417.nid
97071418.nid	97080518.nid	97082218.nid	97092918.nid	97100423.nid
97071500.nid	97080521.nid	97082223.nid	97100312.nid	
97080412.nid	97080523.nid	97082312.nid	97100318.nid	

97080418.nid	97080612.nid	97082318.nid	97100323.nid
97080423.nid	97080617.nid	97082323.nid	97100412.nid

nkx

03190970.701	03190970.802	03190970.902
03190970.801	03190970.901	03190971.001

nsi

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97071417.nsi	97080618.nsi	97082406.nsi	97090612.nsi	97093002.nsi
97071423.nsi	97080621.nsi	97082412.nsi	97090618.nsi	97100312.nsi
97071500.nsi	97080700.nsi	97082418.nsi	97090623.nsi	97100318.nsi
97080417.nsi	97080706.nsi	97082423.nsi	97092712.nsi	97100400.nsi
97080420.nsi	97080712.nsi	97082506.nsi	97092719.nsi	97100406.nsi
97080500.nsi	97080717.nsi	97090400.nsi	97092800.nsi	97100412.nsi
97080505.nsi	97080720.nsi	97090412.nsi	97092805.nsi	97100418.nsi
97080512.nsi	97082213.nsi	97090417.nsi	97092811.nsi	97100500.nsi
97080514.nsi	97082218.nsi	97090500.nsi	97092818.nsi	97100505.nsi
97080518.nsi	97082300.nsi	97090505.nsi	97092900.nsi	97100512.nsi
97080521.nsi	97082305.nsi	97090512.nsi	97092905.nsi	97100518.nsi
97080523.nsi	97082312.nsi	97090517.nsi	97092912.nsi	97100600.nsi
97080606.nsi	97082318.nsi	97090600.nsi	97092917.nsi	97100606.nsi

ntd

97071412.ntd	97080611.ntd	97082318.ntd	97090600.ntd	97092906.ntd
97071418.ntd	97080618.ntd	97082323.ntd	97090605.ntd	97092911.ntd
97071423.ntd	97080623.ntd	97082405.ntd	97090612.ntd	97092917.ntd
97080411.ntd	97080705.ntd	97082412.ntd	97090617.ntd	97092923.ntd
97080415.ntd	97080711.ntd	97082418.ntd	97090705.ntd	97093006.ntd
97080418.ntd	97080717.ntd	97082500.ntd	97092711.ntd	97100312.ntd
97080500.ntd	97080723.ntd	97082505.ntd	97092713.ntd	97100318.ntd
97080505.ntd	97082212.ntd	97090411.ntd	97092717.ntd	97100400.ntd
97080511.ntd	97082217.ntd	97090418.ntd	97092800.ntd	97100405.ntd
97080514.ntd	97082223.ntd	97090423.ntd	97092805.ntd	97100412.ntd
97080517.ntd	97082303.ntd	97090506.ntd	97092812.ntd	
97080600.ntd	97082306.ntd	97090511.ntd	97092818.ntd	
97080605.ntd	97082312.ntd	97090517.ntd	97092823.ntd	

ntk

97071411.ntk	97080500.ntk	97080600.ntk	97080700.ntk	97082312.ntk
97080400.ntk	97080506.ntk	97080606.ntk	97080712.ntk	97082318.ntk
97080412.ntk	97080512.ntk	97080612.ntk	97082212.ntk	97082400.ntk
97080418.ntk	97080518.ntk	97080618.ntk	97082218.ntk	97082406.ntk

ntn

ntn92419.dat	ntn92422.dat	readme.txt

nxp

97071412.nxp	97080600.nxp	97082312.nxp	97090512.nxp	97092712.nxp
97071502.nxp	97080606.nxp	97082318.nxp	97090518.nxp	97092718.nxp
97080412.nxp	97080612.nxp	97082400.nxp	97090600.nxp	97092723.nxp
97080418.nxp	97080618.nxp	97082406.nxp	97090606.nxp	97092817.nxp
97080500.nxp	97080700.nxp	97090412.nxp	97090612.nxp	97092900.nxp
97080506.nxp	97080706.nxp	97090418.nxp	97090700.nxp	97092905.nxp
97080512.nxp	97082300.nxp	97090500.nxp	97090706.nxp	97092922.nxp
97080518.nxp	97082306.nxp	97090505.nxp	97090712.nxp	97100406.nxp

nxx

97080518.nxx	97080600.nxx	97080701.nxx	97080706.nxx	97082405.nxx

nzj

97092717.nzj	97092723.nzj	97092811.nzj	97092911.nzj

nzy

97071417.nzy	97082218.nzy	97090418.nzy	97090623.nzy	97093006.nzy
97071423.nzy	97082306.nzy	97090500.nzy	97090700.nzy	97100313.nzy
97080518.nzy	97082312.nzy	97090506.nzy	97092812.nzy	97100318.nzy
97080600.nzy	97082318.nzy	97090511.nzy	97092818.nzy	97100401.nzy
97080700.nzy	97082400.nzy	97090512.nzy	97092823.nzy	97100406.nzy
97080706.nzy	97082406.nzy	97090611.nzy	97092905.nzy	97100412.nzy
97082212.nzy	97090412.nzy	97090612.nzy	97092912.nzy	97100417.nzy
97082213.nzy	97090413.nzy	97090617.nzy	97092917.nzy	97100422.nzy
97082217.nzy	97090417.nzy	97090618.nzy	97092923.nzy	97100505.nzy

po

po071405.dat	po080523.dat	po090405.dat	po090617.dat	po100305.dat
po071411.dat	po080605.dat	po090411.dat	po090623.dat	po100311.dat
po071417.dat	po080611.dat	po090417.dat	po092806.dat	po100317.dat
po080407.dat	po082205.dat	po090423.dat	po092811.dat	po100318.dat
po080411.dat	po082211.dat	po090511.dat	po092817.dat	po100323.dat
po080417.dat	po082217.dat	po090517.dat	po092823.dat	po100405.dat
po080423.dat	po082223.dat	po090518.dat	po092905.dat	po100411.dat
po080505.dat	po082305.dat	po090523.dat	po092911.dat	po100417.dat
po080511.dat	po082311.dat	po090605.dat	po092917.dat	
po080517.dat	po082323.dat	po090611.dat	po092923.dat	

rsd

rsd92315.dat rsd92417.dat

ship

ship_ua.a ship_ua.b

tml

tml92319.dat tml92408.dat

vafb

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1997aug11115.raw	1997jul31450.raw	1997oct21115.raw
1997aug112315.raw	1997jul31620.raw	1997oct212315.raw
1997aug11422.raw	1997jul31720.raw	1997oct22110.raw
1997aug11822.raw	1997jul31820.raw	1997oct221115.raw
1997aug121115.raw	1997jul32315.raw	1997oct221800.raw
1997aug121853.raw	1997jul41115.raw	1997oct222315.raw
1997aug122315.raw	1997jul42315.raw	1997oct22315.raw
1997aug12315.raw	1997jul51115.raw	1997oct231115.raw
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1997aug140037.raw	1997jul61115.raw	1997oct232122.raw
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1997aug142315.raw	1997jul71115.raw	1997oct232352.raw
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1997jul122315.raw	1997jun52315.raw	1997sep231115.raw
1997jul12315.raw	1997jun61115.raw	1997sep232055.raw
1997jul131115.raw	1997jun61631.raw	1997sep232315.raw
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1997jul152315.raw	1997jun92315.raw	1997sep261923.raw
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1997jul181115.raw	1997oct110052.raw	1997sep272315.raw
1997jul182315.raw	1997oct111115.raw	1997sep281115.raw
1997jul191115.raw	1997oct11115.raw	1997sep282315.raw
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1997jul201115.raw	1997oct112002.raw	1997sep291715.raw
1997jul202335.raw	1997oct112129.raw	1997sep292315.raw
1997jul211115.raw	1997oct112252.raw	1997sep300536.raw
1997jul21115.raw	1997oct112352.raw	1997sep301141.raw
1997jul212315.raw	1997oct120052.raw	1997sep31115.raw
1997jul221115.raw	1997oct120152.raw	1997sep32322.raw
1997jul222315.raw	1997oct120252.raw	1997sep41115.raw
1997jul22315.raw	1997oct121115.raw	1997sep41715.raw
1997jul231238.raw	1997oct122315.raw	1997sep42315.raw
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1997jul271115.raw	1997oct161115.raw	1997sep70515.raw
1997jul272315.raw	1997oct162315.raw	1997sep71115.raw
1997jul281115.raw	1997oct171115.raw	1997sep72315.raw
1997jul282335.raw	1997oct172315.raw	1997sep81115.raw
1997jul291138.raw	1997oct181140.raw	1997sep82315.raw
1997jul292315.raw	1997oct182315.raw	1997sep91115.raw
1997jul301115.raw	1997oct191136.raw	1997sep92315.raw
1997jul302315.raw	1997oct192315.raw	

wnx

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97080420.wnx	97080721.wnx	97090509.wnx	97092809.wnx	97100409.wnx
97080503.wnx	97080803.wnx	97090515.wnx	97092815.wnx	97100415.wnx
97080515.wnx	97082215.wnx	97090521.wnx	97092821.wnx	97100422.wnx
97080521.wnx	97082221.wnx	97090603.wnx	97092903.wnx	97100500.wnx
97080602.wnx	97082302.wnx	97090609.wnx	97092909.wnx	97100503.wnx
97080608.wnx	97082315.wnx	97090615.wnx	97092915.wnx	97100506.wnx
97080615.wnx	97082320.wnx	97090621.wnx	97092921.wnx	97100512.wnx
97080621.wnx	97082403.wnx	97090703.wnx	97093003.wnx	97100518.wnx
97080703.wnx	97090415.wnx	97092323.wnx	97100315.wnx	97100600.wnx
97080708.wnx	97090421.wnx	97092721.wnx	97100321.wnx	97100606.wnx

ww

ww071411.dat	ww080617.dat	ww090417.dat	ww092705.dat	ww100305.dat
ww071417.dat	ww080623.dat	ww090418.dat	ww092711.dat	ww100311.dat

ww080405.dat	ww082205.dat	ww090423.dat	ww092717.dat	ww100317.dat
ww080411.dat	ww082211.dat	ww090505.dat	ww092723.dat	ww100323.dat
ww080417.dat	ww082217.dat	ww090511.dat	ww092805.dat	ww100405.dat
ww080423.dat	ww082223.dat	ww090517.dat	ww092811.dat	ww100411.dat
ww080505.dat	ww082305.dat	ww090523.dat	ww092817.dat	ww100417.dat
ww080511.dat	ww082311.dat	ww090605.dat	ww092823.dat	ww100423.dat
ww080517.dat	ww082317.dat	ww090611.dat	ww092905.dat	ww100505.dat
ww080523.dat	ww082323.dat	ww090617.dat	ww092911.dat	ww100511.dat
ww080605.dat	ww090405.dat	ww090618.dat	ww092917.dat	ww100517.dat
ww080611.dat	ww090411.dat	ww090623.dat	ww092923.dat	ww100523.dat