Progressive Science Dropsonde Data Set 2005-06

Contents:

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For more information on the NCAR GPS Dropsonde System please visit the following site:
http://www.atd.ucar.edu/rtf/facilities/dropsonde

II. Dataset Overview

For the Progressive Science flights, 17 dropsondes were deployed, from the HIAPER G-V aircraft, between December 8, 2005 and January 12, 2006 during 4 missions.

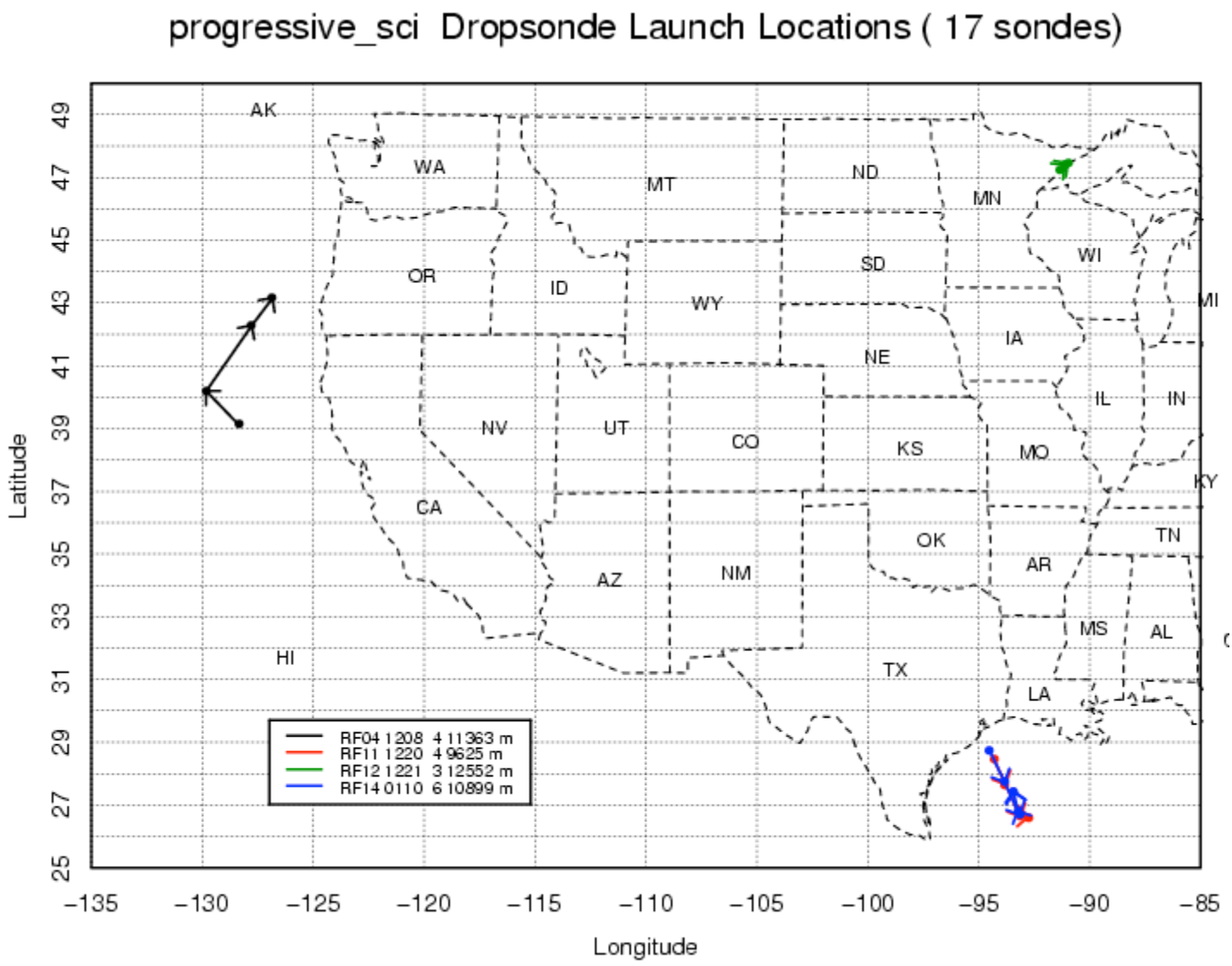

Figure 1 Map of dropsonde locations (dots) for all missions with arrows representing flight directions. Different flights are distinguished by different colors. Flight names, dates (mmdd), number of soundings and mean flight altitudes for each flight are given in the legend.

III File Naming Conventions

The "D" files are typically half-second data files with appropriate corrections and quality control measures applied. The naming convention for these files is the same from project to project - "D", followed by "yyyymmdd_hhmmssQC.cls" where yyyy = year, mm = month, hh = hour of the day GMT, mm = minute of the hour, ss = second of the hour, QC refers to Quality Controlled, and ".cls" refers to the NCAR CLASS format.

IV. Header Information

The header records contain data type, project ID, site ID, site location, actual release time, and possibly other specialized information. The first five header lines contain information identifying the sounding, and have rigidly defined form. The following 6 header lines contain auxiliary information and comments about the sounding, and they can vary from data set to data set. The last 3 header records contain header information for the data columns. Line 13 holds the field names, line 14 the field units, and line 15 contains dashes (--- characters) signifying the end of the header.

The five standard header lines are as follows:

Line Label (fixed to 35 chars in length)	Contents
1. Data Type:	Description of type and resolution of data.
2. Project ID:	ID of weather project.
3. Launch Site Type/Site ID:	Description of launch site.
4. Launch Location (lon,lat,alt):	Position of launch
5. GMT Launch:	Time of release, in format: yyyy, mm, dd, hh:mm:ss

The release location is given as : lon (deg min), lat (deg min), lon (dec. deg), lat (dec. deg), alt (m).

Longitude in deg min is in the format: ddd mm.mm'W where ddd is the number of degrees from True North (with leading zeros if necessary), mm.mm is the decimal number of minutes, and W represents W or E for west or east longitude, respectively. Latitude has the same format as longitude, except there are only two digits for degrees and N or S for north/south latitude. The decimal equivalent of longitude and latitude and station elevation follow.

The six non-standard header lines may contain any label and contents. The label is fixed to 35 characters to match the standard header lines.

V. Data Records

The data records each contain time from release, pressure, temperature, dew point, relative humidity, U and V wind components, wind speed and direction, ascent rate, balloon position data, altitude, and quality control flags.

Field No.	Parameter	Units	Missing Value
1	Time	Seconds	9999.0
2	Pressure	Millibars	9999.0
3	Dry-bulb Temp	Degrees C	999.0

4	Dew Point Temp	Degrees C	999.0
5	Relative Humidity	Percent	999.0
6	U Wind Component	Meters/Second	999.0
7	V Wind Component	Meters/Second	999.0
8	Wind Speed	Meters/Second	999.0
9	Wind Direction	Degrees	999.0
10	Ascension Rate	Meters/Second	999.0
11	Longitude	Degrees	999.0
12	Latitude	Degrees	999.0
13	Range	Kilometers	999.0
14	Angle	Degrees	999.0
15	Altitude	Meters	99999.0
16	QC flag for Pressure		99.0
17	QC flag for Temp		99.0
18	QC flag for Humidity		99.0
19	QC flag for U Component		99.0
20	QC flag for V Component		99.0
21	QC flag for Horizontal Wind		99.0

VI. Data File Specifics

The files contain data calculated at half-second intervals. The variables pressure, temperature, and relative humidity are calibrated values from measurements made by the dropsonde. The dew point is calculated from the relative humidity. The altitude value is calculated from the hydrostatic equation using first available pressure, temperature, and dew point. For the dropsondes specifically, if the sonde is launched over water and transmits data to the surface, the height is calculated by integrating from the surface (sea level) upward. However, if the sonde failed to transmit data to the surface or if the dropsonde is launched over land, because of unknown surface elevations, we integrate from the flight level down. The descent rate of the dropsonde is computed using the time-differentiated hydrostatic equation. The position (lat, lon) are integrated from the initial launch position using the horizontal winds. If a time gap of greater than 60 seconds occurs in the wind measurements, the integration terminates.

All wind data are computed from GPS navigation signals received from the sonde. The raw wind values are calculated at a one half second data rate by a commercial processing card. The resolution of the data is half second.

VII. Data Quality Control

The raw soundings are first run through the Atmospheric Sounding Processing ENvironment (ASPEN), which analyzes the data, performs smoothing, and removes suspect data points. Time series plots of temperature (Figure 2), RH (Figure 3) and wind speed (Figure 4), with regard to altitude, are used to examine the consistency of soundings launched during each flight, and to show

the variability of soundings from different missions. The soundings are then visually evaluated for outliers, or any other obvious problems. Histograms of pressure, temperature, relative humidity, wind speed and wind direction are then created to examine the distribution, range, and characteristics of each parameter.

In performing the QC procedures described above:

- 1 sounding file did not contain any data because the dropsonde was not launched. This file, from flight RF2, was excluded from the final dataset.
- Since flight RF12 took place over an area where surface altitude is unknown, all soundings from this flight were processed through ASPEN with heights integrated from flight level down.

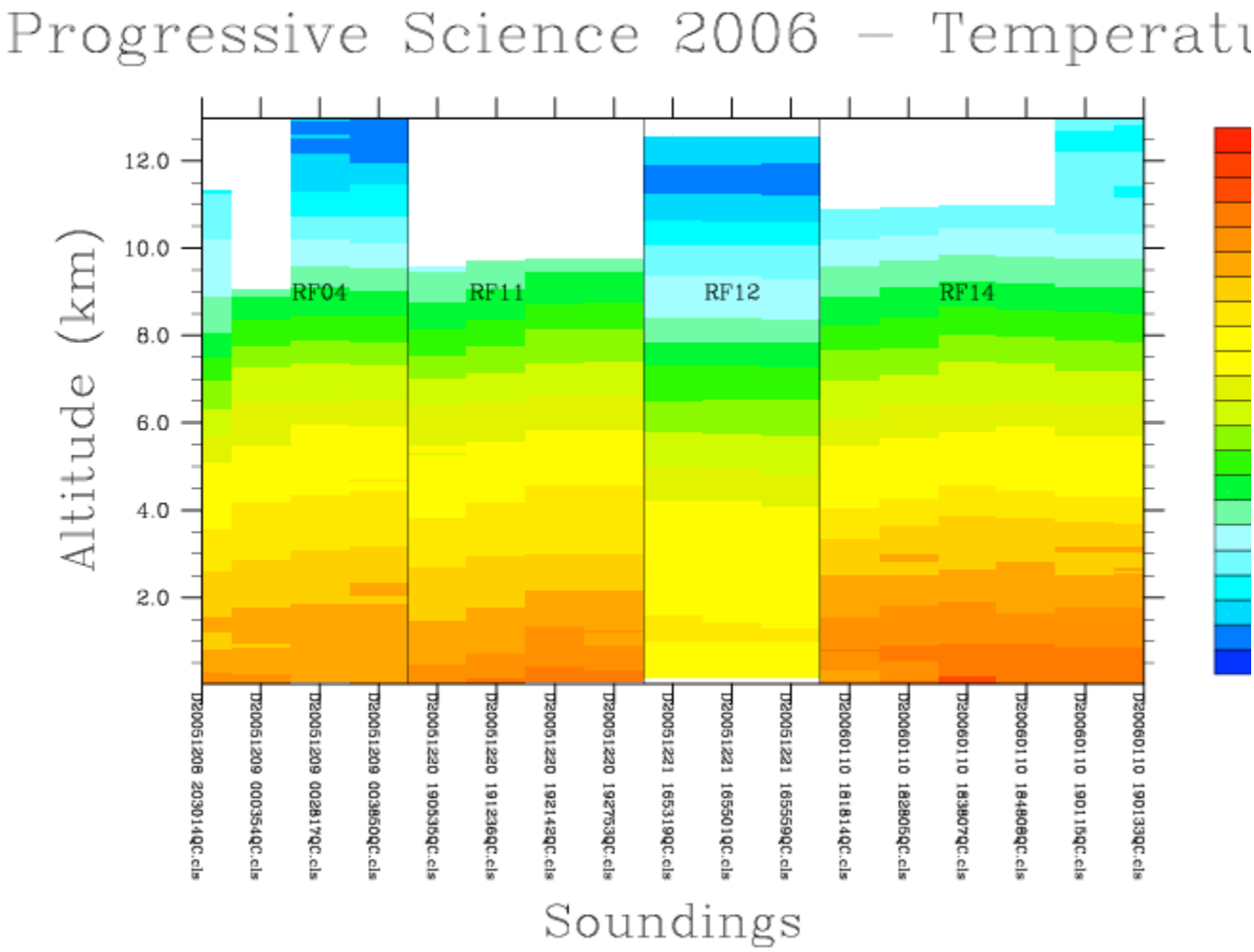

Figure 2 – Time series of dropsonde temperature (deg C) profiles. Sounding files are labeled along x-axis by month, day, hour, minute. RF# indicates the flight number.

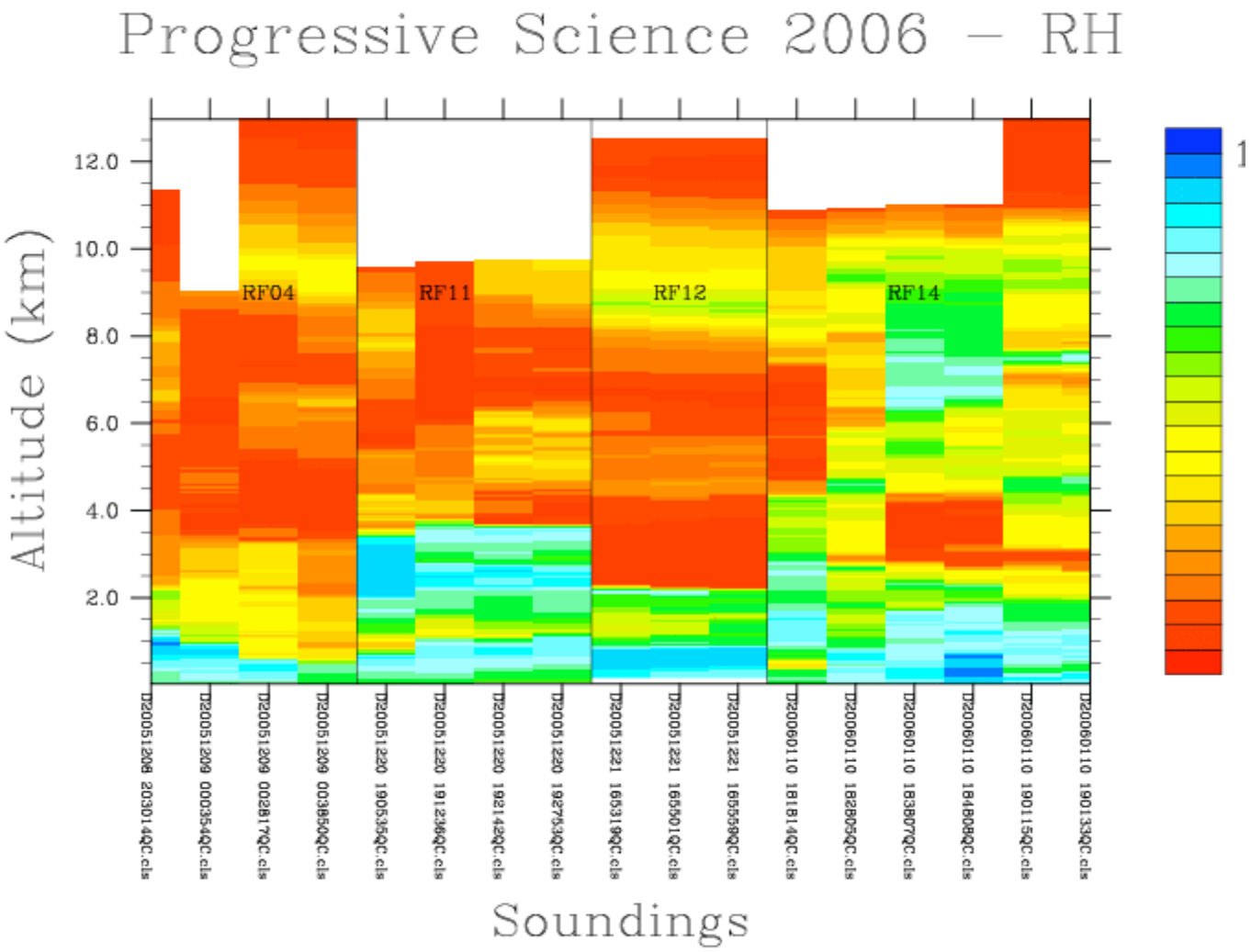

Figure 3 –Time series of dropsonde relative humidity (%) profiles. Sounding files are labeled along x-axis by month, day, hour, minute. rf# indicates the flight number.

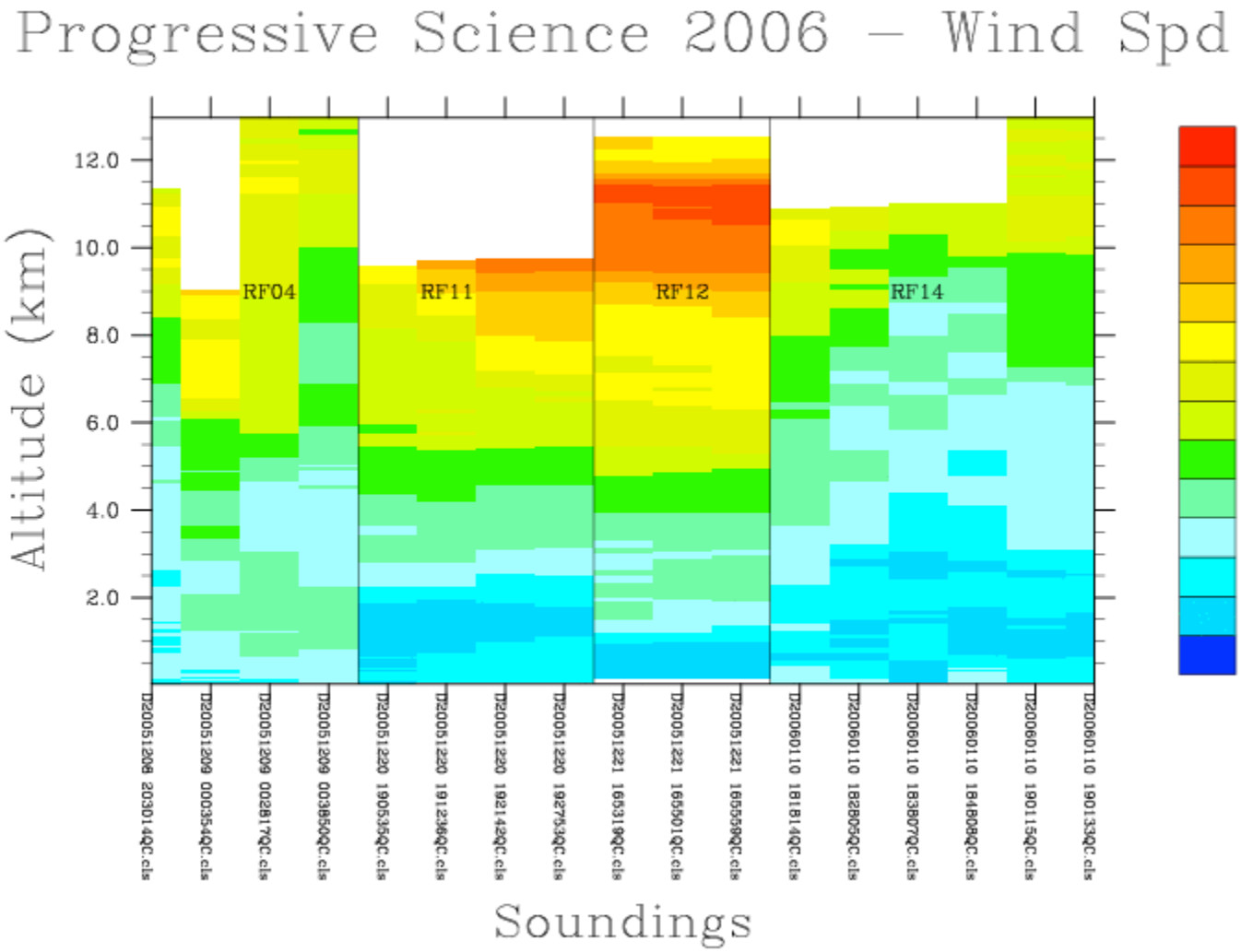

Figure 4 –Time series of dropsonde wind speed profiles (m/s). Sounding files are labeled along x-axis by month, day, hour, minute. rf# indicates the flight number.