TITLE: CABIN_10hz

AUTHOR:

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1. Data Set Overview:

The CABIN files contain measurements from a variety of sensors, those include the navigational instruments, meteorological sensors, particle counters and particle spectrometers. Only integral parameters are provided for the spectrometers (number and volume concentrations), as full size spectra are provided in separate files. Also provided in the Cabin files are some calculated quantities, such as mean winds (speed and direction), vertical wind velocity, relative humidity, water vapor mixing ratio, specific humidity, true airspeed, and pressure altitude.

2. Instrument description:

Navigational data (Lat Long, Alt, East, North and Up velocities, pitch, roll and heading) are obtained from a CMIGITS-III GPS/INS system, and backed up by a NovAtel GPS (Location and Speed) and a Trimble TANS Vector (Attitude). Total Temperature is measured by a Rosemount 102EAL sensor. Dew Point is measured by an EDGETECH EG&G Chilled Mirror. Static pressure, total pressure, and differential pressures over the radome are measured using SETRA transducers. SST is measured by a Heitronics KT19.85 IRT. Particle concentrations and spectra are measured by use of TSI-3025 UFCPC, TSI 3010 CPC, PCASP, and a CAPS probe. Only scatter section of the CAS was polled at 10 hz. 1 Hz data from the other particle instruments is provided in a separate set of 1 hz Cabin files.

3. Data Collection and Processing:

All data are collected by use of National Instruments DAQ system, and software programmed in LabView. The analog acquisition is driven by synch pulse that is received every second from the GPS system. The synch pulse is also used to trigger a 100hz pulse train that is counted and used as a time stamp on all digital data files obtained from 'smart' instruments and is used to time synchronize all the data to GPS/UTC time.

Thermodynamic properties are calculated using algorithms provided in NCARS' RAF Bulletin #9. Horizontal winds are calculated using simple vector subtraction of ground speed and track from true speed and heading, but vertical wind velocity is based on the complete 3-D equations. All sensors are calibrated before and after the mission, and the aerosol probes occasionally during the mission as well.
Note: Although the data are provided here at 10 hz, the resolution of the humidity data is lower than that. The response time of the chilled mirror is ill defined, and varies with dew point depression and ambient temperature. It may sometimes be as much as a couple of seconds. Also, the sensor is prone to go into oscillation and overshoots when humidity changes rapidly, such as in fast ascents and descents.
Note also, the radar altimeter runs out of range and pegs at altitude of about 850 m.

4: Data Format:

The data are provided in column delimited ASCII. Each row in the file corresponds to a given time. Missing data are indicated by a -9999. The column definitions are as follows.

Measured quantities

UTC **mm:dd:hh:mm:ss.x universal time**
GLAT **Lat (deg) GPS latitude (CIRPAS)**
GLON **Long (deg) GPS longitude (CIRPAS)**
GGALT **Nov Atel (m) GPS altitude (CIRPAS)**
GWIE **East Vel (m/s) GPS East aircraft velocity (CIRPAS)**
GWIN **North Vel (m/s) GPS North aircraft velocity (CIRPAS)**
GWIU **Up Vel (m/s) GPS up aircraft velocity (CIRPAS)**
ROLL **Roll (deg) roll of aircraft**
PITCH **Pitch (deg) pitch of aircraft**
THDG **Heading (deg) aircraft heading**
AT **T amb (C) static ambient temperature**
DT **Td amb (C) ambient dew-point temperature**
PS **Ps (mb) static atmospheric pressure**
RADALT **Rad Alt (m) radar altitude**
CONC_CAS **CASFWD (#/cc) CAS concentration, 1 - 50 um diameter**
VOL_CAS **CASFWD (Vol/cc) CAS volume**
SST **SST (C) sea-surface temperature**

Calculated properties

***RHUM* RH amb (%) ambient relative humidity**
***WSC* Wind Speed (m/s) wind speed**
***WDC* Wind Dir (deg) wind direction**
***WVC* Vertical Wind (m/s) vertical wind velocity**
***PALT* P alt (m) pressure altitude**
***TAS* TAS (m/s) true air speed**
***THETA* Theta (K) potential temperature**
***THETAE* Thetae (K) equivalent potential temperature**
2 *MRLA1* MR-h O (g/kg) mixing ratio (from dew point; CIRPAS)
***SPHUM* SP Hum (g/kg) specific humidity (from dew point)**
***RHO* Rho - dry (kg/m^3) ambient density of dry air**
***SYNCH* ? ½ hz GPS synch signal**

5: Data Remarks:

Despite all effort to minimize errors and problems, some always seem to sneak into large data sets. Should users come upon such things, please alert the PI so they may be fixed.