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NCAR/EOL/ISF Radiosonde NetCDF Data Files

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Document Version Control

Version	Date	Author	Change Description
1.0	29 Nov 2018	H. Vömel	Initial Release

1   Conventions

The NetCDF sounding files provided by EOL follow the CF-1.6 metadata convention for climate and forecasting. All variables include a long_name and units attribute, and where applicable a _FillValue attribute.

The standard names for the EOL sounding files use the following convention:

PPP_SSS_RRR_vN_YYYYMMDD_hhmmss.nc

where:

PPP   : project name
SSS   : ID of the Integrated Sounding System (ISS)
RRR   : Radiosonde type
vN   : Data set version number
YYYYMMDD_hhmmss: Date and time of launch in universal time (UT)

Example: IDEAL_ISS2_RS41_v1_20171107_120024.nc.

2 Variables

The sounding files contain profile variables, which are typically at one-second resolution; however, a regular spacing of profile data must not be assumed.
The sounding files also contain reference variables, which are scalar values representing reference observations by independent sensors near the launch site.

2.1 Profile variables

Profile variables are arrays containing the parameters measured by the radiosonde. All fields except time may contain missing values. The parameters in the first data line at time = 0 may come from the reference sensors near the launch site.

Variable	Unit	Missing value	Explanation
time	s		Time since launch
pres	hPa	-999	Air pressure
tdry	°C	-999	Air temperature
dp	°C	-999	Dew point temperature, calculated using Hardy (1998)
rh	%	-999	Relative humidity
u_wind	m/s	-999	Eastward wind component
v_wind	m/s	-999	Northward wind component
wspd	m/s	-999	Wind speed
wdir	°	-999	Wind direction
dz	m/s	-999	Sonde rise rate calculated from the change of geopotential height with time
mr	g/kg	-999	Mixing ratio of mass of water vapor to mass of dry air
vt	°C	-999	Virtual temperature
theta	K	-999	Potential temperature
theta_e	K	-999	Equivalent potential temperature
theta_v	K	-999	Virtual potential temperature
lat	°	-999	North latitude
lon	°	-999	East longitude
alt	m	-999	Geopotential height above MSL
gpsalt	m	-999	GPS reported altitude above MSL

2.2   Reference variables

Reference variables are scalar values, which capture the time of launch as well as reference observations typically coming from a set of independent sensors near the launch site.

Variable	Unit	Missing value	Explanation
launch_time	s		Time (scalar) given in seconds since the launch time contained in the units attribute of the variable.
reference_time	s	-999	Time of the reference observation (scalar), given in seconds since the launch time contained in the units attribute of the variable.
reference_pres	hPa	-999	Reference pressure (scalar)
reference_tdry	°C	-999	Reference temperature (scalar)
reference_rh	%	-999	Reference relative humidity (scalar)
reference_wspd	m/s	-999	Reference wind speed (scalar)
reference_wdir	°	-999	Reference wind direction (scalar)
reference_lat	°	-999	Reference latitude (scalar)
reference_lon	°	-999	Reference longitude (scalar)
reference_alt	m	-999	Reference altitude above MSL (scalar)

The source of the reference observations is different for each campaign. The user should refer to the campaign specific documents for the exact source of these observations.

The time of the reference observation may not be exact and depends on the system configuration and operational procedures. It is considered "close" to the time of launch.

The launch time indicated in the reference variables and metadata may differ from the launch time indicated in the file name. In this case, the metadata fields and reference variables contain the correct value. The incorrect time stamp in the file name is maintained to provide traceability to the raw data file(s).

3 Metadata

Metadata are stored as global attributes in NetCDF sounding files and are mostly taken from the original sounding system files. Not all fields may be present in all files. Most fields are self-explanatory; for completeness, all fields are listed here:

AvapsEditorVersion	:	Aspen version, which generated this file
AverageAscentRate	:	Mean ascent rate over the entire profile
BalloonReleaseDate	:	Date of launch as dd/mm/yyyy in UTC.
BalloonReleaseDateAndTime	:	ISO 8601 formatted time of launch in UTC.
BalloonReleaseTime	:	Time of day of launch as hh:mm:ss in UTC.
Comments	:	Comments entered by the sounding operator
Conventions	:	Version of the CF convention used in this file
featureType	:	="trajectory" indicates a sounding profile
GroundCheckDevice	:	Ground check device used to prepare the radiosonde. For Vaisala RS41 soundings, a RI41-B is used
GroundCheckDeviceSoftwareVersion	:	Software version of the RI41-B
HeightAndPressureInMessagesIsBasedOn	:	This field is typically set to "P Sensor" to indicate that the pressure was measured by the radiosonde, and that geopotential height is based on this measurement. For sondes without pressure sensor, it may be set to "CompPressureFromGpsHeightAndTu" to indicate that the pressure has been computed from the GPS height.
PCorrection\(Pref-P\)	:	Ground check correction for the pressure sensor
PPressure	:	Pressure measured by the radiosonde during the ground check
PrefPressure	:	Pressure measured by the ground-check device
ProcessingTime	:	Time, when this file was generated
QCDisclaimer	:	Any additional QC remarks
ReasonForSoundingFailure	:	If sounding failed prematurely, this may be indicated here.
ReasonForTermination	:	Typically "IncreasingPressure" to indicate balloon burst. This field may also indicate termination due to user request, lost signal, or other reasons.
RepoBranch	:	Revision control information for the software, which generated this file
RepoId	:	Revision control information
RepoLastChangedDate	:	Revision control information
RepoRevision	:	Revision control information
RS41CalculationVersion	:	Version of the RS41 calculation algorithms
SoftwareVersion	:	Version of the sounding system software
SondeSerialNumber	:	Radiosonde serial number
SondeSoftwareVersion	:	Radiosonde firmware version
SondeType	:	Radiosonde model
SoundingDescription	:	Name of the input file, serial number, and station
SoundingID	:	Unique sounding ID
SoundingStatus	:	Sounding status
StationName	:	Name of the sounding station, which follows the ISF naming convention

STDLevelHeights	:	List of heights in m for standard pressure levels up to balloon burst. The standard pressure levels are 1000, 925, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30 hPa
SurfaceDataNote	:	Indicator, whether the data at t=0 s were measured by the reference sensors or the radiosonde
SystemTrademarkAndModel	:	Sounding system model
TDifference\(Tu-T\)	:	Temperature sensor deviation during the ground check procedure
TerminatingAltitude	:	Ceiling altitude reached by the balloon
TIn-builtCheckAirTemperature	:	Temperature of the ground check device during ground check
TrackedSatelliteAverageCount	:	Average number of satellites tracked during the profile
TrefTemperature	:	Ground check reference air temperature, where available
TTemperature	:	Air temperature reading of the radiosonde during ground check
TuTemperature	:	Humidity sensor temperature reading during ground check
UCorrection\(Uref1-U1\)	:	Humidity sensor correction measured during ground check
Uref1Humidity	:	Reference RH used in the humidity ground check correction for sensor 1
UrefHumidity	:	Reference RH used in the humidity ground check correction

4 References

Bob Hardy, ITS-90 formulations for vapor pressure, frostpoint temperature, dewpoint temperature, and enhancement factors in the range –100 to +100 C, Proceedings of the Third International Symposium on Humidity & Moisture, London, England, April 1998.