

Vaisala MW41 Radiosonde Sounding Data File Format

Naming convention

The standard naming convention for radiosonde files is the project name followed by: the facility system deployed, the sounding system type, the version number of the dataset and the launch time of the sonde: 'yyyymmdd_hhmmss", where yyyy = year, mm = month, hh = hour of the day, mm = minute of the hour, ss = second of the hour, in UTC (i.e. IDEAL_ISS2_RS41_v1_20171107_120024.nc).

File Format

The sounding files provided by EOL are in the netCDF format, which is a machine-independent data format, developed at UCAR, which is used extensively for scientific datasets. The files are CF compliant and conform to the standard convention established by the climate and forecasting communities to promote sharing, automated processing and consistent interpretation of similar data files. The files are self-describing and contain a header that details the contents of the entire file and metadata that provide precise definitions of each variable.

Variables (measured or computed)

base_time: Radiosonde launch time expressed as the number of seconds between 1970-01-01 00:00:00 (UTC) and the time of release.

time_offset: Number of seconds (s) elapsed since base_time. The 0.0 second time stamp indicates surface met measurements collected from independent sensors. All subsequent time stamps represent data directly from the radiosonde measured at a one second rate.

time: Number of seconds since 1970-01-01 00:00:00 (UTC) from base_time (i.e. base_time + time_offset).

pres: Atmospheric pressure measured in hectopascals (hPa).

tdry: Dry bulb temperature measured in degrees Celsius (°C).

dp: Dew point temperature calculated from relative humidity and temperature using the vapor pressure equation by Hardy (Bob Hardy, Proceedings of the Third International Symposium on Humidity and Moisture, 1998). The unit of measure is degrees Celsius (°C).

rh: Relative humidity over liquid water (%).

uwind and **vwind:** Zonal and meridional wind components calculated from wind speed and direction, the units of measure are in meters per second (m/s).

wspd: Wind speed measured in meters per second (m/s).

wdir: Wind direction measured in degrees (°).

dz: Ascent rate, in meters per second (m/s) obtained from GPS.

mr: Mixing ratio is derived by calculating the grams of water vapor per kilogram of dry air (g/kg).

vt: Virtual temperature is the temperature that a dry parcel of air would have if its pressure and density were equal to those of a moist parcel of air. It is a computed value expressed in degrees Celsius (°C).

theta: Potential temperature is the temperature an unsaturated parcel of air would have if brought adiabatically to a standard reference pressure. It is a computed value expressed in kelvin. (K).

theta_e: Equivalent potential temperature is the temperature a parcel of air would reach if all of the water vapor were to condense and the parcel were brought adiabatically to a standard reference pressure. It is a computed value expressed in kelvin (K).

theta_v: Virtual potential temperature is the theoretical potential temperature of a dry air parcel that would have the same density as a moist air parcel. It is a computed value expressed in kelvin (K).

lat and **lon:** Position comes directly from the GPS receiver and is measured in degrees.

alt: Geopotential altitude is the computed height above mean sea level (MSL), in meters (m), calculated from the quality controlled radiosonde measured pressure, using the hydrostatic equation.

gpsalt: GPS altitude measured over the WGS84 geoid, in meters (m).

Global Attributes (Metadata) Relevant to Data Users

Conventions: CF convention version number used to standardize file formatting.

bad_value_flag: Numeric value used to indicate a missing or erroneous value.

RepoRevision: Software revision number.

RepoLastChangedDate: Date of software revision in git repository.

RepoID: Revision control ID (ie git ID) of the ASPEN version used to generate netcdf files.

RepoBranch: The git branch used by ASPEN.

AvapsEditorVersion: Name and version of processing software for netcdf conversion.

ProcessingTime: Date and time (UTC) of netcdf file creation.

SoundingDescription: Sounding filename, Radiosonde Serial Number, and the Project name and station ID.

QCDisclaimer: Optional quality control (QC) disclaimer comments that may be entered into ASPEN.

SoundingID: Unique radiosonde serial number.

BalloonReleaseDateAndTime: UTC time of release in ISO format.

SondeType: Radiosonde model identifier.

SondeSerialNumber: Instrument identifier unique to each radiosonde.

SystemTrademarkAndModel: Sounding system identifier, unique to each Vaisala sounding system.

SoftwareVersion: Software version used in the MW41 sounding system.

SondeSoftwareVersion: Version of radiosonde firmware.

Comments: Free-form field for sounding operator comments after completion of the launch.

STDLevelHeights: Standard level heights above mean sea level, in meters, at fixed pressure intervals. These are unique to individual soundings.

PCorrection\(\Pref-P\): Pressure correction applied to all radiosonde measurements in the profile. Computed from the difference between measurements collected from an RI41 pressure reference sensor (Pref) and the radiosonde (P) at the surface during ground check, and is unique to each radiosonde.

UCorrection\(\Uref1-U1\): Relative humidity correction applied to all radiosonde measurements in the profile.

TDifference\(\Tu-T\): Temperature difference between the humidity sensor temperature and ambient temperature sensor prior to heating. This field is only a consistency check and is not used for correcting the temperature measurements.

TIn-builtCheckAirTemperature: RS41 air temperature during ground check.

TuTemperature: RS41 humidity sensor temperature during ground check.

RS41CalculationVersion: RS41 calculations version number.

Uref1Humidity: Reference relative humidity, i.e. 0% by definition.

HeightAndPressureInMessagesIsBasedOn: Origin of the pressure values provided in the file and the origin of the pressure used in the geopotential height calculation.

StationName: Field project and ISF system identifiers.

ReasonForTermination: Explanation for why the sounding was terminated.

TerminatingAltitude: Geopotential height above mean sea level, in meters, at which the sounding ended.

AverageAscentRate: Average rise rate of the balloon over the entire flight, measured in meters per second.

TrackedSatelliteAverageCount: Average number of satellites tracked over the entire flight.

SurfaceHumidity: Relative humidity, in percent, at the surface measured by an independent surface met station.

Temperature: Temperature, in degree Celsius, at the surface measured by the radiosonde during ground check.

Pressure: Pressure, in hectopascals, at the surface measured by the radiosonde during ground check.

GroundCheckDevice: Ground check device identifier.

GroundCheckDeviceSoftwareVersion: Firmware version installed in the ground check device.

PrefPressure: Independent pressure reference measurement, in hectopascals, from the Vaisala ground check device.

TrefTemperature: Independent surface temperature measurement, in degrees Celsius, from the Vaisala ground check device.

UrefHumidity: Independent surface RH measurement, measured as a percent, from the Vaisala ground check device.

ReasonForSoundingFailure: Explains reason for failure, if failure occurred.

SoundingStatus: Indicates status of sounding quality.