

Phoenix (PHX) Mission

PHOENIX MARS METEOROLOGICAL
PRESSURE/TEMPERATURE RDR V1.0



Revision and History Page

Description	Date
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PHOENIX MARS METEOROLOGICAL PRESSURE / TEMPERATURE RDR V1.0

Introduction

The PHX METEOROLOGICAL DATA product contains calibrated temperature and pressure data. The temperature data was collected at 250, 500 and 1000mm above the Phoenix Lander deck, and the pressure data was collected at (nearly) the height of the Lander deck. Nominally the data was collected at 2 sec resolution, but is also provided at 512 sec averages (with distribution statistics). Owing to the placement of a heater near the pressure sensor, a corrected set of values was required, and is provided for the pressure data.

Data Set Overview

The Phoenix Mars Lander arrived at 68.2184N, 234.2487E on May 25, 2008.

The PHX METEOROLOGICAL DATA product contains calibrated values of pressure and temperature data, as well as corrected values of pressure data. Each product is approximately 24 hours (LMST) in duration, and was collected continuously over the entire mission at a data rate of 2 sec. The Data are organized into 'High Resolution' (2 sec) and 'Low Resolution' (512 sec). There are three temperature sensors along the vertical 1.0 m MET Mast (250, 500 and 1000mm), a reference Platinum Resistance Thermometer (PRT) at the base, and a pressure sensor on the Lander Deck on the Payload Electronic Box. [TAYLOR2008]

The collection of High Resolution Data is determined by the setting of P & T threshold values ranging from setting the thresholds to zero (constantly triggering, creating continuous 2 sec data) to essentially infinity (never triggering, creating no 2 sec data). Owing to favorable transmission bandwidth, the unit was operated over the entire mission in triggered (2 sec) mode. During surface operations, it was discovered that a dissipative heater was causing interference with the pressure measurements, owing to its placement very near to the sensor head. A corrective algorithm was developed, employing housekeeping temperature measurements made internal to the pressure sensor head once every 512 sec, and with the interpolated corrections applied to the 2 sec resolution data. A further two tables are included which contain these data. The Data is organized by a unique identifier (Token) in keeping with the other Phoenix instruments. The token for the PT was nominally set each sol, when the PT instrument stopped recording to allow for transfer of data to the Lander (and hence telemetry to Earth). The token is provided as a 4 byte hex value.

Parameters

Each RDR file contains time as the seconds since START_TIME. The MET PT instruments

were nominally operated 24 hours of each Martian sol. Once each sol, the instrument was transitioned out of RECORD to allow for transfer of data from MET flash to the Lander. Thus there will nominally be a ~20 min gap each sol. The MET P&T threshold was commanded each sol, to trigger constantly, creating 2 sec data. The calibration constants used internally onboard the unit were determined prior to launch, and outlined in the CCC report. During surface operations the MET PT was operated continuously, with a gap early in the mission (Sol 19/20) owing to a spacecraft event. Smaller data gaps exist, from dropouts in telemetry, but these were often recovered owing to use of the MET PT internal flash and data retransmits.

Processing

The RDR products have had the following changes as compared to the EDRs:

1. The data has been changed and reordered where required to be consistent with the SIS.
2. The Frame Count is converted to the duration of each measurement in Earth seconds.
3. Temperature Digital Numbers have been converted to degrees Kelvin.

The Pressure Corrected data has been modified as outlined in the SIS document. Very briefly, a thermocap, internal to the pressure sensor head, was employed as a proxy of the pressure sensor temperature, and used to correct the temperature effects in the data. Finally, the data were converted to PDS format, converting the tab-delimited fields to fixed-width fields, and exchanging the multiple packet headers for a single session header by the MET GDS.

Address: Cameron Dickinson
Dept. of Earth and Space Science Engineering, York University
4700 Keele St
Toronto, ON M3J 1P3
Phone: (416) 736-2100 X 23870
Email: cameron.dickinson@gmail.com
For science related questions about the data, please contact the

MET Instrument Science Team Lead:

Address: James Whiteway
Dept. of Earth and Space Science Engineering, York University
4700 Keele St
Toronto, ON M3J 1P3
Phone: (416) 736-2100 X 22310
Email: whiteway@yorku.ca

Data

All of the data in this data set are contained in ASCII tabular files with detached PDS labels. Data is stored in a separate directory relating to the sol in which the recording of

data commenced (i.e. data acquired from 003 10:00 local to 004 10:15 will be in the sol 3 directory)

Individual filenames are constructed as follows:

MS000RMH_00896227243_10CCM0.LBL

1: The first character will always be an 'M', representing MET data.

2: The second character will be an 'S', signifying surface data (versus 'C' for Cruise)

3-5: The next three characters provide the sol number of the data file.

6-8: The next three characters describe the type of MET data,

EML - EDR MET LOW (Resolution)

EMH - EDR MET HIGH (Resolution)

RML - RDR MET LOW (Resolution)

RMH - RDR MET HIGH (Resolution)

RMC - RDR MET Corrected (Pressure Corrected Values)

RMA - RDR MET Ancillary (Pressure Sensor Temperatures)

9: Blank

10-20: SCLK - Spacecraft clock

21: Blank

22-25: Operations Token

26: Producer (M for MET Team)

27: Version

28: Period

29-31: Extension, LBL or TAB

The tabular files are formatted so that they may be read directly into many database management systems (DBMS) or spreadsheet programs on various computers. Each of the files contains two tables. The first is the header table, and is only a single record in length. The second table contains all of the data records for a session and varies in length. All fields in the tables are stored in columns of fixed width and are right justified. The records are of fixed length; since the header records are shorter than the data records, they have been padded with blank spaces at the end of the record. The last two bytes of each record contain the ASCII carriage return and line feed characters. This allows the tables to be treated as fixed length record files on computers that support this file type and as normal text files on other computers.

References

TAYLOR2008

Taylor, P. et al., Meteorology Station MET on the Phoenix Mars Lander: Pressure, Temperature and Wind Speed, *J. Geophys. Res.* E00A10, doi:10.1029/2007JE003015, 2008."