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Analysis of the re-processed high-resolution whole-mission meteorological data of the Viking Landers

O. Kemppinen (1,2), W. Schmidt (1), and A.-M. Harri (1)
(1) Finnish Meteorological Institute, Finland (osku.kemppinen@fmi.fi), (2) Aalto University School of Science, Finland

Mars is currently a subject of a wide scientific interest. However, even amongst all the current and upcoming missions, there is still much untapped potential to be found in the past missions. One good example is the Viking Lander meteorological missions. For almost 30 years since the death of the last Viking Lander, the scientific community has had access to only a very limited set of the processed temperature and wind data, even though the dataset is by a large margin the longest meteorological one ever measured on Mars.

For the past few years, Finnish Meteorological Institute has been updating and modernizing the original analysis routines to be able to process the whole data in a standard Linux environment. The first stage of the project is now nearing completion, which will be accompanied by the release of the whole mission–long processed meteorological data via the Planetary Data System. The release is tentatively scheduled for the second half of the year 2012. In this work we show the first detailed long–term analysis of parts of the preliminary new data.

The newly processed data, including both the temperature and the wind measurements, spans 2245 solar days (sols) for Viking Lander 1 (VL1), with the mean data resolution of 920 samples per sol. A total of 725 sols' worth of data gaps exist, caused by missing or corrupted raw data tapes. The previously published VL1 data sets cover 350 sols of temperature, minus 17 sols of gaps, and 40 sols of wind with no gaps. The data resolution of the previously published data is 25 samples per sol.

The new data for Viking Lander 2 (VL2) spans 1281 sols, with the mean sample resolution of 1419 samples per sol. There are gaps worth a total of 519 sols. The previous VL2 data sets cover 1050 sols of both the temperature and the wind, minus 117 sols of gaps. The data resolution is again 25 samples per sol.

Because of the significantly more data sols compared to the originally published data, the new data allows a significantly deeper long–term VL1 data analysis, as well as a more detailed sub–sol analysis for both landers. In addition to possibly finding new short–time and long–time atmospheric phenomena near the VL sites, with the new data it will be possible to characterise the general diurnal and annual behaviors of the Martian atmosphere more comprehensibly than previously.