

## Viking Lander 2 Data

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This report contains various Viking documentations that may be of use to anyone interested in using Viking seismic data acquired by the seismometer on board the Viking Lander 2 on Mars during the 1976-1978 period (Anderson et al., 1977). It also has Viking Lander 2 seismic data as VUS and ASCII formatted files as well as some FORTRAN programs.

Please note that these old data may contain errors, such as bit errors, introduced in data transmission and transduction. Users may need to deal with these errors case by case.

Figure 1 presents charts showing the dataflow of various Viking Lander 2 seismic data files generated over the last four decades. As far as we are aware, there are three kinds of raw seismic data sets from Viking Lander 2 that are publicly available. They are:

- 1) EDR data set - Copies of EDR (Experiment Data Record) tapes were generated at the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL) during the mission, sent to Massachusetts Institute of Technology (MIT) and archived at the National Space Science Data Center (NSSDC). This data set is described at the NASA Space Science Data Coordinated Archive (NSSDCA) website as NSSDCA ID PSPG-00070. The current (as of 2018-07-11) URL is: <https://nssdc.gsfc.nasa.gov/nmc/datasetDisplay.do?id=PSPG-00070>  
This data set was originally generated from SEISF files, described below, and was written in BCD. NSSDC converted it to ASCII. Unfortunately, there was an error in this conversion — the binary headers of the original files were treated as BCD, thus losing the information provided in the headers. The Japan Aerospace Exploration Agency (JAXA) found a solution to the problem NSSDC introduced when they reformatted the original EDR files MIT sent to NSSDC (Yamamoto et al., 2014). JAXA has made the reformatted EDR files available at <http://darts.isas.jaxa.jp/planet/seismology/viking/index.html>
- 2) SEISF data set - Copies of DTL tapes containing SEISF files generated at JPL during the mission were sent to the University of Texas (UT) in Galveston, and later restored on an 8-mm cassette tape and archived at IRIS/DMC\* (Nakamura, 1992). SEISF files contain raw Viking-2 seismology data in binary bit strings, essentially as received from the Viking lander 2 with additional headers and paddings. These bit strings are scrambled and in unusual bit order. Their format description is found in JPL documents SD-37D000 and PD740072. Relevant pages from these documents, provided by JPL librarian Charlene Nichols, are copied in the attached file SEISF\_FromSD-37D000&PD740072.pdf.
- 3) VUS data set - Copies of VUS (Viking Unscrambled Seismic) tapes containing USEIS (Unscrambled SEISF) files were generated from SEISF files at UT-Galveston during the mission, and later restored on an 8-mm cassette tape and archived at IRIS/DMC\*. Format description of VUS tapes is given in the attached file VUSDescription.pdf. UT-Austin (UT Institute for Geophysics) converted the VUS tapes to ASCII. These files are in the folder, VUSA\_ASCIIFiles. Their format is described in VikingASCIIFileDescription.pdf. Users should be careful when using the ASCII files: If users note something strange or unusual, they should go back to the original files and see what is going on.

\*NSSDCA recently acquired this data set from IRIS/DMC and it is now available through their website:

<https://nssdc.gsfc.nasa.gov/nmc/datasetDisplay.do?id=PSPG-0073>

## Supplemental files with this report

### Data

SEISF\_meteorology\_VUS\_data – contains the data from the Viking Exabyte tape files (Nakamura, 1992). This includes the SEISF files (vkg.1 – vkg.30), the meteorology data (vkg.31 – vkg.46), and the VUS files (vkg.47 – vkg.56).

VUSA\_ASCIIFiles – contains tar-gzipped files (vusa01.tar.gz – vusa10.tar.gz) of the ASCII version of the VUS tapes. Their format is described in VikingASCIIFileDescription.pdf. Users should be careful when using the ASCII files: If users note something strange or unusual, they should go back to the original files and see what is going on.

**Programs** – contains various FORTRAN programs used in generating various files.

copy79.for  
vtcopy.f  
vtimec.f  
vuscov.f  
vuscqc.f  
vuscstr.f  
vusd2ala.f  
vusdecode.f  
vusqc.f  
vusseparate.f

**Supplemental\_Format\_Descriptions** - contains format descriptions of various data files

SEISF\_FromSD-37D000&PD7400072.pdf - describes SEISF files

EDR-2\_DSC\_0410.pdf – describes EDR-2 files. From NASA Space Science Data Coordinated Archive (NSSDCA).

VUSFormat.pdf - describes VUS files

VikingASCIIFileDescription.pdf - describes ASCII files

### References

Anderson, D. L., W. F. Miller, G. V. Latham, Y. Nakamura, M. N. Toksöz, A. M. Dainty, F. K. Duennebier, A. R. Lazarewich, R. L. Kovach and T. C. D. Knight, Seismology on Mars, *J. Geophys. Res.* **82**, 4524-4546, 1977.

Nakamura, Y., Catalog of lunar seismic data from Apollo Passive Seismic Experiment on 8-mm video cassette (Exabyte) tapes, UTIG Tech. Rept. No. 118, 1992.

Yamamoto, Y., R. Yamada and Y. Nakamura, Restoration and verification of seismic data recorded on Viking lander 2 mission, *Lunar Planet. Sci. Conf.*, **45th**, abstract #1808, 2014.

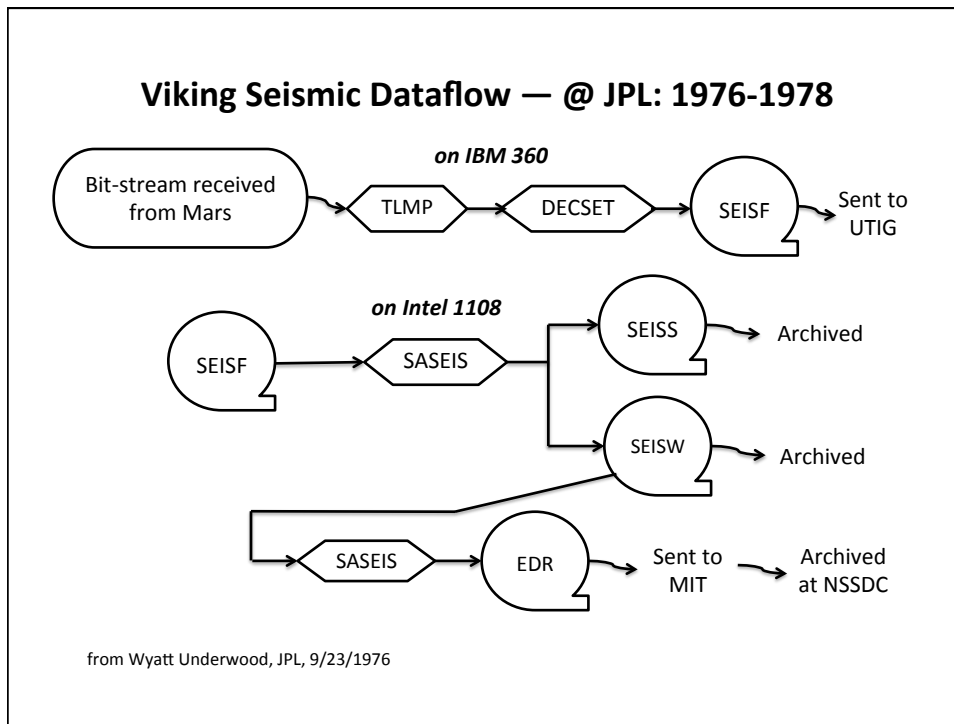


Figure 1a.

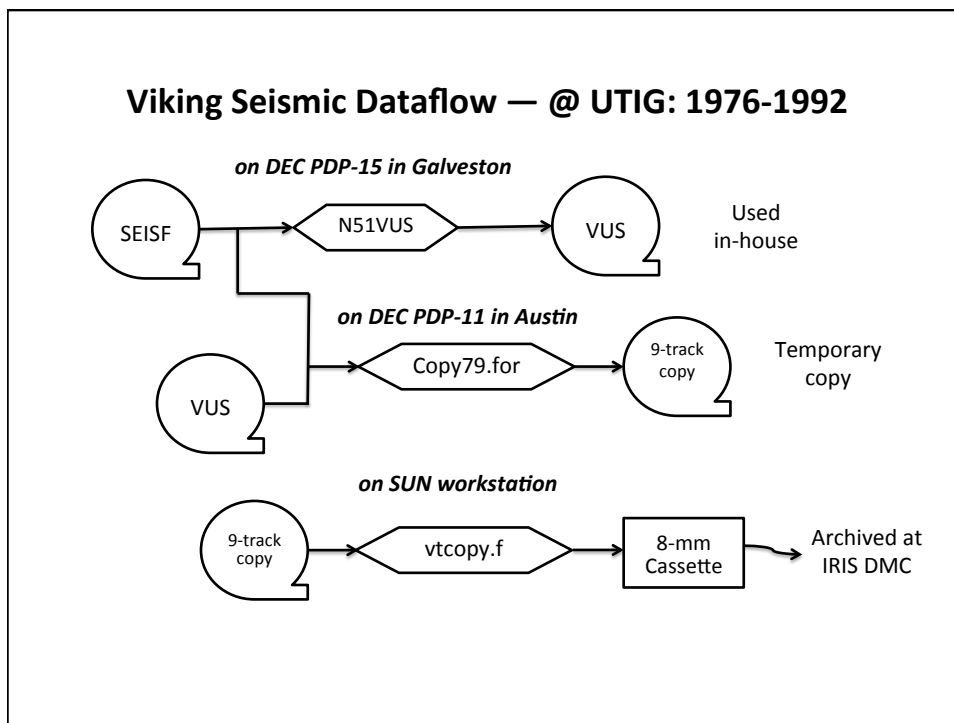


Figure 1b.

Figure 1

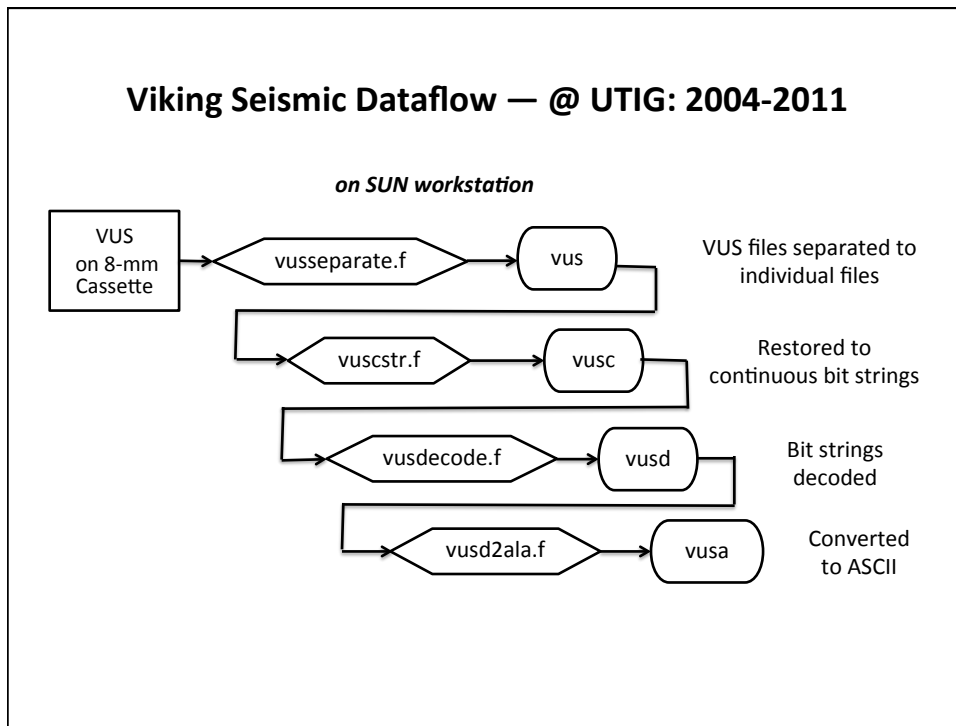


Figure 1c.

Figure 1 (continued)