MARTIAN CLIMATE VARIABILITY: MULTI-YEAR, IN-SITU OBSERVATIONS OF PRESSURE AND TEMPERATURE.
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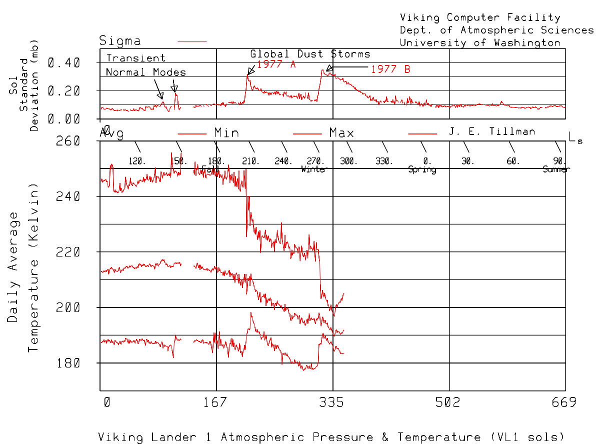
Multi-Year meteorological observations **at the same site** on the surface of Mars are required to define the **Martian Climate**, interpret orbital observations, and understand atmosphere - surface interactions and their impact on spacecraft design, and operations. Prior to the Viking Lander Meteorology Experiments 3.3 Mars years observations at the Lander 1, 22° N site and 1.5 years at the 48° Lander 2 site, it was thought that Mars had "great" dust storms each year at perihelion. However, from atmospheric pressure measurements alone, Tillman [1,2] demonstrated that the first 1.5 years strongly suggest that this is not the case, and confirmed it from third year, Lander 1 observations. The fourth year produced an intense dust storm, with an optical depth of the dense 1977 B dust storm but at the same season as the far less intense 1977 A storm.

Figure 1 illustrates the standard deviation of pressure around the sol mean, and the hourly minimum and maximum, and the sol mean atmospheric temperature at 1.5 meters; these temperatures have been discussed previously [3].



During this first Viking year, note that the beginning of both the 1977 A and 1977 B dust storms is easily detected in either the minimum or maximum temperatures, **but not the sol average**. By comparing all available VL-1 pressure data and these temperature data (processed with a special version of the software in an attempt to compensate for wind sensor failures) during the 3.3 Mars years, we will describe inter annual differences during dust storm seasons for dusty and nominal years. We show that the daily average temperature generally is a poor indicator of great dust storms; this may be important in looking for signatures of terrestrial climate changes. We suggest that this demonstrates the necessity of permanent, (e.g., $>$ 1 Mars year), observations to describe the inter annual variability and to distinguish spatial from temporal variations. This leads to the question "To what extent does the same hold for Earth climate observations and proxies?" Limitations of these data, the special processing, and the potential for further processing and validating will be mentioned.

References

[1] Tillman, J. E., Martian Meteorology and Dust Storms from Viking Observations, PP 333-342, Proceedings of The Case for Mars II conference, Boulder Colo., July 1984, Christopher P. McKay, ed, Vol 62, Science and Technology Series American Astronautical Society, San Diego, Calif 1985.

[2] Tillman, James E., Mars Global Atmospheric Oscillations: Annually Synchronized, Transient Normal Mode Oscillations and the Triggering of Global Dust Storms, J. Geophys. Res., V93, D8, pp 9433-9451, 1988.

[3] Ryan, J. A., and R. M. Henry, Mars atmospheric phenomena during major dust storms as measured at the surface. J. Geophys. res. V84, 2821-2829, 1979.