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Time-series analysis of temperature profiles from VIRTIS Venus Express data

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Nighttime infrared observations of the VIRTIS instrument on board Venus Express have already demonstrated their potential in the study of air temperature fields of the Venusian mesosphere.
The entire available dataset acquired by the VIRTIS-M IR channel was processed at moderate spatial resolution (i.e. averaging pixels in 8x8 boxes) to derive an unprecedented dataset of air temperature profiles in the pressure range 100-0.1 mbar, covering mostly the latitudes south of 45S.
We presented in Grassi et al. (2010, doi:10.1029/2009JE003553) an analysis of the mean properties of temperature profiles, once binned in the latitude/local time/pressure space. Here we discuss the preliminary findings of time-series analysis of data from individual bins. Despite the sparsity of most series, Lomb-Scargle periodogram can be effectively applied in the regions south of 70S, where better coverage is made possible by specific properties of Venus Express orbit. Here the algorithm is able to extract a clear signature related to a period of about 115-120 Earth days, i.e. one Venus solar day, particularly strong at the level around 10 mbar.
Further analysis of average temperature fields in the latitude - longitude space demonstrated, for different local times during night, that air temperatures east of Lada Terra (most specifically in a region centered around 130°E and about 60° wide) are about 10K warmer than in other longitudes at 75S.