

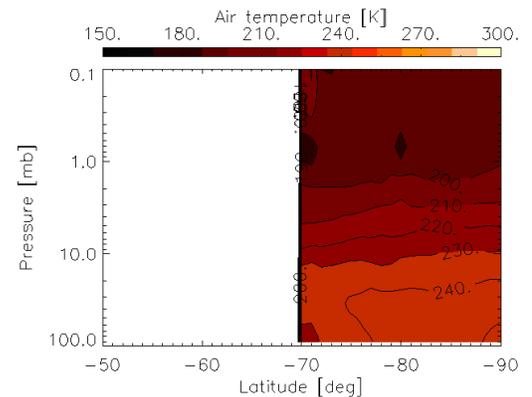
Thermal structure in the Venusian atmosphere: results after more than 2 years in orbit of Venus-Express mission A. Migliorini¹, D. Grassi², G. Piccioni³, P. Drossart⁴, A. Cardesin-Moinelo⁵, ¹IASF-INAF (Rome, Italy, via del Fosso del Cavaliere, 100, 00133 Roma, alessandra.migliorini@iasf-roma.inaf.it), ²IFSI-INAF (Rome, Italy, via del Fosso del Cavaliere, 100, 00133 Roma, davide.grassi@ifsi-roma.inaf.it), ³IASF-INAF (Rome, Italy, via del Fosso del Cavaliere, 100, 00133 Roma, giuseppe.piccioni@iasf-roma.inaf.it), ⁴Obs de Paris-Meudon (Meudon, 5, Place J. Janssen, 92195, Meudon - France, pierre.drossart@obspm.fr), ⁵ESAC-Madrid (Villanueva de la Cañada, Madrid, Spain, alejandro.cardesin@iasf-roma.inaf.it).

Introduction: We present a general overview of the Venus mesospheric temperature fields, as retrieved from the data of Virtis-M instrument on board of Venus Express spacecraft, after more than two years of operations [1]. Atmospheric structure is investigated mainly in the Southern emisphere. Temperature rises poleward along the meridian in a wide range of altitudes. A cold collar centered around 65S is also evident (Fig 1.). Short-time variability of the atmosphere (1h time scale) is dominated by fluctuations peaking at 1 mb, that show maximum amplitudes just after the sunset. Variability within few days is also investigated (Fig 2). Temperatures in the lowest part of probed pressure range ($p < 0.1$ bar) is driven, in the polar region, by the occurrence of polar dypole, whose effects are however limited below 35 mbar.

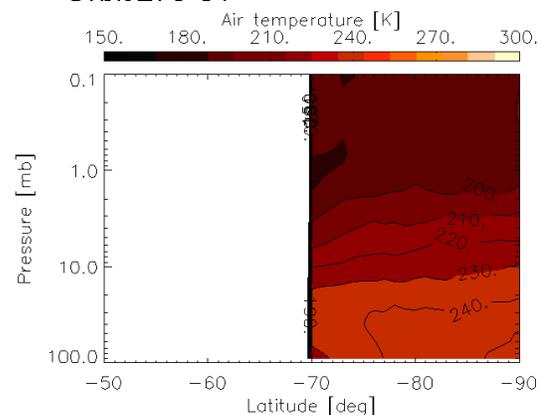
Mean maps of atmospheric temperature at selected pressure levels are also discussed. As an example, the mean map at 90 mbar is shown in fig. 3, obtained by averaging a dataset of 50 frames selected among the whole Venus-Express mission. Atmospheric temperature is in average about 10 K warmer at dusk than at dawn, at 30 to 60 deg South. The thermal profile along the parallel is shown in fig. 4, in the latitude range 60 to 70 deg South. Close to the pole, the so-called cold collar region is visible, in the latitude range from 60 to 75 deg South. In this region, the variation in temperature with respect to the pole, for instance, is of at least 20 K, as it is clear from fig. 3. The same atmospheric structure disappears moving to higher altitudes (lower pressures maps, not shown here).

The results are compared with the issues from previous missions about the Norther emisphere [2] (fig. 5). Atmospheric structure follows in average the behavior in the Northern emisphere.

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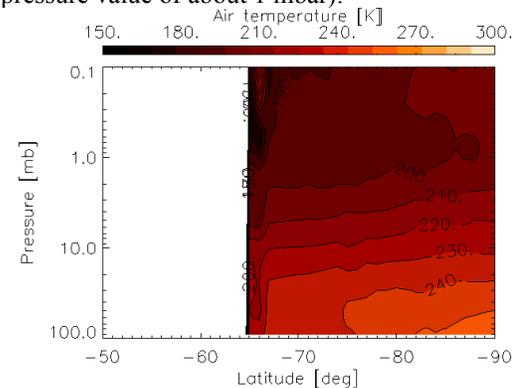


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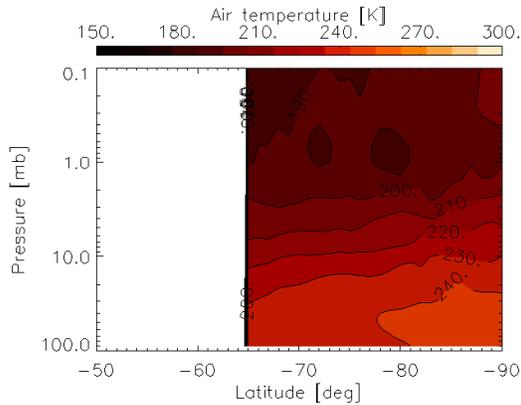


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Fig 1. Example of short term variation (within few hours). Wave-like fluctuations are visible in the upper mesosphere, from about 80 km up (which corresponds to a pressure value of about 1 mbar).



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Fig 2. Example of variation from day to day of the atmospheric temperature, for the pressure levels from 0.1 mbar to 100 mbar.

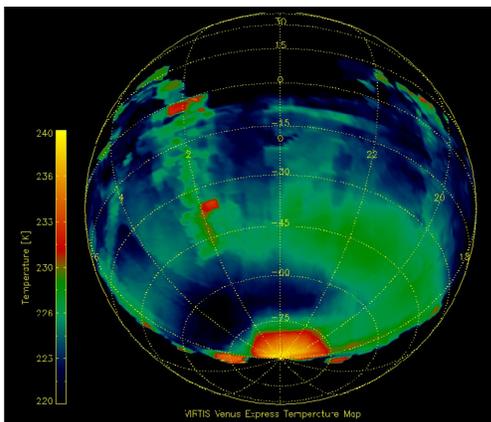
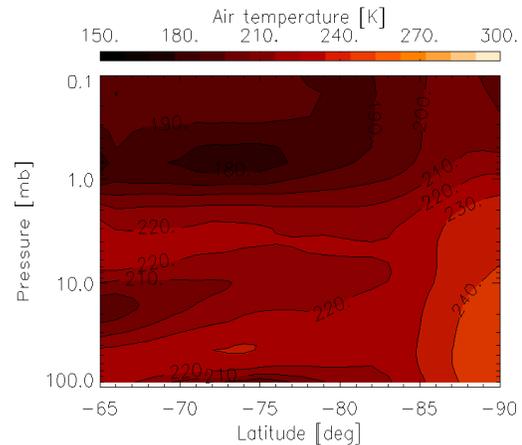


Fig 3. Temperature mean map at a pressure level of 90 mbar. The region around the cold collar is clear at about 60-70 deg in latitude. Temperature is about 10 K warmer at dusk than at dawn side of the planet.

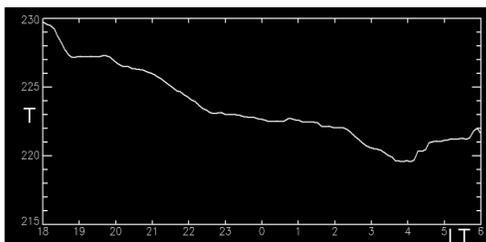


Fig 4. Temperature variation with respect to local time, in the latitude range 60-70 deg South. Temperature is higher at dusk, and it decreases towards dawn, with a minimum value around 4h in local time. The temperature variation is about 10 degrees.

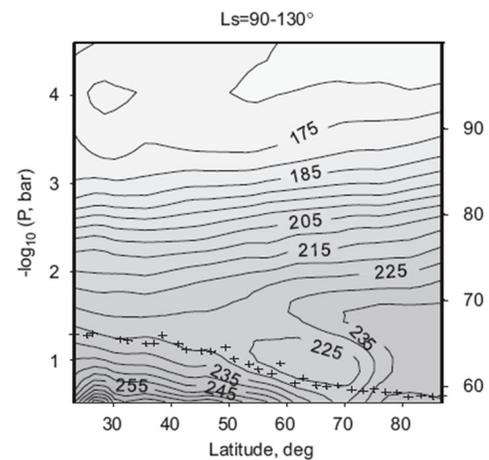


Fig 5. Comparison between Venera 15 results and mean thermal maps, as retrieved on VIRTIS-M data.

References:

[1] Grassi, D. et al., (2008) accepted for publication on *JGR*.

[2] Zasova, L. et al. (2007) *PS&S*, 55, p. 1712-1728

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