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Topographic influence on atmospheric aerosols, temperatures and circulation over Tharsis on Mars

Dr Paulina Wolkenberg

Istituto di Astrofisica e Planetologia Spaziali (IAPS)

- Istituto Nazionale di Astrofisica (INAF)

We analyzed thermal fields over Tharsis retrieved from observations of the Planetary Fourier Spectrometer (PFS) on board the Mars Express (MEx) spacecraft, collected from MY26 until MY35 during northern fall and winter. Along with atmospheric temperatures, we studied variations of dust, water ice total opacities, and surface temperatures. The behavior of atmospheric temperatures along with a tentative circulation around volcanoes is presented. From atmospheric temperatures, we calculated potential temperatures, static stabilities, and gradients of potential temperatures to derive information on atmospheric stratification and depth of the planetary boundary layer (PBL). We considered observations in the LT variation perspective. In conclusion, the circulation changes from the downward during the night to the upward motions during the day over tops and slopes of volcanoes. Lee waves are observed during the night and early morning associated mostly with the presence of water ice clouds.