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Mapping martian ground pressure using OMEGA measurements in the 2 μm CO_2 band

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Observing and analyzing the variations of the atmospheric pressure on the surface of a planet is essential to understand the dynamics of its atmosphere. To this end, we designed on Mars a remote sensing technique to retrieve ground pressure maps, using the main phenomenon that 2 μm CO_2 absorption band depth is an indicator of the martian ground pressure. We used data from Mars express OMEGA spectrometer, a fast and accurate line-by-line radiative transfer model, an additive single scattering model and a ground contribution modelisation. We were then able to get ground pressure maps correctly correlated, quantitatively and qualitatively, with the MOLA topography (given a small registration shift correction). Using an adiabatic reduction of ground pressure to a level of reference, it was then possible to remove the main topographic component of the pressure signal, and detect local meteorology phenomena such as barometric depressions, or gravity wave signature. Further understanding of ground pressure signatures observed should be obtained by completing the Mars Climate Database analysis with some meso-scale simulations.