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Observations of CO₂ clouds on Mars from TIRVIM and NIR solar occultation measurements onboard TGO

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Carbon dioxide is the major constituent of the Martian atmosphere. Its seasonal cycle plays an important role in atmospheric dynamics and climate. Formation of the polar CO₂ frost deposits results in up to 30% of atmospheric pressure variations as well as in dramatic change in surface reflectance and emissivity. Another case of carbon dioxide condensation is formation of a CO₂ clouds that are still poorly studied, despite the fact that they have been observed by a number of instruments [1–6] on the orbit of Mars.

In this work, we will present first results of CO₂ clouds observations from a combination of thermal-infrared (1.7–17 μm) and near-infrared (0.7–1.6 μm) spectra measured by TIRVIM and NIR instruments onboard the ExoMars Trace Gas Orbiter (TGO) in solar occultation geometry. These instruments are part of the Atmospheric Chemistry Suite (ACS), a set of three spectrometers (NIR, MIR, and TIRVIM) that is conducting scientific measurements on the orbit of Mars since the spring of 2018 [7].

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