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Type: Oral presentation

Monitoring the Atmospheric Dust Optical Depth on Mars with OMEGA/MarsExpress

jeudi 24 mars 2022 16:35 (10 minutes)

Dust is everywhere on Mars: deposited on the surface and suspended into the atmosphere. It's a key parameter that affects climate and controls some current surface properties. Dust movements extend over very different spatial scales (few meters to planet scale). To find a link between them, we studied the atmospheric dust by using the near-infrared imaging spectrometer OMEGA onboard Mars Express (3 Martian years of full-operation). We developed a new method in two steps: first one is to define an atmospheric dust index based on the decrease of 2 μm carbon dioxide (CO_2) absorption band when there is atmospheric dust during observations. That required to develop a theoretical model that can predict the CO_2 optical depth in clear atmosphere conditions (without dust). The second step of the method is calibrating this index with the Mars Exploration Rovers (Spirit and Opportunity), which measured optical depth from the Martian ground during the same period as OMEGA. That calibration allows the computation of a dust optical depth from any OMEGA observation. We have applied this method to the entire dataset to study the time and spatial distribution of atmospheric dust. We observed well-known characteristics of the dust cycle (dusty season, interannual variability, ...) and dust movements (dust storm travel routes, dust source areas, ...). We also notice a time and spatial correlation between seasonal dark flows (recurring slope lineae) occurring on steep slopes of the Martian surface (low spatial scale) and regional atmospheric dust movements (medium-high spatial scale). This can be a first step of finding a link between surface dust movements and atmospheric ones.

Field

Planetology (including small bodies and exoplanets)

Day constraints

I will be able to make my presentation on Thursday and Friday.

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Classification de Session: Talk

Classification de thématique: Astrophysics