The circulatory impact of dust from dust profile assimilation

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The circulatory impact of the vertical dust structure

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Dust Profile Assimilation

• Mineral dust is the key radiative forcer in the martian atmosphere.
• Data assimilation: LMD-UK MGCM + observations = best estimate of state (e.g. [1]).
• Vertical dust structure shown by MCS to be more complex than previously assumed [2].
• MCS dust profiles and columns are assimilated to examine impact on the circulation and transport (“3D”), and compared to a MCS column-only assimilation (“2D”) for MY 31.

Summary

• Vertical dust structure has significant impact on temperature structure, global circulation, and transport.
• Circulatory impact of increased elevated dust presence appears greatest during lower-insolation times of year: mitigates effect ofhemispheric topographic asymmetry and dramatically strengthen the N→S Hadley cell. Stronger Hadley cells overall.
• Reduced near-surface eddy activity; possible explanation for southern dust exclusion.
• TGO will offer a new dataset of dust profiles across a range of martian local times.

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