

Determination of near-surface atmospheric moisture imbibition of Martian dust: Effect of water-dust interactions

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Dust plays an important role in driving the Martian climate system. We determine the near-surface atmospheric moisture imbibition (AMI) for Martian dust using the Laboratoire de Météorologie Dynamique Mars General Circulation Model. The AMI provides a good linear approximation for physical processes of water-dust interaction in Martian atmosphere. We observe an average AMI of approximately 2.1 for Mars dust (global, annual average). The AMI is more susceptible to water vapor, geolocation, time of the year, local time, and less dependent on the atmospheric dust content. Depending upon the availability of water vapor, and the amount of dust, the peak value of AMI varies between 6.7 (northern spring) and 12.2 (northern summer). We find a consistent anti-correlation between the AMI, and the water vapor volume mixing ratio (VMR) irrespective of the atmospheric dust content. The solar zenith angle causes a change of about 86% in the AMI.

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