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**Influence of Dust Storm Adsorptive Properties on the Atmospheric Water Content of Mars**

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**Abstract Text:**

Martian global dust storms can raise large amounts of dust into the atmosphere. This dust has the ability to carry adsorbed water with it into the atmosphere. Once it arrives in the atmosphere, the dust can either adsorb additional water or release water vapor. What then happens when you introduce dust that may be carrying significant amounts of water with it that can turn to water vapor? We examined this process numerically by inserting dust into the atmosphere and re-equilibrating the dust with the vapor. We used the two main analogs for Martian regolith, volcanic tuff and palagonite. Palagonite could adsorb a maximum of about 11 wt % and volcanic tuff can adsorb up to 1 wt % of water. Water that is adsorbed on the dust grain while it is still on the surface will eventually be carried up and distributed in the atmosphere. Surface and atmospheric temperatures prior to and during the dust storm conditions affect two major variables: the amount of water carried up from the surface dust and the equilibrium between water vapor and adsorbed water. We found that water raised along with palagonite dust could increase the total water content of the atmosphere by up to about 20 % during the peak of a high opacity dust storm. Despite this increase, there was only a 1 % increase in water vapor. Thus, water in the adsorbed form represents a significant fraction of the water that can be transported during dust storms. Water introduced to the atmosphere via this method may be a significant contributor to the overall atmospheric water cycle.

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