Geophysical Research Abstracts
Vol. 12, EGU2010-12472, 2010
EGU General Assembly 2010

Atmospheric and subsurface water in simulations of Martian paleoclimates with variable obliquity

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Using the UK Mars General Circulation Model (UKMGCM), a series of simulations have been carried out to investigate the effect of changes in planetary obliquity and argument of perihelion, representing scenarios encountered in the past million years, on the Martian water cycle. The UKMGCM water cycle representation includes atmospheric vapour transport, surface condensation, a bulk cloud ice scheme and subsurface vapour diffusion. A difference between this and previous studies is the use of in situ modelling of dust lifting and transport. By avoiding the use of prescribed opacities (based solely on present-day observations) we attempt to represent more accurately the dust loadings that may have occurred during each of these past climate scenarios, and to investigate their effect on the water cycle. Results are compared to the present-day situation, and to other studies carried out in this area.