



Toward a climatological model for early Mars

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Early in its history, Mars probably had a denser atmosphere which might have provided conditions favorable for the presence of liquid water on the surface, an essential prerequisite for the beginning of life and its further evolution. The rate of loss of the atmosphere depends on the efficiency of the atmospheric escape mechanisms. We examine the mechanisms which may have caused rapid erosion of an early Martian atmosphere and calculate the temperatures on the surface with the help of a surface energy balance model taking into account the solar insolation as a function of Martian obliquity changes as well green-house effects. The loss of the planetary magnetic field and large-scale impacts could have significant effects on atmospheric evolution by leaving the upper atmosphere unprotected to the solar XUV and EUV radiation and by radially accelerating outward the atmospheric particles above the escape velocity, respectively.