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Thermal Escape from Early Martian Atmosphere

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Abstract

Recently it has been suggested that the upper atmosphere of early Noachian Mars was hot and highly expanded under the strong EUV flux from the young Sun [1]. Both the high exobase temperature and the far exobase distance facilitate efficient thermal escape of major atmospheric gases such as carbon and oxygen. As a result Mars could only have maintained a stable CO2 atmosphere for several hundred million years after its formation [1]. In this work we include multiple isotopes of carbon and oxygen in the thermosphere-ionosphere model [1,2,3] and use the new model to explore the isotopic fractionation effect of the highly expanded early Martian atmosphere. Similar highly expanded upper atmospheres of early Venus and Earth will be discussed.

References

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