太陽風によるイオンの非熱的散逸：金星・地球・火星の比較

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COMPARATIVE NON-THERMAL ION ESCAPE INDUCED BY THE INTERACTION WITH THE SOLAR WIND

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Non-thermal atmospheric escape exceeds by far the Jeans escape for particles heavier than helium for the solar system planets. In this talk we compare the total non-thermal ion escape rates for Venus, Earth, and Mars caused by the interaction with the solar wind. We review the most recent data on the escape rates based on measurements from Mars Express, Venus Express, and Cluster. The comparison of the non-thermal ion escape rate shows that despite large differences in the atmospheric masses among these three planets (a factor of 100 - 200) and different types of the interactions with the solar wind (magnetized and non-magnetized obstacles), the escape rates from Mars, Venus, and the Earth are within the range 10^{24}-10^{25} s^{-1}. Surprisingly, the expected shielding of the Earth atmosphere by the intrinsic magnetic field is not as efficient as one may have thought. The reason for the comparable ion escape rate is the non-thermal escape caused by the solar wind interaction is a energy - limited process. Indeed, normalizing the escape rates to the planet-dependent escape energy and power available in the solar wind results in the normalized escape rates deferring only by a factor among three planets. The larger terrestorial magnetosphere intercepts and tunnels down to the ionosphere more energy from the solar wind than more compact interaction regions of non-magnetized planets.