THE EXOSPHERE AND SOLAR WIND INTERACTION OF CERES. W.-H. Ip[1,2], Yung-Ching Wang[1] and Ling Tu[2], [1]Institute of Astronomy, National Central University, Taiwan, wingip@astro.ncu.edu.tw), [2]Institute of Space Science, Nationqal Central University, Taiwan)

Introduction: After the orbiter measurements at Vesta, the Dawn spacecraft will visit the largest asteroid, Ceres, to carry out in depth observations of its surface morphology and mineralogical composition. We believe that this path-finding mission would lead to the planning of lander and/or rover missions to Ceres which is a dwarf planet of primary importance in our understanding of the solar system origin and even the origin of life in case it does possess a subsurface ocean [1]. Ceres does not have a thick atmosphere because of its small surface gravity. But its surface is constantly subject to the bombardment of solar wind particles, interplanetary meteoroids and solar radiation. Just like in the case of the Moon and Mercury, a thin exosphere would be generated [2,3]. There are yet no observational constraints on the column densities of gas species like H, He, O, Na, K and Ar. But at an orbital distance of 2.8 AU, we would expect the possible existence of H_2O, CO_2, O_2 and other molecules via surface chemical reactions or if Ceres is partially covered in ice. In the context of solar wind interaction, it is expected that a flux of neutral hydrogen atoms moving in the antisunward direction would be created on the sunlit hemisphere because of reflection of the surface neutralization of the solar wind protons [4]. In this work we will report on the first results from our theoretical modeling.

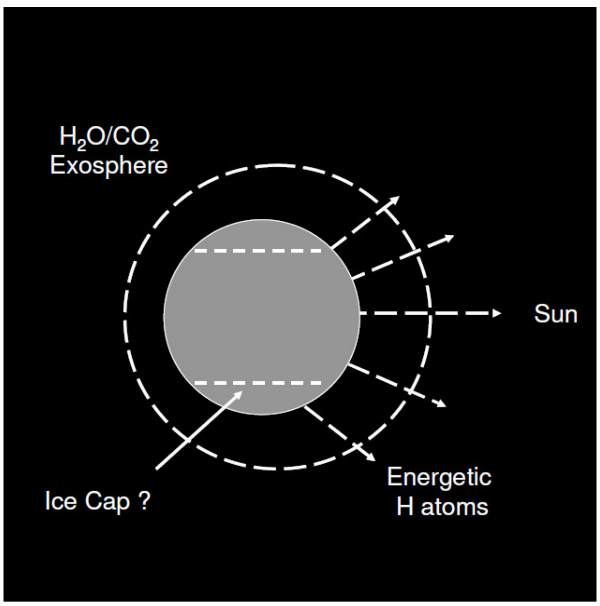

Figure 1: A schematic model of the exospheric environment of Ceres with volatile (H2O) supply from the polar caps, meteoroid impact and solar wind chemical sputtering effect. (Ceres image from NASA HST.)

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