領域: 天文學

Title: Astrobiology in the Solar System (太陽系裡的天文生物學)

Abstract:

The small icy bodies in the solar system such as comets, Europa and Enceladus contain a lot of water (ice) and organic volatile molecules. In addition, Enceladus and Europa are suggested to have liquid water beneath their surfaces due to their surface plume activities (e.g., Porco et al., 2006; Roth et al., 2013). It makes these two little objects the most promising harbors for life in addition to Mars and Titan. We will study the chemical composition and distribution of the atmospheres of the small icy bodies using with the ground-based radio observations (i.e, ALMA), the spacecraft data (i.e., Cassini and Rosetta) and the numerical modelings (i.e., radiative transfer). This synergic project will provide crucial information of the outgassing events of these icy bodies and better constraints in the ocean chemistry models (i.e., Europa) such as the salinity and the oxidation state by investigating the sources of the atmospheric species and their associated radiolytic effects (irradiated vs. prior-to-irradiated). Therefore, this work will also improve understanding of the evolution of ocean, atmosphere and life in early history of the solar system; and contribute to future space missions, such as NASAs next flagship mission to Europa and ESA’s JUICE mission.