R009-12
B 会場 ：11/6　AM2 （10:45-12:30）
12:00〜12:15

#安田　陸人 [1)], 木村　智樹 [2)], 三澤　浩昭 [1)], 土屋　史紀 [3)], 佐藤　晋之祐 [4)], 堺　正太朗 [5)], 熊本　篤志 [3)], 笠羽　康正 [6)],Cecconi　Baptiste[7)],Louis　Corentin[8)],Zarka　P.[9)]
([1] 東北大・理・惑星プラズマ大気研究センター,[2]Tokyo University of Science,[3] 東北大・理・惑星プラズマ大気,[4] 東北大学 惑星プラズマ・大気研究センター,[5] 東北大・理・地球物理,[6] 東北大・理,[7]LESIA, Observatoire de Paris,[8]DIAS Dunsink Observatory,[9]Observatoire de Paris

Numerical radar simulation for the explorations of the ionospheres of Jupiter's icy moons

#Rikuto Yasuda[1)], Tomoki Kimura[2)], Hiroaki Misawa[1)], Fuminori Tsuchiya[3)], Shinnosuke Satoh[4)], Shotaro Sakai[5)], Atsushi Kumamoto[3)], Yasumasa Kasaba[6)], Baptiste Cecconi[7)], Corentin Louis[8)], P. Zarka[9)]
([1]PPARC, Tohoku Univ.,[2]Tokyo University of Science,[3]Planet. Plasma Atmos. Res. Cent., Tohoku Univ.,[4]Tohoku University,[5]Dept. Geophys., Science, Tohoku Univ.,[6]Tohoku Univ.,[7]LESIA, Observatoire de Paris,[8]DIAS Dunsink Observatory,[9]Observatoire de Paris

Jupiter's icy moons such as Europa and Ganymede may harbor subsurface liquid water oceans. While only Earth has the ocean on the surface in the current solar system, multiple icy bodies like the icy moons of giant planets have oceans in their subsurface under the icy crust. So, the icy bodies are potentially more universal habitable environment than the Earth-type bodies. The icy bodies' ionospheres include essential information for understanding the habitable environments because the ionospheres are formed as a result of the crusts' weathering and putative water plumes from the subsurface oceans. Especially, the ionospheric structures and time variability reflect the activity of the crusts and oceans. However, the structures are still unclear because the ionospheric radio occultation and other effective explorations have difficulties of limited observing opportunities. So, we have been trying to uncover the structures by radar exploration, which will be connected to the explorations with the Radio & Plasma Wave Investigation (RPWI) and the Radar for Icy Moon Exploration (RIME) onboard the Jupiter ICy moons Explorer (JUICE). For future investigations of radio wave sounding with RPWI and RIME ranging in tens KHz to tens MHz, we have developed a numerical simulation code that models the propagation of electromagnetic (EM) waves and emulated occultation of the Jovian radio waves by the icy moon's ionosphere during the flybys of the Galileo spacecraft to Jupiter's icy moons. Here, we show the vertical ionospheric profiles using our numerical simulation code. We found that the maximum electron density is estimated at ˜50 /cc in lower latitudes of Ganymede's trailing hemisphere and ˜150 /cc in higher latitudes of the leading hemisphere. We argue that these results reflect surface weathering due to magnetospheric particle bombardment. In this presentation, we will also indicate the ionospheric profiles of Europa and Callisto and discuss the generation processes of the profiles. As the next step, we plan to simulate the reflection and transmission of the EM waves in the icy crust and underlying ocean. By combining this new simulation with our current one for the ionospheres, the icy moon's ionospheric and subsurface structures are expected to be elucidated. These simulations would also give constraints on the pressure and temperature of the subsurface, which finally lead to deep understandings of the icy moon's habitability.