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Towards EJSM (Europa Jupiter System Mission) in 2020s

Sho Sasaki[1*], Masaki Fujimoto[2], Takeshi Takashima[2], Hajime Yano[2], Yasumasa Kasaba[3], Jun Kimura[4], Yukihiro Takahashi[4]

[1]National Astronomical Observatory, [2]ISAS/JAXA, [3]Tohoku University, [4]Hokkaido University

Europa Jupiter System Mission (EJSM) is an international mission to explore and Jupiter, its satellite and environment. EJSM consists of (1) The Jupiter Europa Orbiter (JEO) by NASA, (2) the Jupiter Ganymede Orbiter (JGO) by ESA, (3) the Jupiter Magnetospheric Orbiter (JMO) studied by JAXA. They will be launched in 2020.

Together with plasma instruments on board JEO and JGO, JMO will investigate the fast and huge rotating magnetosphere to clarify the energy procurement from Jovian rotation to the magnetosphere, to clarify the interaction between the solar wind the magnetosphere. JMO will clarify the characteristics of the strongest accelerator in the solar system. JMO will investigate the role of Io as a source of heavy ions in the magnetosphere. Using multiple flybys with Callisto, we can enhance the inclination of JMO up to 50 degree. Then, high latitude regions of Jupiter can be observed from the spacecraft. Also we can obtain valuable information such as interior structure of Callisto, through the multiple encounters.

JAXA is studying solar power sail for deep space explorations following a successful ion engine mission HAYABUSA. This is not only a solar sail (photon propulsion) but also include very efficient ion engines where electric power is produced solar cells within the sail. An engineering mission IKAROS (Interplanetary Kite-craft Accelerated by Radiation Of the Sun) was launched and operated successfully in 2010. A mission with a large (100m-scale) solar power sail can transfer a large spacecraft to Jovian system. We are studying a mission to Jupiter and one (or two) of Trojan asteroids, which are primitive bodies with information of the early solar system as well as raw solid materials of Jovian system.

Keywords: Jovian Magnetosphere, Exploration of Jupiter, Icy satellites, Trojan asteroids, Europa, Callisto