



Jupiter Magnetospheric Orbiter and Trojan Asteroid Explorer in EJSM (Europa Jupiter System Mission)

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Europa Jupiter System Mission (EJSM) is an international mission to explore and Jupiter, its satellites and magnetospheric environment in 2020s. EJSM consists of (1) The Jupiter Europa Orbiter (JEO) by NASA, (2) the Jupiter Ganymede Orbiter (JGO) by ESA, and (3) the Jupiter Magnetospheric Orbiter (JMO) studied by JAXA (Japan Aerospace Exploration Agency). In February 2009, NASA and ESA decided to continue the study of EJSM as a candidate of the outer solar system mission.

JMO will have magnetometers, low-energy plasma spectrometers, medium energy particle detectors, energetic particle detectors, electric field / plasma wave instruments, an ENA imager, an EUV spectrometer, and a dust detector. Collaborating 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 and the magnetosphere. Especially when JEO and JGO are orbiting around Europa and Ganymede, respectively, JMO will measure the outside condition in the Jovian magnetosphere. JMO will clarify the characteristics of the strongest accelerator in the solar system with the investigation of the role of Io as a source of heavy ions in the magnetosphere.

JAXA started a study of a solar power sail for deep space explorations. Together with a solar sail (photon propulsion), it will have very efficient ion engines where electric power is produced solar panels within the sail. JAXA has already experienced ion engine in the successful Hayabusa mission, which was launched in 2003 and is still in operation in 2010. For the purpose of testing solar power sail technology, an engineering mission IKAROS (Interplanetary Kite-craft Accelerated by Radiation Of the Sun) will be launched in 2010 together with Venus Climate Orbiter PLANET-C. The shape of the IKAROS' membrane is square, with a diagonal distance of 20m. It is made of polyimide film only 0.0075mm thick. Currently we are studying a mission to Jupiter and one (or two) of Trojan asteroids using a large (100m-scale) solar power sail that can transfer large payload mass as far as Jupiter. Trojan asteroids are primitive bodies with information of the early solar system as well as raw solid materials of Jovian system. According to the mission plan, as the main spacecraft flies by Jupiter, it will deploy a JMO spinner around Jupiter. Proposed instruments on board Trojan spacecraft are cameras, IR spectrometers, XRS, a laser altimeter, and a surface vehicle (if rendezvous with the target is possible). An instrument for measuring cosmic background is also proposed.

Currently JEO and JGO will be launched in 2020 and the Trojan spacecraft with JMO shall be launched at the same window. The mission (Trojan-JMO) will take 6 years to Jupiter and 5 years more to a Trojan asteroid around L4. The mission study team also includes J. Kawaguchi, Y. Kawakatsu, and M. Morimoto of JAXA.