

ISAS space science in 2020s

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Space Policy Commission under the Cabinet Office intends to guarantee predetermined steady annual budget for space science and exploration to be performed by ISAS/JAXA. This policy is clearly stated in the "Basic Plan on Space Policy" recently revised and approved by the Government of Japan. This document is our legitimate backbone that allows ISAS/JAXA to have stable and regular launch cadence with newly-defined mission lines, long-term planning on missions and enabling technology development and early commitment to international programs. Three distinct mission categories ( or pillars ) are strategic Large mission (3 launches in 10 years) with H3 vehicle, competitively-chosen Medium-size focused missions (comparable to NASA's SMEX) launched approximately every other year with Epsilon rocket, and missions of opportunity (S-class) for participation to foreign agency-led large missions. The latest L-mission is the JAXA-NASA X-ray astronomy satellite Hitomi (ASTRO-H launched in 2016). Our provisional decadal plan for L-class is articulated around the Martian Moons eXplorer (MMX, 2022) and the far-infrared mission with ESA (SPICA, 2027-2028). L-class candidates for the 2025 slot include LiteBIRD for Cosmic Microwave Background B-mode polarization detection and Solar Power Sail mission for Trojan exploration. M-class missions in orbit and development phase include Hisaki (UV planet observations, launched in 2013), ERG (van Allen probe to be launched in JFY 2016) and SLIM (lunar-lander to be launched in JFY 2019). Candidates for 4th and 5th M-class missions are being selected. S-class projects in development/planning phase include ESA-led BepiColombo, JUICE, X-ray astronomy mission Athena and NASA-led WFIRST. Our enabling technology for astrophysics and fundamental physics missions in 2020s include cryogenic systems as represented by Hitomi, SPICA and LiteBIRD, and those for 2020s~ 2030s planetary science are two-fold; (1) landing on planet/satellite starting with pathfinder mission SLIM, (2) sample & return technology as represented by Hayabusa, Hayabusa2 and MMX. We desire to participate in foreign-agency-led large astrophysics missions and missions to distant planets in 2020s~2030s. ISAS has benefitted from intimate collaboration with NASA over past 30 years especially in X-ray astronomy, solar physics, and magnetospheric science. We could not make Hitomi happen without the tremendous contribution from NASA. We have been looking forward to new substantial collaboration following ASTRO-H with NASA. ISAS/JAXA ongoing and planned missions for 2020s are scientifically attractive. These mission candidates are ambitious but will be feasible if we have early coordination and stable relationship with our international partners. We hope that these missions pave the way to even more ambitious joint plans for 2030s space science.