[EE] Evening Poster | P (Space and Planetary Sciences) | P-CG Complex & General

[P-CG21]Future missions and instrumentation for space and planetary science

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Not only national space agencies but some universities and even companies in the world are now leading a number of space science and exploration missions and also energetically initiating new research activities for satellite and rocket developments and international collaborations in these days because the Earth observations from the space and the space explorations could be achieved much easier than a few decades ago. The deployment to the space, which itself is not purely a scientific purpose but one of methods for better sciences, is vigorously motivating the technical innovation and the educational development. For successful space missions, it is also crucial to research and develop aim-oriented on-board instruments, and the fundamental research and development of observational instrumentation with future perspectives could totally lead space missions in some case. Detailed investigation and evaluation on various on-board instruments are needed during their proposals, selections, and fabrications in order to promote the missions, and inevitably we have to make multi-sided arrangements and evolution at every process and aspect of any type of space missions, independently of their mission sizes. In this session, we focus on these comprehensive research activities in the space missions, including the mission integrations and the individual instrumental developments, and we also call many presentations showing the uniqueness and renovation regarding the mission strategy and methodology, and the status and latest results in the related state-of-the-art researches and developments, which would provide all of researchers and developers with invaluable opportunities for active discussion, information sharing, and collaboration toward the realization of more missions for more fruitful space sciences and explorations in nearer future.

[PCG21-P13]Investigation of the Solar System Structure using the Solar Power Sail: OKEANOS

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The solar power sail mission: OKEANOS (Oversize Kite-craft for Exploration and AstroNautics in the Outer Solar system) is a Japanese candidate deep-space probe that will be powered by hybrid propulsion of solar photon acceleration and ion engines. The main scientific objectives are studies of Trojan asteroids in the Jovian L4 or L5 regions. The long distance and period from the launch to the swing-by at Jupiter will give us a good opportunity to explore the solar system between the Earth and the Jupiter to elucidate the solar system disc structure. We define the cruising-phase sciences of the OKEANOS mission as the scientific theme that will be explored or observed from the launch to the swing-by at Jupiter. Candidates of instruments for the cruising phase are: the EXo-Zodiacal Infrared Telescope (EXZIT), the Arrayed Large-area Dust detectors in INterplanetary space (ALADDIN)-2, the MaGnetic Field

experiment (MGF)-2, and the GAmma-ray burst Polarimeter (GAP)-2. In this paper, we report scientific purpose and observation plans of them.

Zodiacal light observed at visible and near-infrared wavelengths is thought to be sunlight scattered by interplanetary dust. The two-dimensional distribution of zodiacal light reflects the three-dimensional structure of interplanetary dust. However, it is still controversial that how the ratio of asteroid-origin to comet-origin changes by the heliocentric distance. Therefore, the comparison of the radial distribution of zodiacal light and the in-situ dust observation will help clarify the distribution and components of solid particles in our solar system. These results are expected to provide precise distribution of the interplanetary dust in our solar-system discs.
The temperature of the solar wind, which depends on the heliocentric distance, has been observed to be greater than that predicted by the adiabatic model. Therefore, the existence of heating processes, such as plasma turbulence or magnetic reconnection, could be predicted. The observation of the magnetic field by the devices separated in the scale of the membrane of the Solar Power Sail provides the resolution of the plasma turbulence on the electron scale. Thus, the intermittent observation of the magnetic field between the Earth and Jupiter would determine the heating mechanism of the solar wind. The synergy of the magnetic field and dust observation may show the interaction between interplanetary dust and solar wind. By analyzing the environments on the dust surface, the chemical evolutions of molecules caused by solar wind and cosmic radiation can be investigated. We are investigating the possibilities to detect gamma-rays and particles from the solar-system shocks.