

Current status of MELOS1 Mars exploration planning

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MELOS (an acronym of Mars Exploration with Lander-Orbiter Synergy) is Japan's new and ambitious plan for a series of Mars exploration missions. The ultimate goal of the MELOS series missions is to understand the solid planet, the surface processes, the atmosphere, and its surrounding plasma environment as one integrated system. This, of course, requires multiple missions of orbiters and landers, equipped with various instruments. The first of the MELOS series, MELOS1, is currently under planning. The mission consists of two elements: an orbiter and an entry-descent-landing (EDL) demonstrator. The scientific objective of the orbiter is the spatial and temporal variability of Martian dust, which have significant effect on the Martian climate through a variety of processes, such as heating of atmosphere by absorption of the sunlight, etc. To continuously monitor the evolution of dust storms, the orbit (near equatorial, as opposed to polar orbits in most missions) is so designed (1) that enables the orbiter nearly in synchronization with the planet's rotation when it is around the apocenter, and (2) that the apocenter's local time is always maintained near the noon. The instruments on board MELOS1 include the imaging polarimeter (visible wavelengths), the thermal-infrared camera, the sub-mm sounder, plus the ultra-stable oscillator for the radio occultation science. The EDL demonstrator will primarily perform experiments of engineering aspects, while a small portion of its payload will be available for scientific experiments. Current proposals include the interior-structure study, the astro-biological experiments, and the surface-geology study. The selection will take place in this year and the MELOS1 mission will be proposed for the launch around 2020. We welcome inputs from the world Mars science community and/or contributed instruments that require and benefit from MELOS1's unique orbit.

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