Europa Lander Stereo Spectral Imaging Experiment (ELSSIE)

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In support of the search for biosignatures on Europa, determining habitability of Europa's ocean, and understanding physical processes that modify Europa's ice crust, we are prototyping ELSSIE (Fig. 1) under a grant from the ICEE-2 program. ELSSIE would: 1) provide panoramic and workspace views to support sampling; 2) collect infrared data to identify and map enrichments in organics and non-ice phases and determine which ice is least radiation-damaged, thus supporting selection of the best samples for *in situ* analysis; and 3) survey the landscape for evidence of active surface processes.

ELSSIE's sensor combines a 20-filter, 0.4-3.65 µm multispectral stereo imager with a 0.8-3.6 µm point spectrometer, both sharing a single radiation-shielded HgCdTe focal plane array. ELSSIE provides stereo and imaging/spectroscopic measurements of reflected light from visible to infrared wavelengths to search for organics, detect salts and biominerals, characterize ice crystallinity and grain size, and map their distributions. Adjustable focus and onboard z-stacking provide in-focus images from the lander deck to infinity. The Sensor is supported by a Data Processing Unit (DPU) based on that of the Mapping Imaging Spectrometer for Europa (MISE). The DPU merges multiple exposures of each image to remediate radiation, calibrates data onboard, co-registers images from different filters, and reduces 20-filter data to a few "summary images" that measure key absorptions and are downlinked to support sample selection. Additional image compression is applied to science and tactical imaging campaigns to enable comprehensive investigation of surface morphology and composition within Europa Lander's constrained downlink.

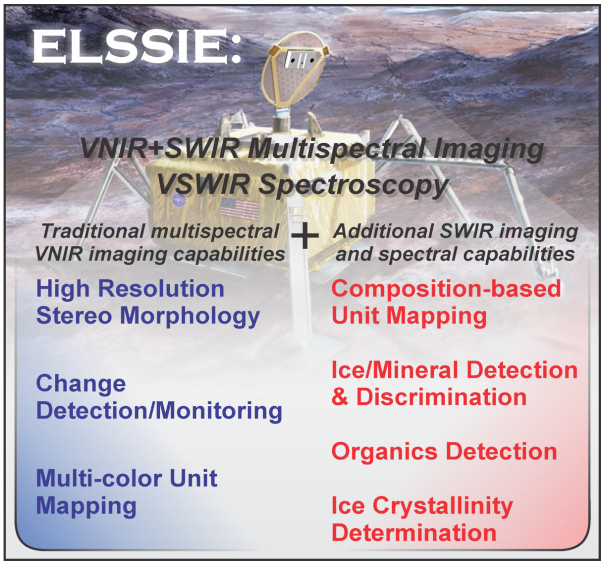

Fig. 1. ELSSIE leverages Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) and MISE operational concepts and onboard and onground processing to advance context remote sensing for landed missions.