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Detection of olivine-rich craters in the northern lowlands by OMEGA on Mars Express

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The OMEGA VIS-IR imaging spectrometer on board Mars Express has mapped the northern latitude regions of Mars at resolutions of 300 m to 1 km / pixel between October 2004 and January 2005. Extended low albedo regions at medium to high northern latitudes have spectra with a strong blue slope from 1 to 3 μm and relatively weak mafic absorption features. Small low albedo regions are observed in many large craters in the northern lowlands. The spectra of these areas also present a blue slope in the near infrared, but a wide absorption band is observed from 0.9 to 1.5 μm, with band strengths ranging from 10% to 40%. This demonstrates that olivine is a major component of their mineralogical composition, in combination with whatever component is responsible for the blue slope (volcanic glass or alteration products). A similar signature is observed in some ejecta with higher albedos. The most likely interpretation is that the cratering process extracted material from an ubiquitous olivine-rich bedrock underlying the northern lowlands, depositing it in the ejecta blanket or in the central depression. This finding has important implications for the formation process of the northern lowlands.