HIGH SPECTRAL & SPATIAL RESOLUTION ANALYSES OF MARTIAN METEORITE-LIKE COMPOSITIONS ON THE SURFACE OF MARS. V. E. Hamilton[1] and P. R. Christensen[2], [1]Hawai'i Institute of Geophysics and Planetology, University of Hawai'i (hamilton@higp.hawaii.edu), [2]Dept. of Geological Sciences, Arizona State University.

Objective: We are attempting to identify potential Martian meteorite source regions on Mars using high spatial resolution thermal infrared imaging data from the Mars Odyssey Thermal Emission Imaging System (THEMIS) in conjunction with high spectral resolution data from the Mars Global Surveyor Thermal Emission Spectrometer (TES). [1] used TES data to identify regions of Mars with thermal infrared spectral signatures like those of some Martian meteorites and additional characterization of the mineralogy, geology, and cratering histories of these sites is required to determine if any of these areas can be linked definitively to the meteorites.

Introduction: Global deconvolutions of MGS TES data identify only small areas in Martian dark regions with spectral signatures like those of Chassigny, ALH A77005, and/or ALH 84001 [1]. No signatures like those of basaltic shergottites were identified anywhere in the dark regions at the maximum scale (32 pixels/degree) of the study. [1] concluded that the Martian meteorites are not representative of a large fraction of the Martian crust, which appears not to be Al-depleted. No candidate parent craters were proposed in any of the areas in which the meteorite-like compositions were identified, primarily because detailed correlations of the spectral signatures and commonly complex local geology are required.

This study: New visible and infrared imaging data from THEMIS show areas with Martian meteorite-like spectral components in unprecedented spatial detail (~20 and ~100 m/pixel, respectively), allowing us to correlate better TES hyperspectral data with features on the Martian surface. Decorrelation stretch images of THEMIS infrared data reveal details of the distribution of Martian meteorite-like mineralogies with respect to local geology (Figure 1). We also have used THEMIS multi-band infrared image data to identify new locations with meteorite-like compositions that were suspect in the initial TES data analysis because of their small spatial extent. New deconvolution analyses of the TES data improve upon the deconvolutions of [1] by using an end member library containing mineral spectra rather than meteorite and Martian surface type spectra. These new deconvolutions place better constraints on the local variations in mineralogy and the solid solution compositions of major phases (e.g., olivine).

Reference: [1] Hamilton, V. E. et al. (in press) *Met. Planet. Sci.*

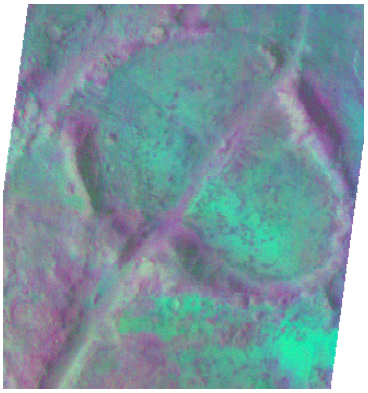

Figure 1. THEMIS infrared image of crater in Nili Fossae showing olivine-bearing materials in green/bright. Image width is ~32 km.