SEARCHING FOR THE 506-nm PYROXENE ABSORPTION BAND IN METEORITE SPECTRA. E. A. Cloutis[1], and M.J. Gaffey[2]. [1]Department of Geography, University of Winnipeg, Winnipeg, MB, Canada R3B 2E9. E-mail: e.cloutis@uwinnipeg.ca. [2] Department of Space Studies, University of North Dakota, Grand Forks, ND, USA 58203. E-mail: gaffey@space.edu.

Introduction: Fe^{2+}-bearing, low-Ca pyroxene and pigeonite reflectance spectra exhibit a narrow Fe^{2+} spin-forbidden absorption band in the 506-nm region. This feature is seen in reflectance spectra of terrestrial [1] and synthetic pyroxenes [2], HED meteorites [3], and telescopic spectra of Vesta, vestoids [4] and other asteroid types [5].

This feature is the strongest of the Fe^{2+} spin-forbidden bands and hence can potentially be used as an indicator of the presence of pyroxene in the absence of longer wavelength data. In order to determine the applicability of this feature to planetary remote sensing, we measured reflectance spectra of a number of powdered meteorites and mixtures of pyroxenes plus other materials.

Experimental Procedure: Given the narrowness of this band (on the order of 6 nm FWHM) high spectral resolution data is required for its detection and characterization. We measured reflectance spectra of the following materials (with ~0.3 nm resolution): E-chondrites, aubrites, LL, L, and H chondrites, eucrites, a low-Fe (Fs~0.4) terrestrial pyroxene, and orthopyroxene (Fs13) + meteoritic metal mixtures.

Results: For this study, we define an absorption band as being present if it occurs in the right wavelength region, is visually apparent in the spectrum, and is apparently stronger than the noise in the spectrum. Using these criteria, we identify an absorption band in spectra of some E-chondrites (Daniel's Kuil, Pillistfer, Indarch), but not others. We find evidence for a weak band in reflectance spectra of all four of our available aubrites, but generally only for the larger grain sizes. An absorption band is also present in our low Fe (Fs~0.4) terrestrial sample.

Of the ordinary chondrites examined, only H-chondrites show evidence for a 506-nm absorption band. This is consistent with the higher pyroxene abundance in H vs L and LL chondrites (but not the lower Fs content in this group). Detection limits were also determined for pyroxene+metal mixtures. A band is evident in a 90%-10% metal-pyroxene (Fs 13) mixture.

Discussion: The data acquired to date suggest that the 506-nm region absorption band is a potentially useful indicator of the presence of pyroxene. The position of this band gives an indication of Fe^{2+} content; near 503 nm in the low Fe^{2+} samples (aubrites, E-chondrites), and closer to 506 nm in higher Fe^{2+} samples (H-chondrites, HEDs). The presence of this band in some E-chondrite spectra and high metal content mixtures suggests that it can serve as an indicator of the presence of pyroxene in a wide variety of assemblages. It should be noted that in the aubrite and E-chondrite spectra, the depth of this band is <0.5%. Therefore detecting its presence requires high SNR data.

References: [1] Kaletzke L. et al. 2006. Abstract #2174, 37th Lunar & Planetary Science Conference. [2] Klima R. L. et al. (2007) M*eteoritics & Planetary* Science 42:235-253. [3] Hiroi T. et al. (2001) *Earth Planets* Space 53:1071-1075. [4] Cochran A. L. et al. (2004) Icarus 167:360-368. [5] Busarev V. V. (1998) Icarus 131:32-40.