WEATHERING OF S- AND C-CLASS ASTEROIDS: EFFECTS AT UV WAVELENGTHS. A. R. Hendrix[1] and F. Vilas[2], [1]Jet Propulsion Laboratory/California Institute of Technology, 4800 Oak Grove Dr., MS 230-250, Pasadena, CA, 91109, arh@jpl.nasa.gov, [2]MMT Observatory, PO Box 210065, University of Arizona, Tucson, AZ, 85721 (fvilas@mmto.org).

Introduction: Space weathering, the bombardment of airless bodies by micrometeoroids and irradiation by solar wind particles, affects spectra of solar system bodies by darkening and 'reddening' (where the spectral reflectance increases with wavelength) their surface materials, as well as degrading absorption features [1] at visible-near IR (VNIR) wavelengths. These effects are well documented for the Moon (e.g., [2]), where they are apparent in spectra of natural lunar soils, but not seen in spectra of powdered lunar rock samples. The cause of these weathering effects is likely vapor deposition of submicroscopic iron (SMFe) [3][4], through solar wind irradiation and micrometeorite bombardment of the lunar surface.

The effects of space weathering on the Moon and asteroids at VNIR wavelengths have been well-studied (e.g., [1][2][3][4][5]). Space weathering is an important process in the asteroid belt, and is believed to be the cause of spectral differences between ordinary chondrite (OC) meteorites and their proposed parent bodies, S-class asteroids. More recently, we have studied the *ultraviolet* effects of weathering [6][7] and found them to be distinct and likely more sensitive to small amounts of weathering than VNIR wavelengths. We expand on our previous work and report our results here.

S-class asteroids: *UV effects of weathering.* At visible-near-IR wavelengths, S-type asteroids are generally spectrally redder (and darker) than ordinary chondrite meteorites, whereas the opposite is generally true at near-UV wavelengths [7]. We have analyzed all of the good-quality S-class asteroid spectra available in the archive of ultraviolet observations from the *International Ultraviolet Explorer* (IUE) and the *Hubble Space Telescope* (HST). We have determined the spectral slopes in the near-UV (NUV) and compare with the spectral slopes of laboratory-measured spectra of ordinary chondrite meteorites [8]. We find that the NUV slopes of the asteroids are bluer than those of the meteorites, presenting the opposite trend as in the VNIR. The UV bluing is most prominent in the 300-400 nm range, where the strong Fe^{3+} UV/blue IVCT absorption feature is degraded with weathering. Similarly, laboratory measurements of lunar samples show that lunar soils (presumably more weathered) are spectrally redder at longer wavelengths, and spectrally bluer at NUV wavelengths, than less-weathered crushed lunar rocks.

New observations. In order to test our results by extending to slightly longer wavelengths, we have obtained NUV-visible spectra of 6 S-class asteroids (7, 18, 20, 23, 42, 471) and Karin asteroid 10783 using the 6.5-m MMT telescope with the facility Blue Channel spectrograph on UT 11 - 12 Dec 2006.

C-class asteroids: Because this group of asteroids varies dramatically from the S-class in terms of composition, it is expected that the weathering effects will be different, particularly if (as we believe) the S-class weathering effects are driven by the amount of iron available in the surface composition to be converted to nanophase iron.

We have analyzed the entire set of existing UV observations of C-class asteroids in the IUE/HST archive. We find that there is a distinct spectral difference between C-class asteroids and carbonaceous chondrites meteorites in the NUV region, while spectral differences at VNIR wavelengths are largely not present.

In an analysis comparable to our S-class work, we compare the spectral slopes of the C-class asteroids with the spectral slopes of carbonaceous chondrite meteorites. We find that the C-class asteroids are largely spectrally bluer in the NUV than the carbonaceous chondrites; this may be similar to the VNIR spectral trend [9]. We explore the possible reasons for such a spectral exhibition and potential implications for thermal metamorphism on these bodies. Carbonaceous chondrites are darker than ordinary chondrites, but do exhibit a UV "dropoff," or IVCT absorption feature. (The UV dropoff is quite subdued for CI1 and CM2 types.) Thus, we may expect a similar weathering pattern for C-types as for S-types. If a meteorite or asteroid exhibits a UV dropoff, that suggests that it includes some transparent (i.e., silicate) material; it is not composed entirely of opaque, carbonaceous material. So perhaps many C-class asteroids have enough transparent material to cause the UV absorption edge, but not enough to produce significant VNIR bands.

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