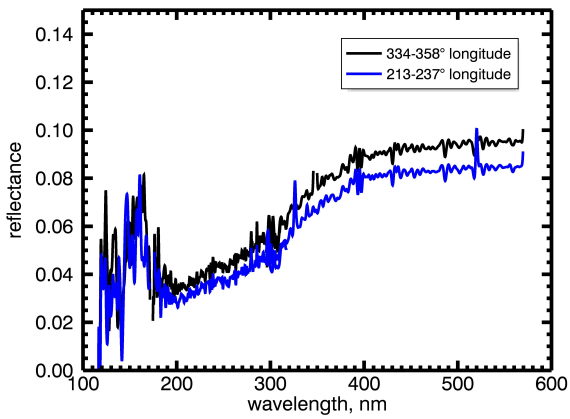
CERES' ULTRAVIOLET SIGNATURES AND COMPOSITIONAL CLUES. A. R. Hendrix[1], F. Vilas[1] and J.-Y. Li[1], [1]Planetary Science Institute, Tucson, AZ (arh@psi.edu).

Introduction: We present the first spectral observations of Ceres in the far-ultraviolet as measured by HST/STIS in August-September, 2015 (HST Cycle 22). The observations are motivated by early broadband UV observations [1][2][3] suggesting a UV absorption centered near 260 nm along with a very strong increase in UV reflectance into the far-UV (FUV) (~160 nm). We use the STIS data to test a prediction of graphitized carbon on the surface, and we look for signatures of water ice and/or water vapor.

Observations and Data Reduction: We have observed two central longitudes of Ceres – near 0°E and 240°E (this latter area one of the regions in which Herschel detected water vapor) – using the G140L (~120-172 nm), G230L (~170-310 nm) and G430L (~300-570 nm) detectors. Both observations captured "bright spots" on Ceres' surface. We used the pipeline processed data in these analyses.



The Upturn at 210 nm: It is typical of silicates and non-opaque minerals to have reddish reflectances in the UV-visible, reach a minimum in reflectance in the 150-450 nm region and then have a blue slope in the far-UV; for instance, this is the spectral behavior of the Moon [7]. The minimum in reflectance generally corresponds to the transition from volume to surface scattering (e.g. [5]). The blue FUV slope is typical because many minerals exhibit larger indices of refraction in this regime (especially k, the imaginary part that controls absorption); in the surface scattering regime of the FUV, materials with high k are reflective rather than absorptive. Ceres first presented clues it was different because the FUV rise (the FUV upturn) was so dramatic – much stronger than seen in silicates [1][2][4]. The new STIS data indicate that the FUV rise (blue FUV upturn) begins at ~210 nm and peaks near 160 nm. Such a strong FUV upturn is similar to that seen in graphitized carbons [6] – consistent with the visibly-gray and low albedo of Ceres. Spectral models using existing optical constants indicate that the FUV spectral shape of Ceres is consistent with a glassy carbon. At longer near-UV wavelengths, another species dominates the spectrum (mixture model work is ongoing).

Temporal and Spatial Variations in UV Signatures: Earlier broadband UV observations of Ceres [1][2][4] show differences in (1) the shape of the UV absorption in the 250-400 nm region and (2) the shape and magnitude of the FUV rise. These differences could be attributed to real temporal and/or spatial (hemispheric) changes in the surface composition and/or grain size. Such differences could perhaps be related to plume activity and deposition of material and/or compositional variations related to Ceres' "bright spots." This is under investigation and will be discussed.

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