Spectra of small Koronis family members

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The space-weathering process and its implications for the relationships between S- and Q-type asteroids and ordinary chondrite meteorites are long-standing problems in asteroid science. Although the visible and near-infrared spectra of S- and Q-type objects qualitatively show the same absorption features and quantitatively show evidence of the same minerals, the S types display increased spectral slopes and muted absorption features compared to the Q types. This spectral mismatch is consistent with the effects of the space weathering process. Binzel et al. provided the missing link between Q- and S-type bodies in near-Earth space by showing a reddening of spectral slope in objects from 0.1 to 5 km that corresponded to the transition from Q- to S-type spectra. This result implied that size, and therefore age, is related to the relationship between Q- and S-type. The existence of Q-type objects in the main belt was not confirmed until Mothe-Diniz and Nesvorny (2008) found them in young S-type clusters. To investigate the trend from Q to S in the main belt, we examined space weathering within the old main-belt Koronis family using a spectrophotometric survey (Rivkin et al. 2011, Thomas et al. 2011). Rivkin et al. (2011) identified several potential Q-type objects within the Koronis family.

Our Q-type candidates were identified using broad-band spectrophotometry and could not be taxonomically classified on that basis alone. We obtained follow-up visible and near-infrared spectral observations of our potential Q-type objects, (26970) Elias, (45610) 2000 DJ_{48}, and (37411) 2001 XF_{152}, using Gemini and Magellan. We will present the results of these spectral follow-up observations. Observations of (26970) Elias demonstrate that the object is more consistent with the average Q-type spectrum than the average S-type spectrum.