THERMAL INFRARED SPECTRAL COMPARISONS OF MINERALS AND ASTEROIDS IN RELATION TO THE FROST LINE. A. B. Lyall, P. C. Hart, C. L. Fisher, M. Mallon, I. Irvine, Waynflete School

Abstract: In this project, relative emissivities of various asteroids were compared to emissivities of both anhydrous and hydrated silicate minerals: pyroxene, olivine, serpentine, and lizardite. These were analyzed at mid-infrared wavelengths (8-13 um) because of the lack of previous research in these wavelengths. Reflectance spectra were obtained from the ASTER Spectral Library and were converted to emissivity (1-reflectance). The emissivities were plotted side-by-side on a graph and similar features were identified by eye. The minerals that showed similarities were analyzed due to their hydration and the distance the asteroid was from the sun. Olivine and serpentine were difficult to observe due their lack of similarity to the asteroid spectra in the mid-infrared range. Lizardite and pyroxene were identifiable in most of the asteroid spectra. It was found that hydrated minerals were apparent in asteroids inside of the frost line and outside of it. For example, 383 Janina was the only asteroid in our data set that did not have features of lizardite, a hydrated mineral. It is therefore likely that Janina formed inside the frost line and migrated outward over time. Several of the asteroids showed no presence of pyroxene, possibly due to the very low albedo of the asteroids. 3 Juno, located inside the frost line, was found to contain the hydrated mineral lizardite. One possible conclusion that can be drawn based on the appearance of hydrated minerals inside of the frost line was that some of these asteroids moved within the belt, explaining the existence of hydration inside of the frost line or the lack of them beyond the frost line. These findings are significant as they prove that the relationship between hydrated minerals at mid-infrared wavelengths and location is not absolute. It can also show that asteroids have moved significantly within the belt between their formation and now.