The LXD-mode Main-Belt/NEO Observing Program (LMNOP): Results

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The spectral region beyond 2.5 µm is rich with spectral features due to OH, water, and organic materials. For many low-albedo objects, it hosts the only detectable absorption bands. For this reason, astronomical observations of asteroids at these wavelengths are critical to understanding their nature, even though such observations can be difficult due to the Earth's atmosphere [1].

Since 2002, we have been obtaining data in the 2–4 µm region using the SpeX instrument on the IRTF in "LXD mode" [2]. While not originally designed as a survey, we call the collection of individual projects that we have completed over the years the "LXD-mode Main- belt/NEO Observing Program" (LMNOP). At the time of the upgrade of the SpeX instrument earlier in 2014, 390 observations of 210 different asteroids have been observed in the LMNOP. We have focused on C-complex asteroids (53 % of targets), but the survey also includes significant numbers of targets in the X complex (24 %) and S complex (11 %). The SpeX upgrade, with an associated break in observing and a need to change the reduction pipeline for future data, marks a convenient time to mark the end of this phase of the LMNOP.

The data collected has already been used to determine the surface compositional variation on Ceres [3-4], Lutetia [5], and Vesta [6], and to discover water ice frost on the surface of Themis [7]. Analysis is now moving forward into studies of compositional variation on Pallas and Hygiea, among other objects. The data is also being analyzed to study the links between the Ch-class asteroids and the CM meteorites, and to calculate the amount of water/OH implied by the asteroid spectra.

We will present results from the LMNOP dataset, including in-depth studies of individual objects, interpretations of taxonomic groups, and the beginnings of a taxonomic system in the 3-µm range itself.

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