Comparing the diameters and visual albedos derived from radar and infrared observations

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Radar observations provide direct measurements of the physical sizes of near-Earth objects, independent of visual albedo, composition, and thermal properties, which can act as calibration or sanity checks for models of thermal-infrared emission by small bodies. Thermal modeling of infrared observations by the NEOWISE [1–3] and ExploreNEOs (Spitzer) [4–6] programs has provided diameters and visual albedos for several hundred near-Earth objects. Meanwhile, since 1998, the Arecibo radar program has detected over 350 near-Earth objects, including more than 40 objects from each of the NEOWISE and ExploreNEOs catalogs, providing rotation-rate, size, and shape constraints depending on the strength and resolution of the received echoes. In addition, our observations with the SpeX instrument on the NASA IRTF provide a sample of roughly two dozen objects, observed on multiple dates at different viewing geometries, that were also observed by the Arecibo radar and NEOWISE and/or ExploreNEOs programs. We will compare the diameters and visual albedos inferred from radar to those derived from thermal modeling of infrared observations from WISE, Spitzer, and/or the IRTF, and look for correlations between the outliers and their sizes, shapes, compositions, and viewing geometries, all of which can affect the assumptions made in the process of standard thermal modeling.

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