

Compositional and textural inhomogeneity of Chelyabinsk meteorites

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Meteorites are important sources of information on composition and age of the solar system materials. However, collected meteorites are likely biased and unrepresentative of the near-Earth meteoroid population. Mineralogy and reflectance spectra of meteorites are used to link specific classes of meteorites and asteroids, but are not definitive enough. Meteorites of which fall were witnessed are rare and substantial case when meteorites and their parent bodies are directly linked, and both orbital and material data of the near-Earth bodies are known. The fireball was eye-witnessed near Chelyabinsk city of Russia in 15 February 2013, and associated meteorites of total mass of 4-6 ton, were subsequently recovered. Survey of physical and chemical nature of small bodies with an Earth-crossing orbit is crucial in understanding the origin and evolution of the near-Earth materials and in planetary defense. While near-Earth objects (NEO) >1 km dia. have been largely identified by NEO survey programs, most NEOs <?100 m dia. remain unknown. Thus, it is important to study the Chelyabinsk-sized objects. We present mineralogy and reflectance spectra of several chips of Chelyabinsk meteorites, which indicate chemical and spectral inhomogeneity, suggesting the complex history of the parent body.

Keywords: Chelyabinsk meteorites, Meteoroid impacts, Inhomogeneity