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Compositional Variations in Asteroids: A Record of the Early Solar System

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Asteroids may contain a record of heliocentric gradients in the material that formed the Solar System [Lee et al., 1997; Lugmair and Shukolyukov, 1998; Manuel et al., 1998a]. These heterogeneities are suggested by characteristic levels of O-16 in different categories of meteorites and planets [Clayton et al., 1976], primordial He and Ne trapped with isotopically "strange" Xe in chondritic diamonds [Lewis and Anders, 1988] and in Jupiter [Manuel et al., 1998b], terrestrial-type Xe in meteoritic troilite (FeS) and in Mars [Hwaung and Manuel, 1982; Lee et al., 1996], primordial He and Ne linked with isotopically "strange" Xe in diverse meteorites [Sabu and Manuel, 1980], s-products of nucleosynthesis in chondritic SiC grains [Srinivasan and Anders, 1978; Tang and Anders, 1988], a radial gradient of Mn-53 in the early solar system [Lugmair and Shukolyukov, 1998], and "mirror-image" isotopic anomalies in mineral grains of meteorites [Oliver et al., 1981; Begemann, 1993].

Asteroids may document these compositional variations in the material that formed the Solar System from an interstellar cloud [e.g., Wood, 1999] with presolar grains [Bernatowicz and Zinner, 1996] or from heterogeneous supernova debris [Manuel and Sabu, 1977; http://www.umr.edu/~om/report_to_fcr/report_to_fcr1.htm].

Most of these observations are summarized in the Proceedings of the ACS Symposium organized by Glenn Seaborg and Oliver Manuel on "The Origin of Elements in the Solar System." For information, contact Susan.Safren@wkap.com.

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