Tuesday, March 14, 2000
ASTEROIDS AND COMETS
1:30 p.m.   Room B

Chairs:  M. S. Kelley
A. R. Hendrix

Oxidation During Metamorphism of Ordinary Chondrites and Implications for the NEAR Mission to
433 Eros [#1406]
Modal mineralogy and elemental abundances in olivine and low-Ca pyroxenes support the hypothesis that
oxidation increases during progressive metamorphism of L and LL chondrites.

Nittler L. R. *  Clark P. E.  McCoy T. J.  Murphy M. E.  Trombka J. I.
Bulk Compositional Trends in Meteorites: A Guide for Analysis and Interpretation of NEAR XGRS Data from
Asteroid 433 Eros [#1711]
We have compiled a large database of bulk meteorite elemental compositions. We investigate compositional
trends in a variety of meteorite classes to aid in interpretation of NEAR XGRS elemental abundance data
from the asteroid Eros.

Britt D. T. *  Consolmagno G. J.
Modeling the Structure of High Porosity Asteroids [#1800]
Simple energy balance calculations suggest that materials in porous asteroids may be sorted by size with
smaller size fractions on the surface and larger fractions deeper inside. Friction on the smaller size
fractions restrict infilling of deep fractures and voids.

Asphaug E. *
The Large, Undisturbed Craters of Mathilde: Evidence for Structural Porosity [#1864]
The impact craters on Mathilde are curious in lacking associated ejecta deposits and disruption.
Detailed models show that Mathilde’s porosity both isolates the shock and enhances ejection speed beyond
\( v_{\text{esc}} \).

Gaffey M. J. *
Identifying Asteroidal Parent Bodies of the Meteorites: The Last Lap [#1092]
Spectral studies of asteroids and dynamical models have converged to yield, at last, a clear view of
asteroid-meteorite linkages. Plausible parent bodies for most meteorite types have either been identified or
it has become evident where to search for them.

Wilson L. *  Keil K.
Crust Development on Differentiated Asteroids [#1576]
We discuss issues related to the development of crusts on differentiated asteroids, focusing on
differences expected if the source of melts building the crust is a magma ocean formed during accretion or a
mantle melted by short-lived radio-isotopes.

Abell P. A. *  Gaffey M. J.
Probable Geologic Composition, Thermal History, and Meteorite Affinities for Mainbelt Asteroid
349 Dembowska [#1291]
Reflectance spectra obtained at sub-Earth latitudes of -65 show Dembowska has a surface composition with
a OPX:OL ratio of 45:55 with a variation of ~20% and has an albedo spot on its surface indicative of
changes in mineralogy or an impact crater.
Forging Asteroid-Meteorite Relationships Through Reflectance Spectroscopy

Near-infrared spectra were obtained for 196 asteroids as part of SMASSIR. SMASSIR focused on observing asteroids assumed to be one of the following: (1) olivine-rich, (2) objects with “Vesta-like spectra” (the “Vestoids”), and (3) postulated meteorite parent bodies.

The Formation Age of Comets: Predicted Physical and Chemical Trends

The chemical composition of a comet has always been considered to be a function of where it formed in the nebula. We suggest that the most important factor in determining a comet’s chemistry might actually be when it formed. Specific predictions are presented.

Trapping of Volatiles in Amorphous Water Ice

We present results for low temperature and pressure experiments of ice formation. These experiments were performed for comparison to Kuiper Belt Objects.

Collisional Processing of Proto-Comets in the Primordial Solar Nebula

We find that icy planetesimals (proto-comets) in the giant planets region of the solar nebula will be collisionally eroded on timescales shorter than their dynamical lifetimes for ejection to the Oort cloud.

When Rubble Piles Collide

We present results from a project using a direct numerical method to map the parameter space of collisions between km-sized spherical rubble piles. We find that our rubble piles are relatively easy to disperse, even at low impact speed.

Tracking NEAs from Their Source Regions to Their Observed Orbits

We use our estimate of the debiased NEA population and results from numerical integration to determine the inflow/outflow rate of NEAs from their source regions and the asteroid populations in those regions.