similar to those in the inclusions of the reduced CV3 chondrites, although additional knowledge of CAI materials in oxidized CV3s other than Allende is of critical importance to fully assess this interpretation.


VIDEO OBSERVATIONS OF THE PEEKSKILL METEORITE FIREBALL: ATMOSPHERIC TRAJECTORY AND ORBIT. Z. Cepelka1, P. Brown2, R. L. Hawkes3, G. Wetherill4, M. Beech5, and K. Mossmann5, 1Department of Interplanetary Matter, Astronomical Institute of the Academy of Sciences, 251 65 Ondrejov Observatory, Czech Republic, 2Department of Physics, University of Western Ontario, London, Ontario, N6A 3K7, Canada, 3Department of Physics, Engineering and Geology, Mount Allison University, Sackville New Brunswick, E0A 3C0, Canada, 4Carnegie Institution of Washington, Department of Terrestrial Magnetism, 5241 Broad Branch Road, NW, Washington DC 20015, USA, 5Department of Astronomy, University of Western Ontario, London, Ontario, N6A 3K7, Canada.

At 23:48 UT (±1 min) on October 9, 1992, a fireball, brighter than the full Moon, appeared over West Virginia, traveled some 700 km in a north-easterly direction, and culminated in at least one meteorite impact. A 12.4-kg ordinary chondrite (H6 monomict breccia) was recovered in Peekskill, New York. Unfortunately, the event was captured on several television recordings.

Peekskill is only the fourth meteorite to have been recovered for which detailed and precise data exist on the meteoroid atmospheric trajectory and orbit. Consequently, there are few constraints on the position of meteorites in the solar system before impact on Earth. In this talk, the preliminary analysis based on 5 video recordings of this fireball (from all existing 15 video recordings) will be given.

Preliminary computations revealed that the Peekskill fireball was an Earth-grazing event, the third such case with precise data available. The body, with an initial mass of the order of 10^4 kg and with initial velocity of 14.7 km/s (geocentric velocity of 10 km/s) was in a precession orbit with a = 1.5 AU, an aphelion of slightly over 2 AU, an inclination of 5° and an orbital revolution of 1.8 yr. The no-atmosphere trajectory over the Earth’s surface would have led to a perigee of 22 km, but the body never reached this point due to tremendous fragmentation and ablation. The dark flight of the recovered meteorite started from a height of 30 km, when the velocity dropped below 3 km/s, and the body continued an additional horizontal distance of 50 km without ablation, until it hit a parked car in Peekskill, New York, with a vertical velocity of about 80 m/s.

Our observations are also the first video records of a bright fireball and the first motion pictures of a fireball with an associated meteorite. During the second half of its flight, the fireball exhibited extensive fragmentation with several dozen individual fragments visible on some video frames. A maximum simultaneous separation of fragments was >20 km. At least 70 pieces are visible on two high-resolution still photographs of the event. Details on the fragmentation dynamics of the body will be presented, and the results of photometric work will be discussed.

Work is continuing on the further refinement of the atmospheric trajectory and orbit. We anticipate improvements through measurements from additional digitized video frames, more reliable positional measurements of reference objects, incorporation of data from additional stations, and better modeling of ablation and deceleration.


BORON ISOTOPE VARIATIONS IN CHONDRULES: CONSEQUENCES ON CHONDRULE FORMATION AND BORON COSMOCHEMISTRY. M. Chaussidon1 and F. Robert2, 1CRPG-CNRS, BP 20, 54501 Vandoeuvre-lès-Nancy, France, 2Musée d’Histoire Naturelle-CNRS, 61 rue Buffon, 75005 Paris, France.

A B isotope study of chondrules was undertaken in several chondrites (Semarkona LL3, Allende CV3, Hedjaz L3, and Estacado H6) to (1) evaluate the potential of B isotopes for constraining the mechanism of chondrule formation and (2) document the possible B isotope heterogeneity of nebular precursors and of chondrules. Measurements were made with an IMS 3f ion microprobe at CRPG (Nancy) on ~25-µm spots, following the procedures developed for mantle rocks [1,2] and with careful attention paid to problems of surface contamination. Values of 10B/11B vs. NBS 951 (11B/10B = 4.04558) are given with an accuracy varying between ±5% and ±10% according to the B contents. Elemental ratios of B, Na, Mg, Al, K, and Ca vs. Si were determined simultaneously on the same spots by ion probe.

Large discrepancies exist between the only two existing B isotope studies of bulk chondrites, which report three 10B measurements between −0.5 ±