Special Section

Origins and structure of the Solar System

Symposium "Origins and Structure of the Solar System"
Instituto de Astronomía, Instituto de Geofísica and Instituto de Geología,
Universidad Nacional Autónoma de México.
México, D.F., August 7-9, 2007.

Preface

Over the last three decades, studies of the Solar System have become a well-established research tradition at the Universidad Nacional Autónoma de México (UNAM). Investigation has been conducted in the fields of solar physics, asteroids and meteorites, but recently, lines of investigation have diversified to include the study of protoplanetary objects, as well as the evolution of the Earth and its biotic environment.

In order to promote the interaction between different specialized groups working directly or indirectly on topics related to the study of the Solar System and the Earth, the Instituto de Astronomía, Instituto de Geofisica and Instituto de Geología, UNAM, organized the symposium "Origins and Structure of the Solar System", which provided a forum for researchers and students to present and discuss the results of their investigations on planetary geology and geophysics, the nature of the Earth and the interplanetary medium, and the early evolution of the environmental conditions for life. The symposium was successful in attracting many contributions on a wide range of topics, which reflected a multi- and interdisciplinary character of the solar system studies.

A selection of the contributions presented at the symposion is included in this and in a forthcoming issue of Revista Mexicana de Ciencias Geológicas, in the special section "Origins and Structure of the Solar System". It is worth mentioning that these contributions are the result of the interdisciplinary collaboration between different academic groups: the Instituto de Astronomía, Instituto de Geología, Instituto de Geofísica, Instituto de Ciencias Físicas, Instituto de Investigaciones Nucleares, Facultad de Química, and the Centro de Radioastronomía y Astrofísica of the UNAM, as well as the Escuela Superior de Ingenieria Mecanica y Electrica and the Centro de Estudios Avanzados of the Instituto Politécnico Nacional (IPN), the Instituto Potosino de Investigación Científica y Tecnológica, the Centro de Investigaciones Científicas de Yucatán, the Centro de Investigaciones en Energía de Temixco and the Max Planck Institute for Solar System Research.

In this issue, the special section is composed by six papers focused on two main topics: (1) conditions and processes in the early Solar System as recorded by chondritic meteorites; and (2) features of craters resulting from the impact of interplanetary bodies on the Earth surface.

The first four papers introduce the topic of chondritic meteorites, which are among the oldest and most primitive materials in the solar system. These objects, coming from the interplanetary medium, preserve valuable information about the conditions under which they formed and were subsequently modified, and are thus a primary source of information on the early history of the solar system.

In the first paper, Hernández-Bernal *et al*. report K-Ar and Pb-Pb ages for individual

chondrules of eight Mexican ordinary chondrites of the type H5 (Cosina, Nuevo Mercurio, Aldama), LL5 (Tuxtuac), L4 (Zapotitlan Salinas), L5 (El Pozo), and L6 (Pacula); and also of the Allende carbonaceous chondrite (CV3). The wide K-Ar age range preserved in the chondrites is interpreted to reflect resetting of the formation ages by heating events associated to protracted bombardment. Pre-solar ages, both K-Ar and Pb-Pb, of chondrules from some chondrites imply the incorporation of pre-solar material in the primordial bodies.

The thermal history of chondrules in the ordinary chondrite Nuevo Mercurio (H5) is investigated by Cervantes-de la Cruz *et al*. on the basis of textural evidence and thermometric determinations; the data obtained allowed discriminating between the higher temperatures of chondrule formation and the lower temperatures of prograde thermal metamorphism in the chondritic parental body.

On the basis of optical and scanning electron microscopy, X-ray diffraction, and microprobe analyses, Reyes-Salas *et al*. characterize the Escalón meteorite as a high iron, type 4 chondrite (H4), with metamorphism of the stage S3 and weathering grade W0. Features of opaque phases in chondrules are interpreted to reflect slow cooling at low temperatures.

Flores-Gutiérrez *et al*. report the results of a micromagnetic and microstructural study of individual chondrules from the Allende carbonaceous chondrite (CV3). Analyses of magnetic hysteresis parameters reveal that in nearly spherical, homogeneous chondrules, the magnetization ratio has a linear relationship with coercivity, and correlates with the internal structure and composition of chondrules, whereas compound chondrules, with features indicating fragmentation and alteration processes are characterized by hysteresis parameters falling outside the main trend.

The two last papers included in this first special section report on studies of the Chicxulub crater, which formed by the impact of an interplanetary body approximately sixty-five million years ago, and whose effects have been related to the end of the Mesozoic Era. Salguero-Hernández *et al.* present an analysis of seismic reflection data of deep layers, which allowed discovering the existence of radial asymmetries in deformation and fracturing of the Mesozoic rocks within in the crater. In order to improve the comprehension of the processes of excavation and deposition of materials during these violent impact events, Rebolledo-Vieyra *et al.* made use of aeromagnetic anomaly modeling, borehole information and magnetic mineral data to develop a new structural model of the Chicxulub crater.

El editor invitado

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