

Large Meteorite Impacts and Planetary Evolution

B. O. Dressier and G. W. Johns

Volume 24, Number 4, December 1997

URI: https://id.erudit.org/iderudit/geocan24_4con01

[See table of contents](#)

Publisher(s)

The Geological Association of Canada

ISSN

0315-0941 (print)

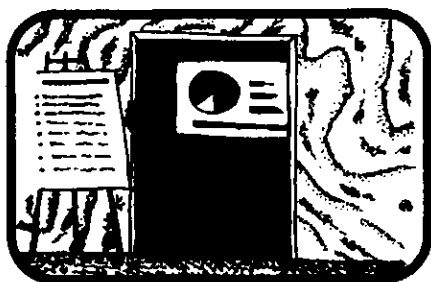
1911-4850 (digital)

[Explore this journal](#)

Cite this article

Dressier, B. O. & Johns, G. W. (1997). Large Meteorite Impacts and Planetary Evolution. *Geoscience Canada*, 24(4), 203–204.

Conference Report



Large Meteorite Impacts and Planetary Evolution

B.O. Dressler
Lunar and Planetary Institute
3600 Bay Area Boulevard
Houston, Texas USA 77058-1113

G.W. Johns
Precambrian Geoscience Section
Ontario Geological Survey
933 Ramsey Lake Road
Sudbury, Ontario P3E 6B5

The second international conference on Large Meteorite Impacts and Planetary Evolution was again held in Sudbury, Ontario, from 30 August 30 to 5 September 1997. Sudbury is the perfect venue for such a conference as it is the site of what is now widely believed to be one of the world's largest meteorite impacts. Approximately 140 registrants from South Africa, Ethiopia, Ghana, China, Russia, Germany, Austria, Norway, Britain, Australia, Czech Republic, Finland, Netherlands, Sweden, United States and Canada enjoyed Sudbury's hospitality and fine weather.

The three formal days of the conference were fully occupied with 79 oral presentations and 30 posters (Lunar and Planetary Institute, 1997). In order to enter-

tain such a full program, talks were limited to 15 minutes and the morning coffee breaks were eliminated. This structure was not fully appreciated by all the participants but the program stayed on schedule. A shortened lunch break was accommodated by the organizing committee providing lunch on site.

A very popular and entertaining public lecture entitled "Strange Worlds: Radar Encounters with Earth-approaching Asteroids" by Dr. Steven Ostro of the Jet Propulsion Laboratory, California, was sponsored by both the conference and Science North, a non profit science centre.

The Sudbury Structure was examined by more than 60 participants on pre- and post-conference field trips (Dressler *et al.*, 1992) led by B.O. Dressler. A specialized post-conference trip emphasizing the geochemistry of the mineralized Sublayer of the Sudbury Igneous Complex (Lightfoot *et al.*, 1997) was led by Gord Morrison and Peter Lightfoot of Inco Exploration and was fully subscribed. The trip discussed the data bearing on the origin of the Sublayer and Offsets and the associated mineral deposits and showed examples of two Sublayer structures; an embayment and radial Offset Dike.

The first day of the scientific program, on the Sudbury Structure and diamonds and carbonaceous matter in the Sudbury and other terrestrial impact structures, provided new insight on the origin of the Sudbury Igneous Complex, the Sudbury Breccia pseudotachylites, and the heterolithic breccias of the Onaping Formation. It was shown that laboratory geochemistry and basic field observations must both be used to solve geological problems as isotopic evidence supports an one-magma impact melt origin for the Igneous Complex (M. Ostermann, A. Dickin) while structural field evidence (U. Riller, J. Cowan) is in disagreement with this interpretation. Field observation can also result

in widely divergent interpretations as the commonly accepted impact origin of the Sudbury Breccias was challenged in one talk proposing a magmatic-breccia origin possibly not related to the Sudbury impact. Following the 1994 discovery of fullerenes in the impact breccias of the Onaping Formation (Becker *et al.*, 1994), the origin of the carbonaceous matter in the breccias and mudstones of the Sudbury Basin has come centre stage in Sudbury geology (L. Becker, D. Heymann) and provided for several "lively" discussions during the meeting. Other studies of the Onaping Formation presented carbon isotopic evidence for a biogenic origin of the carbonaceous matter in the heterolithic breccias of this formation. The Sudbury Structure is an additional site from which impact diamonds have been reported (V. Masaitis).

Day two of the conference was filled with talks on several terrestrial impact structures, on shock metamorphic effects on target rocks, and on the possible impact origin of the Bushveld Complex, South Africa (W.E. Elston). Of special interest were several presentations on the K/T-boundary, Chicxulub Structure (Yucatan) and the Jurassic-Cretaceous boundary Morokweng impact structure in South Africa (M. Andreoli, C. Koeberl). This recently discovered structure possibly is 340 km in diameter and is 144.7±1.9 Ma old. This age is indistinguishable from the age of the Jurassic-Cretaceous boundary, indicating that large meteorite impacts may have influenced the evolution of life on Earth to a considerably larger degree than previously assumed.

The "Effects of Planetary Impact" and "Geophysical Constraints on the Character of Large Impact Structures" sessions on the third and last presentation day of the conference dealt with the impact of cratering on early Earth (R.A.F. Grieve), meteorite impact and lunar differentiation (P.H. Warren), numeric modelling of large

impact basin formation, a review of geophysical data on the Vredefort Structure in South Africa (H. Henkel), and a wealth of new data and interpretations on the Chicxulub Structure. BIRPS (British Institutions Reflection Profiling Syndicate) seismic profiles across the northern part of the Chicxulub Structure are presently being investigated by an "International Chicxulub Working Group." The seismic profiles were on display for the entire conference and were the source of much discussion. The seismic work and several drill holes to a depth of about 700 m provide the background for a deep drilling project planned by the International Continental Drilling Project (ICDP).

It is expected that a proceedings volume will be published as a GSA special paper late in 1998 or early in 1999.

Field trip guide books for trips offered during the conference are available from: Publication Sales, Ontario Ministry of Northern Development and Mines, 933 Ramsey Lake Road, Sudbury, Ontario, Canada P3E 6B5.

E-mail: Pub_sales@torv05.ndm.gov.on.ca

REFERENCES

- Becker, L., Bada, J.L., Winans, R.E., Hunt, J.E., Bunch, T.E. and French, B.M., 1994, Fullerenes in the 1.85 billion-year-old Sudbury impact structure: *Science*, v. 265, n. 5172, p. 642-645.
- Dressler, B.O., Peredery, W. V. and Muir, T.L., 1992, Geology and mineral deposits of the Sudbury structure: Ontario Geological Survey, Guidebook 8, 33 p.
- Lightfoot, P.C., Naldrett, A.J. and Morrison, Gordon, 1997, Sublayer and offset dikes of the Sudbury igneous complex and Introduction and Field Guide: Ontario Geological Survey, Open File Report 5956, 36 p.
- Lunar and Planetary Institute (LPI), 1997, Large meteorite impacts and planetary evolution: Abstracts, LPI Contribution 922, 66 p.

Positions Available

McMASTER UNIVERSITY

SCHOOL OF GEOGRAPHY AND GEOLOGY

The School of Geography and Geology at McMaster University is seeking a geologist or geoscientist for a full-time tenure-track position at the Assistant Professor level, effective July 1, 1998. Candidates must have completed a Ph.D., and should have interests and experience in sediments and sedimentology, and/or water and groundwater, and in the application of techniques such as isotope geochemistry, geophysics, or field studies. The successful applicant will be expected to teach sedimentology, and to have demonstrable excellence in both teaching and research.

McMaster University encourages applications from qualified women and men, members of visible minorities, Aboriginal people and persons with disabilities. In accordance with Canadian immigration requirements this notice is directed to Canadian citizens and permanent residents.

Applications, including c.v. and the names of three referees, should be submitted to:

Dr. Fred Hall, Director
School of Geography and Geology
McMaster University
1280 Main St. W.
Hamilton, ON L8S 4M1

Applicants should also arrange to have three letters of reference sent directly to the same address.

CLOSING DATE: February 16, 1998

McMASTER UNIVERSITY

STEPHEN JARISLOWSKY CHAIR IN ENVIRONMENT AND HEALTH

McMaster University has recently designated Environment and Health as one of its new Strategic Areas. To complement our existing strengths in this area, which include a Chair in Environmental Health that is funded by the three federal councils (NSERC, SSHRC, and MRC), we seek a senior scientist with environmentally relevant expertise in the physical, biological or environmental sciences.

McMaster invites applications for the Stephen Jarislawsky Chair in Environment and Health from individuals with an internationally distinguished research and teaching record commensurate with a tenured appointment at the senior Associate Professor or Full Professor level in one of Canada's leading research universities. The successful candidate will have an academic home in one of the Departments of Biology or Chemistry or our newly formed School of Geography and Geology, as appropriate to his or her scholarly background, with the possibility of joint appointment or associate membership in these units or elsewhere. She or he will be expected to play a leadership role in interdisciplinary research and education under the umbrella of Environment and Health. Relevant research areas include, but are not limited to, water, environmental chemistry, the interaction of the environment with living organisms and the ecology of stressed environments, and atmospheric science. The appointment will commence July 1, 1998.

Applicants should send, by February 1, 1998, a full Curriculum Vitae and letters from three referees to:

Dr. Peter Sutherland
Dean of Science
McMaster University
Hamilton, Ontario L8S 4K1 Canada

In accordance with Canadian Immigration requirements, this advertisement is directed in the first instance to Canadian citizens and permanent residents of Canada.

McMaster University is committed to Employment Equity and encourages applications from all qualified candidates, including aboriginal peoples, persons with disabilities, members of visible minorities, and women.