IMPACTITES FROM POPIGAI CRATER. V. L. Masaitis, Karpinsky Geological Research Institute, St. Petersburg, Russia.

Impactites (tagamites and suevites) from Popigai impact crater, whose diameter is about 100 km, are distributed over an area of 5000 km² [1,2]. The continuous sheet of suevite overlies the allogenic polymict breccia and partly authogenic breccia, and may also be observed in lenses or irregular bodies. The thickness of suevites in the central part of the crater is more than 100 m. Suevites may be distinguished by content of vitroclasts, lithoclasts, and crystalloclasts, by their dimensions, and by type of cementation, which reflects the facial settings of ejection of crushed and molten material, its sedimentation and lithification. Tagamites (impact melt rocks) are distributed on the surface predominantly in the western sector of the crater. The most characteristic are thick sheetlike bodies overlying the allogenic breccia and occurring in suevites where minor irregular bodies are widespread. The maximal thickness of separate tagamite sheets is up to 600 m. Tagamites, whose matrix is crystallized to a different degree, include fragments of minerals and gneiss blocks, among them shocked and thermally metamorphosed ones. Tagamite sheets have a complex inner structure; separate horizontal zones distinguish in crystallinity and fragment saturation. Differentiation in the impact melt *in situ* was not observed.

The average chemical compositions of tagamites and suevites are similar, and correspond to the composition of biotite-garnet gneisses of the basement [3]. According to the content of supplied Ir, Ni, and other siderophiles, impact melt was contaminated by 5% cosmic matter of collided body, probably ordinary chondrite [4]. The total volume of remaining products of chilled impact melt is about 1750 km³. Half this amount is represented by tagamite bodies. Though impact melt was in general well homogenized, the trend analysis showed that the concentric zonation in distribution of SiO_2, MgO, and Na_2O and the bandlike distribution of FeO and Al_2O_3 content [5] testifies to a certain inheritance and heterogeneity in country rock composition laterally and vertically in the melting zone. The radial ray inhomogeneities of content of newly formed high-pressure phases determined in impactites also reflect the peculiarities of melt transportation during excavation. On the other hand, the irregularity of distribution of supplied siderophile elements in impactites shows that contamination by cosmic matter was probably associated with the condensation from vapor on cold fragments engulfed by melt after its homogenization.

References (all in Russian): [1] Nedra L. (1980) *Geology of Astroblemes*, 231 pp. [2] Masaitis V. L. (1984) In *Modern Ideas of Theoretical Geology* (L. Nedra, ed.), 151–179. [3] Raikhlin A. I. and Mashchak M. S. (1977) *Meteoritika, 36,* 140–145. [4] Masaitis V. L. and Raikhlin A. I. (1989) *Meteoritika, 48,* 161–169. [5] Masaitis V. L. et al. (1980) In *Cosmochemistry of Meteorites, Moon and Planets*, 176–191, Naukova dumka, Kiev.

SUDBURY BRECCIA AND SUEVITE AS GLACIAL INDICATORS TRANSPORTED 800 KM TO KENTLAND ASTROBLEME, INDIANA. John F. McHone[1], Robert S. Dietz[1], and Walter V. Peredery[2], [1]Geology Department, Arizona State University, Tempe AZ 85287-1404, USA, [2]INCO Exploration and Technical Services Inc, Copper Cliff, Ontario P0M 1N0, Canada.

A glacial erratic whose place of origin is known by direct comparison with bedrock is known as an *indicator* [1]. In 1971, while visiting the known astrobleme at Kentland, Indiana, one of us (Peredery) recognized and sampled in the overlying glacial drift deposits a distinctive boulder of Sudbury suevite (black member, Onaping Formation) that normally occurs within the Sudbury Basin as an impact fall-back or wash-in deposit. The rock was sampled (but later mislaid) from a farmer's cairn next to a cleared field. Informal reports of this discovery prompted the other authors to recently reconnoiter the Kentland locality in an attempt to relocate the original boulder. Several breccia blocks were sampled but laboratory examination proved most of these probably to be diamictites (tillites?) [2] from the Precambrian Gowganda Formation, which outcrops extensively in southern Ontario [3]. However, one sample was confirmed as typical Sudbury Breccia, which outcrops in the country rock surrounding the Sudbury Basin. Thus two glacial indicators were transported by Pleistocene continental glaciers about 820 km over a tightly proscribed path and, curiously, from one astrobleme to another.

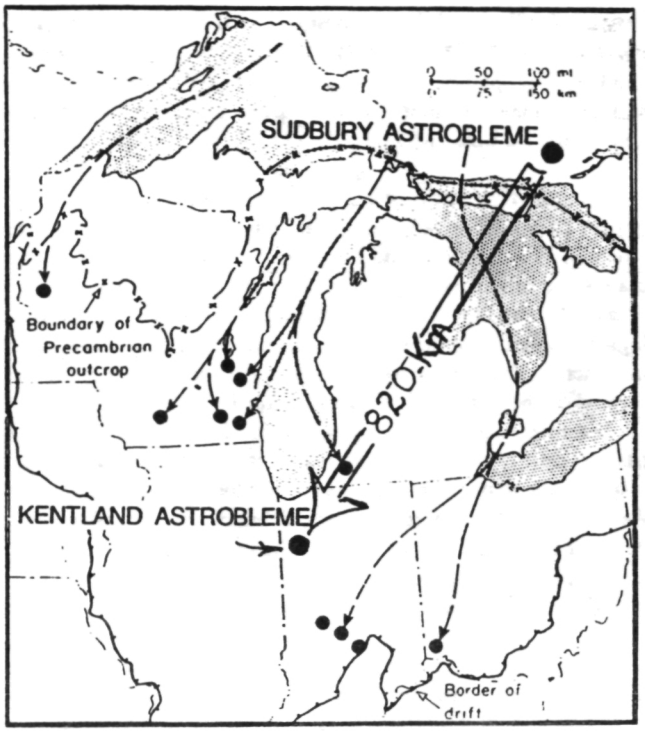

Fig. 1. Map showing Wisconsin epoch glacial transport of two indicator rocks (Onaping black suevite and Sudbury breccia) from the Sudbury astrobleme, Ontario, some 820 km to the Kentland, Indiana, astrobleme. Dashed lines indicate presumed glacial transport of diamond erratics to the midwest till plain. After [1].

Brecciated boulders in the Illinois/Indiana till plain are usually ascribed to the Gowganda or Mississagi formations in Ontario. But impact-generated rocks need not be confused. The carbonaceous matrix of the suevite, for example, was sufficiently distinctive to assign it to the upper portion of the black Onaping. The unique and restricted source area of these indicators provide an accurate and reliable control for estimating Pleistocene ice movement.

References: [1] Flint R. F. (1957) *Glacial and Pleistocene Geology*, Wiley, 553 pp. [2] Harker and Giegengack (1989) *Geology, 17,* 123–126. [3] Young G. M. (1981) In *Earth's Pre-Pleistocene Glacial Record International Geological Correlation Programme Project 38: Pre-Pleistocene Tillites* (M. J. Hambrey and W. B. Harland, eds.), 807–812.