Energy and Shock Effect of a Recent Meteor Impact, South Mountain, Nova Scotia

George R. Stevens
Department of Geology, Acadia University, Wolfville, Nova Scotia B0P 1X0

An oval feature measuring 350 meters by 420 meters on the granite of the South Mountain Batholith is identified as a meteor impact doublet of probable postglacial age. It is designated "ASTRID," the acronym of its file designation. The crater is characterised by a flat, depressed inner floor sharply ringed by a discontinuous low bedrock wall, and a broad upwarped welt external to the rim. The composite feature is situated within a broader fen flanked by wooded hills along sharp linear boundaries. Both the fen and the crater interior are blanketed with holocene fluvio-lacustrine sediments. Microscopic study of

Copyright © 2015 Atlantic Geology

specimens taken from the rim wall reveals diaplectic shock reduction of orthoclase lattices (Maskelynite), induction of gridiron twinning, and pervasive systematic fresh microfractures, microfaults, polygonization and lattice distortion of all minerals. Impact melt is indicated by a thin veinlet of glass in one specimen. Biotite kink-bands and quartz Boehm lamellae are rare, and shatter cones have not yet been found. Data from analysis of nuclear explosion craters and from lunar and terrestrial impact craters indicate that the ASTRID feature was caused by the simultaneous impacts of two objects (bolide fragments?) 105 meters apart, resulting in the oval doublet rim shape. Energy scaling laws indicate that each object was about 760 tonnes mass, 7 meters diameter (if Fe-Ni), and that each carried as much as 92_{TNT} kilotons (3.86×10^{21} ergs) energy equivalent.

The ASTRID site is flooded and frozen at present, making possible the current magnetometer survey on the ice. This data is expected to reveal the extent of shock remagnetization. Microscopic and X-ray diffraction studies of the shocked granite continue, and seismic, coring, and downstream sedimentologic projects are planned.