Dating impact events with shocked zircon: insights from the Sudbury impact crater, Ontario, Canada

GAVIN G. KENNY,1,2* MARTIN J. WHITEHOUSE,1 JOSEPH A. PETRUS,3 LIUIZ F. MORALES,4 BALZ S. KAMBER2

1NordSIMS laboratory, Swedish Museum of Natural History, SE-114 18 Stockholm, Sweden. (*gavin.kenny@nrm.se)
2Department of Geology, School of Natural Sciences, Trinity College Dublin, Dublin 2, Ireland.
3School of Earth Sciences, University of Melbourne, Parkville, Australia.
4Scientific Center for Optical and Electron Microscopy (ScopeM), ETH Zürich, Zürich, Switzerland.

Despite zircon’s wide geochronological utility, dating impact events with shock metamorphosed zircon has proven difficult. Here we present a study that advances impact event chronology with an example of shocked zircon from the Sudbury basin, whose age was precisely known before. We report the first terrestrial occurrence of large, impact-aged neoblasts up to 100 μm in dimension from a site other than Vredefort (Fig. 1) – indicating that easily datable neoblasts may be a more widespread feature than previously thought. We also applied SIMS U-Pb age mapping to areas of small neoblasts, demonstrating this technique as a potentially powerful tool in acquiring impact ages for other craters where large neoblasts are absent.

Figure 1: Electron Backscatter Diffraction (EBSD) map showing myriad large and small neoblasts in a single shocked zircon from Sudbury. Black circles are LA-ICPMS analytical pits and ellipses highlight SIMS U-Pb analytical sites.