Meteorite bombardment of Earth at the Triassic/Jurassic boundary: Evidence from impactites and craters

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Background: The history of Earth has been punctuated by a series of highly energetic impact events, some of which have significantly affected the terrestrial biosphere. There is good evidence in the geological record for several such events in the latest Triassic, which includes impact craters, impactites and tsunamites. The timespan over which these craters and deposits were formed is however currently unclear, which complicates efforts to demonstrate temporal and genetic relationships between the various events. The goals of this project are to test the hypothesis that impactites and tsunamites in the UK Upper Triassic are genetically linked to one of more of the craters of a similar age in France and Canada, and thereby understand better the possibility of significant perturbation to the Earth system at the Triassic/Jurassic boundary.

Project outline: There are two known late Triassic craters: Rochechouart in France (~40 km in diameter and with an age of ~201 Ma), and Manicouagan in Canada (~100 km in diameter and with an age of ~214 Ma). There are also two sets of impactite deposits in the late Triassic of the UK that have been linked to impact events: a sequence of sedimentary rocks in the Rhaetian Penarth Group (~208-201 Ma) that display extensive soft-sediment deformation\(^1,2\), and a layer of impact ejecta (tektites) in southwest England that has been dated to ~214 Ma\(^3\). The most straightforward interpretation is to link the two craters to the two sets of impactites, but the geological and chronological evidence is still debated. The focus of this studentship will be on the evidence for impacts within the sedimentary record of the UK, with the work to be undertaken including: (i) refining the chronology of the impactites and the provenance (i.e., source crater) of ejecta deposits; (ii) seeking evidence for impact ejecta associated with soft sediment deformation in the Penarth Group; (iii) refining the chronology of the Penarth Group deposits. The project student will work with a dynamic team of planetary scientists at Glasgow University and SUERC where they will gain a suite of skills in mineralogy and petrology, geochronology and planetary science. The student will also be encouraged to collaborate with a vibrant international meteorite research community, and so have the opportunity to travel widely in order to undertake research and present results at UK and international conferences.

Application procedure: There are two routes to apply for this PhD project.

Applicants for a College of Science and Engineering Scholarship (available to UK, EU and International students) should submit the following five items to Leenah Khan (leenah.khan@glasgow.ac.uk) by 5pm (Glasgow time), Thursday 31st January, 2019:
(1) a Research Proposal of maximum 750 words (in Word, not PDF) comprising title, proposed supervisor(s), aims and objectives, research context, research methodology, and bibliography;
(2) a two-page CV;
(3) a specimen of academic writing (such as a coursework essay) of no more than 3000 words;
(4) academic transcripts (only using the pages with course marks noted);
(5) Applicants should also ask two referees to send a reference letter to Leenah Khan (leenah.khan@glasgow.ac.uk).
If you have your own funding, please apply via the website of the College of Science and Engineering*. The application deadline is 31 January 2019. Please contact the principal supervisor with any questions (Martin.Lee@Glasgow.ac.uk).

*https://www.gla.ac.uk/schools/ges/researchandimpact/postgraduate/#/applyingtoundertakeaphd

References: