

Proposed Studentship



Provenance of Sediments from Sumatra, Indonesia

Supervisors: Robert Hall, Lloyd White

Project Description:

Sumatra is one of the largest Indonesian islands. This project will focus on the Cenozoic evolution and unroofing of the Sumatran volcanic arc using petrological studies of sandstones and their heavy minerals, including zircons, and aims to characterise Sumatra as a potential source area for the many hydrocarbon-rich Cenozoic sedimentary basins of the region.

Sumatra and its forearc are often cited as an example of a classic accretionary margin but field-based studies question this model. Paleogene and Neogene sandstones on Nias are derived predominantly from Sumatra and record its unroofing history but nothing is known about their heavy mineral assemblages and zircon ages. Sumatra is composed of the Cenozoic volcanic arc built on an uplifted basement exposed in the Barisan Mountains. To the north of the Barisan Mountains are basins containing thick (up to 5 km in the North Sumatra Basin) terrestrial-shallow marine siliciclastic sediments. These basins are often interpreted as back-arc basins, although they are older than the volcanic arc and lie on the continental crust. The basement includes granitoids, which are likely to have provided detritus to the basins on land and in the forearc, and may be as old as Devonian. There is only limited information on the igneous history of the island, which is mostly based on K-Ar dating.

This project will undertake a sampling and zircon age dating program in Sumatra, focusing on sandstones of a wide range of depositional ages and modern river sands, although these may be dominated by detritus derived from the recent volcanic arc. Zircon U-Pb dating will be performed using LA-ICPMS and possibly SHRIMP techniques. Detrital mineral studies will be coupled with heavy mineral analyses. The project will aim to characterise zircon age populations diagnostic of Sumatran basement and will provide an understanding of sedimentary pathways from Sumatra to the Cenozoic sedimentary basins.

The project will involve extensive fieldwork in Sumatra. The student will join a large and active research group working in SE Asia based at Royal Holloway which includes several PhD and MSc students working on a wide range of field-based projects.

This project is one of several PhD studentships open to UK/EC students proposed for funding in 2014. The exact number of studentships to be supported is not yet certain but those selected will be fully funded, including fieldwork costs, by the SE Asia Research Group (<http://searg.rhul.ac.uk/>).

References:

- Clements, B., Sevastjanova, I., Hall, R., Belousova, E., Griffin, W., Pearson, N., 2012. Detrital zircon U-Pb age and Hf-isotope perspective on sediment provenance and tectonic models in SE Asia. In: Rasbury, T., Hemming, S., Riggs, N. (Eds.), Mineralogical and Geochemical Approaches to Provenance. Geological Society of America Special Paper, **487**, pp. 37-61.
- Morton, A.C., Humphreys, B., Dharmayanti, D.A., Sundoro, 1994. Palaeogeographic implications of the heavy mineral distribution in Miocene sandstones of the North Sumatra Basin. Journal of Southeast Asian Earth Sciences **10**, 177-190.
- Sevastjanova, I., Clements, B., Hall, R., Belousova, E., Griffin, W., Pearson, N., 2011. Granitic magmatism, basement ages, and provenance indicators in the Malay Peninsula: Insights from detrital zircon U-Pb and Hf-isotope data. Gondwana Research **19**, 1024-1039.
- Sevastjanova, I., Hall, R., Alderton, D., 2012. A detrital heavy mineral viewpoint on sediment provenance and tropical weathering in SE Asia. Sedimentary Geology **280**, 179-194.

Please contact the Postgraduate Programmes Co-ordinator, if you have additional questions about the department or application procedures (email: pgadmin@es.rhul.ac.uk ; fax: 01784-471780; tel: 01784-443581).

An application form can be found here www.rhul.ac.uk/studyhere/postgraduate/applying

Applicants are requested to send an additional copy of their CV directly to the lead supervisor of the project in which they are interested. Please also contact the supervisor if you have any questions about the project itself.