NUS National University of Singapore

Department of GEOGRAPHY Seminar Series

Semester 1, 2014-2015

The timing of river capture and tectonics: the Cenozoic evolution of Asian rivers in the eastern sector of the Himalayan orogeny

Speaker: **Grahame Oliver**
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Chair: Alan Ziegler, Department of Geography, NUS
Date/Time: Friday, 8 August 2014, 3.30 – 5.00 pm
Place: Earth Lab (AS2 02-03), Department of Geography, NUS

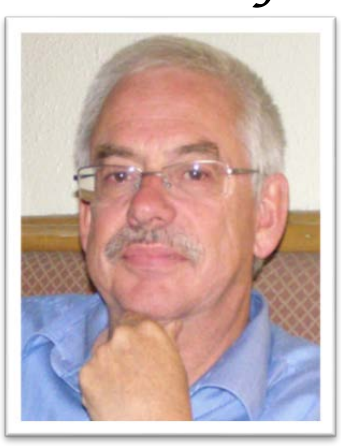
Abstract

Several large rivers including the Yarlung Tsangpo, Brahmaputra, Irrawaddy, Salween, and Mekong pass through the syntaxis region of the eastern Himalayas. By combining U/Pb dating and εHf analyses of zircons from batholiths and detrital zircons within the syntaxis region, it is possible to identify different provenance areas for the palaeo-rivers and interpret how these changed through time. It is proposed that the Yarlung Tsangpo formerly drained into the palaeo-Irrawaddy River in Burma during the Eocene and Oligocene. Significantly, the εHf signature of detrital zircons changes for the Miocene deposits, and the eastern syntaxis and intra-Burma batholiths become the dominant source areas for the Irrawaddy River in the Miocene (at around 18 Ma).

Detrital $^{40}Ar/^{39}Ar$ thermochronology of single grains of white mica have been used to identify which tectonothermal events are recorded in the sedimentary rocks in central Burma, and whether changes in provenance from Late Eocene to early Miocene time are related to exhumation in the eastern sector of the Himalayan orogen. To discriminate between source terranes, a comparison is made between the new mica ages and the published thermochronology data from Jurassic-Tertiary bedrock of the southern Lhasa terrane, and the Transhimalayan rocks of the eastern syntaxis, eastern to southeastern Myanmar, and Thailand. Detrital white mica $^{40}Ar/^{39}Ar$ ages for the Eocene and Oligocene deposits reflect a broad range of cooling events that are Jurassic to Oligocene in age and the majority of the $^{40}Ar/^{39}Ar$ ages are older than 60 Ma. In contrast, the detrital micas from Miocene deposits have a very narrow range of $^{40}Ar/^{39}Ar$ ages with one dominant peak of 30 – 40 Ma. The thermochonology data support the interpretation that provenance for the Irrawaddy River changed between the Oligocene and Miocene, and confirms the timing of disconnection to the early Miocene (at around 18 Ma).

It is proposed that exhumation and deformation along the boundary between the Burma plate and the Asian margin in the syntaxis contributed to the disconnection of the Yarlung Tsangpo-Irrawaddy river during increased coupling of the India and Burma plates. The disconnection of the Tsangpo-Irrawaddy river system at about 18 Ma coincides with the onset of strike-slip movement on the Sagaing Fault and Gaoligong Shear zone and allows a revised paleogeographic reconstruction of Burma during the Cenozoic. The significance of this newly proposed palaeogeography for the petroleum systems in Myanmar and Bangladesh will be mentioned.

About the Speaker



After a career spent teaching and researching at the Universities of Otago New Zealand, Cambridge England, Dublin Ireland, London Ontario Canada, Curtin Australia, and St Andrews Scotland, Dr Grahame Oliver relocated to NUS in 2008 to become the first Visiting Senior Fellow funded by the South East Asian Petroleum Exploration Society (SEAPEX). Now, as a Senior Lecturer, he teaches geoscience in modules on the Biophysical Environment, Planet Earth and Petroleum Geoscience.

He researches crustal geodynamics and the evolution of ancient and modern mountain belts in Europe and Asia. He specialises in geochronology, petrology and structural geology. Currently he is working on the crustal geodynamics of South East Asia, and the groundwater and geothermal energy potential of Singapore.

ADMISSION IS FREE – ALL ARE WELCOME
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