Proposed Studentship

Building Accretionary Prisms: studying the interaction between the Himalaya uplift and the Sumatra subduction

Supervisor(s): Paola Vannucchi, Amy Gough, Jason Morgan

Project Description:

Scientific background

Erosion of the Himalayas is responsible for the greatest sediment accumulations on the planet. Nonetheless, the effects of these sediments on the nearby subduction system remain poorly investigated, in particular due to limited offshore data. In 2016, IODP Exp. 362 recovered a full sedimentary section of the material that eventually will be subducted in the Indo-Australian plate. The Burma-Sunda subduction zone is a long lived subduction system in which compression was already active in the late Jurassic. Unravelling its onland record and comparing it with incoming sediment sections will illuminate how Himalayan uplift and resulting consequent climate change has affected the Burma-Sunda forearc, and the earthquake cycle along this megathrust.

Research methodology

The project will use IODP borehole and outcrop data from the Indian Ocean and Nicobar-Sumatra islands. Physical properties of the material, as well as the provenance of the sediments will be analysed. The student will then analyse the time-evolution of stresses in this system by exploring a numerical model that incorporates the tectonic response of the subduction system to Himalaya uplift and associated erosional redistribution of material within the system.
Preliminary numerical models will be explored using COMSOL, and, as necessary, more advanced numerical models will use state-of-the-art in-house codes written in well-vectorized MatLab. Samples from IODP Exp. 362 are already available. Field work in Sumatra/Nicobar Islands will be required.

Training

Field mapping. Deformation analysis of outcrops. Sediment provenance. Numerical modelling.

Person specification

The student should be equally comfortable to learn field mapping and numerical modelling.

Reference

L.C. McNeill, B. Dugan, J. Backman, K.T. Pickering, H.F.A. Pouderoux, T.J. Henstock, K.E. Petronotis, A. Carter, F. Chemale Jr., K.L. Milliken, S. Kutterolf, H. Mukoyoshi, W. Chen, S. Kachovich, F.L. Mitchison, S. Bourlange, T.A. Colson, M.C.G. Frederik, G. Guèrin, M. Hamahashi, B.M. House, T.N., A. Hüpers, T.N. Jeppson, A.R. Kenigsberg, M. Kuranaga, N. Nair, S. Owari, Y. Shan, I. Song, M.E. Torres, P. Vannucchi, P.J. Vrolijk, T. Yang, X. Zhao, E. Thomas (2017). *Understanding Himalayan erosion and the significance of the Nicobar Fan*. Earth and Planetary Science Letters, 475, pp. 134-142, DOI: 10.1016/j.epsl.2017.07.019

A. Hüpers, M.E. Torres, S. Owari, L.C. McNeill, B. Dugan, T.J. Henstock, K.L. Milliken, K.E. Petronotis, J. Backman, S. Bourlange, F. Chemale Jr., W. Chen, T.A. Colson, M.C.G. Frederik, G. Guèrin, M. Hamahashi, B.M. House, T.N. Jeppson, S. Kachovich, A.R. Kenigsberg, M. Kuranaga, S. Kutterolf, F.L. Mitchison, H. Mukoyoshi, N. Nair, K.T. Pickering, H.F.A. Pouderoux, Y. Shan, I. Song, P. Vannucchi, P.J. Vrolijk, T. Yang, X. Zhao (2017). *Release of mineral-bound water prior to subduction tied to shallow seismogenic slip off Sumatra*. Science 356 (6340), 841-844. DOI: 10.1126/science.aal3429.

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