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Tibet, the Himalaya and the Development of the Asian Monsoon: A chicken and egg problem for the IODP.

Both DSDP and ODP have made significant contributions to the understanding of the Asian monsoon system. Most notably work offshore Oman in the late 1980s was the suggested an intensification of the monsoon after 8 Ma. Many climate modellers have related monsoon strength to the elevation of the Tibetan Plateau, yet recent work from the plateau itself indicates that Tibet may have been elevated much earlier that 8 Ma, at least in the southern and central plateau. If true how does that relate to an 8 Ma monsoon? Moreover, modern models for the generation of the Greater Himalaya suggest an important role for monsoon-driven erosion in causing exhumation after around 22 Ma, well before the proposed monsoon intensification. Proposals have been submitted to IODP for renewed drilling of the Indus and Bengal fans in order to determine the variations in clastic flux to the ocean and the intensity of chemical weathering in South Asia, which can then be correlated with the tectonic evolution of the mountains. This work must be done offshore because there is a large unconformity before 22 Ma in the Himalayan foreland that has removed the terrestrial record. New drilling is also needed because the existing monsoonal sections in south Asia do not extend beyond 17 Ma, not old enough to compare with the onset of the Greater Himalaya. In the meantime a 24 Ma monsoon record has been derived from Leg 184 drilling in the South China Sea. This record indicates that the East and South Asian monsoons varied largely in parallel with one another since 17 Ma and that the initial intensification is around 22 Ma, while the summer monsoon may have weakened, not strengthened at 8 Ma. If this is correct in South Asia too this suggests that progressive growth of the Tibetan Plateau caused an intensification of monsoon rains around 23 Ma, perhaps when the plateau reached a critical threshold size. The resultant climate change then fed back on the solid Earth by driving stronger rains on the southern edge of Tibet, and allowing the Greater Himalaya to be exhumed. Subsequent monsoon weakening at 10–8 Ma caused deformation to step south in the Lesser Himalaya.

Peter Clift's interests lie in the research of the sedimentary and tectonic evolution of active and collisional plate margins. Current fields of specific interest include land-ocean interactions in the marginal seas of Asia, especially the Arabian Sea and the South China Sea. He is also working on associated syn-orogenic sedimentation in the Himalaya and is developing single grain geochemical techniques to link clastic provenance studies with thermochronologic methods in order to reconstruct orogenic erosion histories. Reconstruction of Asian monsoon intensity over millennial and million year time scales is an important objective in order to understand its influence on orogenic erosion. He is further interested in the role than erosion plays in controlling the thickness and volume of the continental crust globally and how excess crustal material is returned to the

upper mantle via fluvial transport and mass recycling in subduction zones. For more information on Peter's research go to
http://www.abdn.ac.uk/~wpg008/PChomepage.html