Geophysical Research Abstracts
Vol. 12, EGU2010-2699, 2010
EGU General Assembly 2010

Subduction, erosion and the sediment record: Insights from Miocene sediments, Hengchun Peninsula, Taiwan

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Detrital sedimentary records include vast archives of material that have been removed from developing tectonically active regions. These archives have been used to investigate challenging questions on continental deformation, exhumation and palaeodrainage using a variety of different techniques including heavy minerals, fission-track dating and palaeocurrent reconstructions. The Hengchun Peninsula of southern Taiwan and offshore Hengchun Ridge form a present day accretionary prism, with accretionary wedge growth occurring both by frontal accretion, with sediments from the continental margin scraped up into the accretionary wedge and by underplating. Miocene sediments in Hengchun include foreland basin deposits, deep marine turbidites and forearc basin deposits. As a result the detrital sediments record details of accretionary prism growth associated with continued Luzon arc-continent collision.

Diametrically opposite palaeocurrents are preserved in the Miocene sandstones of the Hengchun Peninsula, southern Taiwan. Controversial explanations include an exotic source terrane to the south and/or 180 ° rotation of a depositional basin. We document the tecto-thermal evolution of the Miocene sediment source(s) using a double dating approach. U-Pb grain ages range from Miocene to Archaean, while zircon fission-tracks record thermal cooling primarily in the Cretaceous with minor peaks in the Miocene, Triassic, Jurassic and Permian. The primary source of the Miocene sediments at the centre of the controversy was similar. Palaeocurrent data are influenced by local basin geometry and submarine topography and suggest that sediment deposition in the Miocene was strongly controlled by incipient subduction, associated structural trends and submarine topography. A similar control on deposition in the modern Taiwan collision zone is apparent in the offshore region today.