Geophysical Research Abstracts
Vol. 12, EGU2010-7912, 2010
EGU General Assembly 2010

Resolving the early Mesozoic Panthalassa Ocean architecture with lower mantle slabs

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Subduction has consumed most of the oceanic palaeo-plates that once occupied the vast Mesozoic Paleo-Pacific, or Panthalassa Ocean. The plate motion of four major plates (Farallon, Izanagi, Phoenix and Pacific) have been reconstructed as far back as the early Cretaceous, but are based on few constraints and extrapolation. Plate tectonic reconstructions of the Panthalassa Ocean are essentially unconstrained further back in time except for the presence of intra-oceanic blocks that accrete at later times. We identify subducted oceanic lithosphere remnants, imaged in a recent seismic wave tomography model and interpret intra-oceanic subduction zones that were once active in the Triassic-Jurassic Panthalassa Ocean. We infer a major subduction zone (named Telkhinia) in a central Panthalassa location, defining two separate oceans (Thalassa and Pontus). Fossil intra-oceanic subduction complexes along the west Pacific margin are associated with this major divide of the Panthalassa Ocean. Termination of the Telkhinia subduction zone in the Jurassic, followed by plate reorganization and the appearance of a ridge at the Asian eastern margin, is postulated to have caused the wide scatter of superterranes.