Geophysical Research Abstracts
Vol. 20, EGU2018-10810-1, 2018
EGU General Assembly 2018

Eastern Tethyan tectonics and geodynamics since Pangea breakup

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The opening and closure of successive Tethyan ocean basins has resulted in a network of suture zones along southern Eurasia that delineate a mosaic of accreted Gondwana-derived terranes. We present our latest publicly available plate tectonic reconstructions for the Tethyan tectonic domain since Pangea breakup in the open-source and cross-platform GPlates software (www.gplates.org). The opening of the Neo-Tethys in the latest Jurassic north of Greater India was most likely driven by the onset of subduction along southern Eurasia, leading to northward slab pull that was propagated across the older Meso-Tethyan plate, with localisation of rifting occurring on the Greater India and NW Australian (continental) passive margins. Seafloor spreading from $\sim$155 Ma likely detached and transferred the East Java and West Sulawesi (Argoland) continental fragments northward from the NW Australian shelf, with accretion occurring on the Sundaland (southwest Borneo) core along the Luk Ulo-Meratus suture by $\sim$80 Ma. The southern Eurasian margin, at least between Lhasa and Sumatra, transitioned from being a purely Andean-style margin in the latest Jurassic, to a convergent margin also accommodating intra-oceanic subduction along the Kohistan-Ladakh and Woyla arc systems. Although we assume that intra-oceanic subduction developed as a retreating trench to open a large back-arc basin, further work is required to test whether the intra-oceanic subduction may have been generated spontaneously along a pre-existing lithospheric weakness, such as a transform boundary or an inverted mid-oceanic ridge system. Contemporaneous latest Jurassic seafloor spreading along the New Guinea margin was likely driven by a very different tectonic mechanism than the Neo-Tethyan seafloor spreading north of Greater India and the NW Australian shelf. Instead, supra-subduction zone ophiolites ($\sim$157 +/- 16 Ma) suggest an active margin, with the Sepik back-arc basin (sometimes referred to as the Pocklington Sea) opening much like the present-day Sea of Japan. Although the chronology remains uncertain, the Sepik back-arc basin was likely consumed along a north-dipping subduction zone in Late Cretaceous to Eocene times, with terminal collision occurring in the late Eocene to early Oligocene. We applied our plate reconstructions as time-dependent surface boundary conditions to numerical forward models of mantle convection in CitcomS to study the evolution of the Tethyan mantle structure, which allowed us to compare the present-day mantle prediction with P- and S-wave seismic tomography. The Tethyan subduction history has important implications for the long-wavelength topography of the overriding plate, including regional uplift or subsidence, with sinking slabs dominating the dynamic topography signal in this complex convergence zone between the Indo-Australian, Eurasian and Pacific plates. Our approach highlights the need for end-member plate reconstruction scenarios that can be tested using numerical approaches, especially in regions where seafloor spreading histories have been lost to multiple phases of subduction.