

Continent-Ocean Transition or Boundary? Crowd-sourced seismic interpretations of the East-India Margin

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The determination of the nature of continental margins, whether in the form of Continent Ocean Boundaries (COB) or Continent Ocean Transitions (COT), have important implications for understanding the state and evolution of these margins. Deep seismic images are the best tool for imaging the crusts, subsurface structures and their geometry. However, due to the inherent uncertainty associated with the interpretation of geophysical data, there are multiple subsurface models that, while honouring the data, can lead to interpretations of different margin types (i.e. COT or COB) for the same area.

Here, we explore the range and variability in interpretations of a single seismic section from the Eastern India margin, carried out by different groups of interpreters in an experiment that took place during the Seismix 2016, held in Aviemore (United Kingdom). Three elements of their interpretations (the moho, the basement and the interpreted faults) were digitalised and sorted by margin type (COT or COB). The comparison of the different interpretations allows us to identify areas of greater uncertainty, defined by greater variability in the interpretations. Thinning factors for the continental crust in all interpretations, based on the Moho and basement geometries, have been calculated. The five COB interpretations have crustal thicknesses ranging from 30 km (continental crust) through a minimum crustal thickness of 0 km. The average oceanic crustal thickness is 5.7 km. For the nine COT, interpretations range from a maximum continental crust of 22 km to a minimum of 16.3 km; and an average oceanic crustal thickness of 6.9 km. Our analysis of interpretations of a single seismic section from the East Indian Margin shows that COB and COT models are not really single deterministic model concepts; but that within them a range of possible models exists. In our opinion the terms are unhelpful and the binary nature of the concepts do not represent the reality of interpretations, or at least not in our example, of continent-ocean margins.