



On the Causes of Oceanic Arcs Curvature: Insights from Numerical Modelling

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A striking feature of oceanic trench systems is their alignment into an arcuate shape. Oceanic arcs are surface traces of subducting oceanic plates plunging at the deep-sea trenches into the Earth's mantle. They portray a convex curvature as seen from the oceanic plate as it approaches the trench. We use a new numerical technique for lithosphere-mantle interaction to investigate the dynamic causes of arc curvature and test two alternatives: (1) External feedback between the migrating lithosphere and the secondary induced mantle flow, (2) Internal heterogeneities within the lithosphere itself, e.g. owing to differences in cooling ages of the plate at the trench. We find that almost all arcs on the Earth are in the range described by hypothesis 1 and 2. Internal heterogeneities within the slab seem to be the most potent driver for curvature.