



Subduction initiation triggered by mantle suction flow

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Subduction initiation at passive margins, despite its important role in Wilson cycle, is still a debatable issue. Several workers have suggested different mechanisms for triggering subduction initiation along passive margins. Here we propose a new triggering factor, which is suction mantle flow. We suggest that a suction mantle flow, which is induced from the neighboring subduction zones in the region, is able to push the oceanic plate into the mantle and convert the passive margin into an active plate boundary. Using coupled thermo-mechanical models, we show that a dipping shear zone develops along passive margin as a suction mantle flow exists either below the passive margin or below the oceanic plate near the future plate boundary. Few million years after formation of shear zone, oceanic plate descends into the mantle and subduction initiates. In our numerical experiments, the subduction initiation time varies, depending on several parameters including the magnitude, domain size and location of the suction mantle flow velocities, age of oceanic plate and strength of continental lithosphere. we find that subduction nucleation is followed by trench retreat if the suction mantle flow excites an oceanward flow below the continental plate.