
T52B-08: The Terminal Stage of Subduction: the Hindu Kush Slab Break-off

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The terminal stage of subduction arrives when the ocean basin is closed and the continental margin arrives at the trench. The opposite forces of the sinking slab and buoyant continent ultimately leads to break-off of the subducted slab. This process, although common in geological history, is rarely observed, because it is short-lived. Here we report new precise earthquake hypocenters, detailed tomographic images and earthquake source mechanisms from the Hindu Kush region in Central Asia, which hint at continental subduction and plate necking. Our images provide a rare glimpse at the ephemeral process of slab break-off: the Hindu Kush slablet in its uppermost section is thinned or already severed and that intermediate depth earthquakes cluster at the neck connecting it to the deeper slab. From a strain rate analysis, we deduce that the deep portion of the slab is in the process of detaching from the shallower fragment at much higher rates than the current convergence rate at the surface. The increased strain rate might arise as the buoyant continental crust, which is dragged into the subduction system in its terminal stage, resists subduction, whereas the earlier subducted mantle lithosphere pulls from underneath.

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