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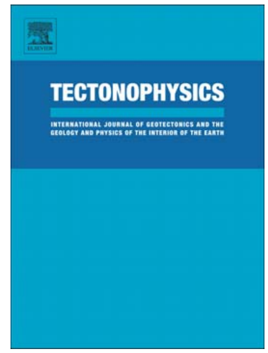

Slab dip, surface tectonics: How and when do they change following an acceleration/slow down of the overriding plate?

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Slab dip, surface tectonics: How and when do they change following an acceleration/slow down of the overriding plate?

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Abstract

We present analogue models simulating the subduction of an oceanic lithosphere beneath an overriding plate advancing at variable rates. The convergence velocity is imposed by lateral boundary conditions in this experimental set. We analyze the geometry of the slab and the deformation of the overriding plate. Experiments confirm the strong correlation between the absolute velocity of the overriding plate on the one hand, the geometry of the subducting plate and the deformation of the overriding plate on the other hand. Following an instantaneous change in kinematic boundary conditions, the subduction system progressively shifts to a new steady-state regime. Models suggest that the adjustment time necessary to shift from the previous to the new equilibrium is independent of the imposed upper plate velocity. Transient stage lasts $\sim$12.5±6 m.y. for the shallow slab dip (100-150-km depth), $\sim$29.2±10 m.y. for the deeper slab dip (300-350-km depth), and $\sim$2.2±2 m.y. for the upper plate deformation. The analysis of present-day subduction zones and their evolution through the last 20 m.y suggests an adjustment time of $\sim$15 m.y. for shallow slab dip and $\sim$20 m.y. for deep slab dip in Nature. Since only few subduction zones have