Geophysical Research Abstracts, Vol. 9, 02345, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-02345

Permo-Triassic subducted slabs return from the grave

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The D"-layer above the core-mantle boundary forms both the final sink ('slab graveyard') for the deepest subducted plates (slabs) and a possible source region for mantle plumes. In this paper we test a scenario in which slabs penetrate the D"-layer and generate mantle plumes. Parts of a subducting plate can be accreted to the overriding plate to form orogens. We use the duration of orogenesis to date the onset and end of a subduction event and apply seismic tomography to image slabs in the mantle. Comparison of paleogeographic reconstructions with tomographic images provides a tool to constrain paleolongitude of former subduction zones. High seismic velocity anomalies in the D"-layer underneath the northern America-Atlantic-European realm correspond to the Permo-Triassic active margins of western Pangea. This suggests that western Pangea had a 45˚ more westerly paleolongitude than currently assumed. Surrounding the projected position of these anomalies in the D"-layer at the earth surface, a large number of upper Mesozoic and Cenozoic mantle-plume related Large Igneous Provinces and hotspots have been identified. In this paper we link four orogenies to mantle plume events and show a slab mantle transit time of 230-250 Ma between onset of orogeny and onset of mantle plume volcanism, coupled through a whole mantle convection cycle.