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Behaviour of continental lithospheres of India and Asia during the collision, inferred from tomography and tectonic reconstruction

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Using tomographic images and seismicity distribution, we determine the geometry of the subduction of India in the Hindu Kush seismic region, and measure the length of its slab. We infer that this measure is an estimate of the size of India after the slab breakoff process that most likely occurred at the early stage of the collision. By using the paleomagnetic positions of India, we were able to deduce an age for this slab breakoff of about 45 Ma and to infer the timing and rate of this subduction (see Villaseñor et al, same volume). We infer from tomographic horizontal cross-section the contour of the breakoff, and deduced the contour of continental lithosphere of India which will be involved in the following collision process, as the rest of it, is detached and will sink into the mantle. We follow the evolution through time of this contour of India during the collision process, by moving it back to present using the Euler poles determined from the paleomagnetic anomalies, as it has already been done for South East Asia (Replumaz et al, 2004). We obtain successive maps showing the evolution of the lithosphere of India from 45 to 15Ma, and inferred its becoming in the mantle. Using previous tectonic reconstruction (Replumaz and Tapponnier, 2003), we show here that this evolution is correlated with the subduction of the Asian lithosphere, and with the extrusion of Indochina. Those two processes absorb the northwards motion of India when and where India is not subducting itself. This suggests that India is not squeezing the Asian lithosphere, which therefore does not thicken. We also suggest

how to form the geometry of the Indian slab beneath the Hindu Kush, with very sharp boundaries. The lithosphere of India has been cut by several faults during the collision, and we deduced which one and when, using the tectonic reconstruction (Replumaz and Tapponnier, 2003).

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