Geophysical Research Abstracts, Vol. 8, 07623, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07623

Lithosphere structure underneath the Tibetan plateau inferred from elevation, gravity and geoid anomalies

I. Jimenez-Munt (1), M. Fernandez (1), J. Verges (1), J. Platt (2)

(1) ICT 'Jaume Almera', CSIC, Lluis Sole i Sabaris s/n, 08028 Barcelona, Spain. (e-mail: ivone@ija.csic.es, mfernandez@ija.csic.es, jverges@ija.csic.es, Tel:+34 93 4095410). (2) Dept. of Earth Sciences, USC, Los Angeles, CA 90089-0740, USA. (e-mail: jplatt@usc.edu)

The Tibetan plateau is the product of crustal thickening caused by collision between India and Asia. Plate tectonic reconstructions suggest continuous northward movement of the Indian plate relative to stable Eurasia at nearly 50 mm/yr for the last 50 My. The plateau is now at ˜5 km elevation with steep topographic gradients across the southern and northern margins. These steep topographic gradients are also related with high lateral variations on the geoid and gravity anomaly. In a SSW to NNE cross section, the Bouguer gravity anomaly decreases in 500 km from about 0 mGal in the India plate to ˜-500 mGal on the Tibetan plateau. Seismic studies crossing the plateau found a thick crustal root underneath the plateau, which would be in agreement with this high elevation and low values of the Bouguer gravity anomaly. The geoid anomaly also presents a steep gradient on the Himalayan front and the northern margin, getting values between 20-30 m on the plateau suggesting a pronounced thinning of the lithospheric mantle. Uplift late in the tectonic evolution of the plateau, the widespread extension, and the associated magmatism have been attributed to convective removal of the lower part of lithospheric mantle and its replacement by hotter and lighter asthenosphere. Some of this processes have been studied numerically, the effect of the convective removal of the lithosphere on the evolution of the Tibetan plateau. Here we present a two-dimensional lithospheric thermal and density model along a transect from the Indian plate to Asia, crossing the Himalaya front and the Tibetan plateau. The model is based on the assumption of local isostasy equilibrium and constrained by the topography and gravity and geoid anomalies. The thermal state of the lithosphere is linked to the mentioned observables through the temperature-dependent density of the mantle lithosphere. Results are discussed in terms of possible geodynamic evolution

of the Himalayan orogen.