Geophysical Research Abstracts
Vol. 14, EGU2012-5609, 2012
EGU General Assembly 2012

Lateral variations of gravity anomalies in the Eastern Himalayas: preliminary results and interpretations

T. Berthet (1), G. Hetényi (2), R. Cattin (1), C. Champollion (1), E. Doerflinger (1), S. Sapkota (3), D. Drukpa (4), and J. Chophel (4)

(1) Géosciences Montpellier, CNRS – UM2, Montpellier, France, (2) Swiss Seismological Service, ETH, Zurich, Switzerland, (3) Department of Mines and Geology, DMG, Ministry of Industry, Kathmandu, Nepal, (4) Department of Geology and Mines, DGM, Ministry of Economic Affairs, Thimphu, Bhutan

The Himalayas are the most spectacular example of continental deformation in the world. They result from the evolution of the convergent margin between Indian and Eurasian plates and extend laterally (E-W) over more than two thousand kilometers in northern India, Nepal and Bhutan. In the same time, most of the crustal thickening is localized within only two hundreds kilometers (N-S) between India and Tibet. This pattern has been already imaged in Central Nepal by seismological methods (e.g. receiver functions) and land gravimetry. These methods clearly reveal a deepening of the Moho from 35 to 75 km depth and the associated Bouguer anomaly decrease of about ∼500 mGal. Hence, our current understanding of the Himalayas, especially for crustal structures and rheology, is based on interpretation and modeling of datasets acquired mostly across Central Nepal. However, considering the lateral complexity of topography and geology of the fold and thrust belt along the Himalayas, new geophysical investigations are now needed to better assess E-W variations of the crustal structure.
Here we present a new land gravity dataset acquired during two field campaigns in Fall 2010 and 2011 in both western Nepal and Bhutan. Several N-S profiles have been measured including the first gravity measurements in Bhutan. Although new gravity points are in a wide range of elevation from hundred of meters to several thousands, the profiles show smooth decreasing gradients of Bouguer anomalies from South to North. The obtained new gravity profiles across the continental wedge confirm that gravity field is primarily controlled by the deepening of the Indian plate toward Tibet (longer, ∼100-km wavelength) and the geometry of the foreland basin (shorter, ∼10-km wavelength). The comparison with other available datasets reveals clear lateral variations along the Nepal and Bhutan Himalayas. To understand the observed variations, we perform 2D thermomechanical modelling of the flexure and compute synthetic Bouguer anomalies. We show that the E-W variations can be interpreted in terms of changes of the mechanical properties of the Indian plate.