Geophysical Research Abstracts
Vol. 19, EGU2017-16481, 2017
EGU General Assembly 2017

Orogenic mass changes detectable in satellite gravity missions

Carla Braitenberg, Tommaso Pivetta, and Federico Morsut
University of Trieste, Department of Mathematics and Geosciences, Trieste, Italy (berg@units.it)

Long term GNSS time series detect vertical crustal movement rates, which typically at orogens demonstrate uplift. The orogenic uplift can be ascribed to tectonic and post-glacial adjustments and crustal thickening. We investigate the sensitivity of satellite gravity change rate observations to detect the associated mass changes. Gravity change rate joint with uplift monitoring allows to distinguish the mechanism of uplift (Braitenberg and Shum, 2016). We use known vertical uplift rates over specific orogens to predict the gravity change for different geodynamic hypotheses of pure uplift and mantle inflow, or crustal thickening and isostatic Moho lowering. The sensitivity of gravity as a tool to distinguish the two mechanisms is investigated. The estimate of this tectonic signal is important, when the observed gravity change rates of GRACE and future missions are interpreted exclusively in terms of hydrologic changes tied to climatic variation. We find that in some areas, as the Tibetan plateau and the Himalayan- Alpine range, the tectonic signal is measurable by satellite gravity and contributes to a better understanding of the geodynamic processes leading to orogenesis.

Braitenberg C. and Shum C. K. (2016). Geodynamic implications of temporal gravity changes over Tibetan Plateau. Italian Journal of Geosciences, in press.