



Co-seismic gravity changes at TIGO/Concepcion after the M8.8 Maule Earthquake, Chile measured by absolute and superconducting gravimeters in comparison with a viscoelastic-gravitational model

Hartmut Wziontek (1), Reinhard Falk (1), Herbert Wilmes (1), Peter Wolf (1), Hayo Hase (2), Armin Boer (2), Ivan Cona (2), and Rongjiang Wang (3)

(1) Federal Agency for Cartography and Geodesy (BKG), Frankfurt / Main, Germany, (2) Federal Agency for Cartography and Geodesy (BKG), Observatorio Geodesico TIGO, Concepcion, Chile, (3) Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences, Potsdam, Germany

The Transportable Integrated Geodetic Observatory (TIGO) near Concepcion is located only 80 km south from the epicenter of the devastating Earthquake of magnitude 8.8 occurred on 27 February 2010 in Maule region, Chile. Since November 2002, temporal gravity changes at the geodetic fundamental station are recorded with highest precision by the superconducting gravimeter RSG038, which is complemented since May 2006 by weekly absolute gravity measurements with FG5-227. A comparison campaign with FG5-101 in April 2010 confirmed the high accuracy of the absolute gravity measurements after the Earthquake. The combination of all gravity observations allowed us to reveal a co-seismic gravity decrease of about 100 nm/s^2 from direct measurements for the first time. The separation from the strong seasonal gravity signal of mostly hydrological origin was possible after extrapolation of the temporal behavior of the pre-earthquake signal by singular spectrum analysis (SSA) and by a composite annual cycle. Finally, the obtained gravity change is compared with the response calculated from numerical model for the deformation zone at the plate boundary between the subducting Nazca plate and the South America plate by means of viscoelastic-gravitational dislocation theory.