Geophysical Research Abstracts
Vol. 12, EGU2010-7814, 2010
EGU General Assembly 2010
© Author(s) 2010

Four Years of Absolute Gravity in the Taiwan Orogen (AGTO)

Maxime Mouyen (1), Frédéric Masson (1), Cheinway Hwang (2), Ching-Chung Cheng (2), Nicolas Le Moigne (3), Chiung-Wu Lee (4), Ricky Kao (4), and Nicky Hsieh (4)

(1) Institut de Physique du Globe de Strasbourg, Université de Strasbourg-CNRS, Strasbourg, France (maxime.mouyen@eost.u-strasbg.fr, +33 (0)3 90 24 01 25), (2) Department of Civil Engineering, National Chiao Tung University, Hsinchu, Taiwan , (3) Géosciences Montpellier, Université Montpellier 2-CNRS, Montpellier, France, (4) Center for Measurements Standards, Industrial Technology Research Institute, Hsinchu, Taiwan

AGTO is a scientific project between Taiwanese and French institutes, which aim is to improve tectonic knowledge of Taiwan primarily using absolute gravity measurements and permanent GPS stations. Both tools are indeed useful to study vertical movements and mass transfers involved in mountain building, a major process in Taiwan located at the convergent margin between Philippine Sea plate and Eurasian plate. This convergence results in two subductions north and south of Taiwan (Ryukyu and Manilla trenches, respectively), while the center is experiencing collision. These processes make Taiwan very active tectonically, as illustrated by numerous large earthquakes and rapid uplift of the Central Range. High slopes of Taiwan mountains and heavy rains brought by typhoons together lead to high landslides and mudflows risks.
Practically, absolute gravity measurements have been yearly repeated since 2006 along a transect across south Taiwan, from Penghu to Lutao islands, using FG5 absolute gravimeters. This transect contains ten sites for absolute measurements and has been densified in 2008 by incorporating 45 sites for relative gravity measurements with CG5 gravimeters. The last relative and absolute measurements have been performed in November 2009.
Most of the absolute sites have been measured with a good accuracy, about 1 or 2 μGal. Only the site located in Tainan University has higher standard deviation, due to the city noise. We note that absolute gravity changes seem to follow a trend in every site. However, straightforward tectonic interpretation of these trends is not valuable as many non-tectonic effects are supposed to change g with time, like groundwater or erosion. Estimating and removing these effects leads to a tectonic gravity signal, which has theoretically two origins : deep mass transfers around the site and vertical movements of the station. The latter can be well constrained by permanent GPS stations located close to the measurement pillar. Deep mass transfers, on the contrary, must be evaluated by modelling. Relative gravity, despite lower accuracy, enable us to cover wider area (about 10 000 km^2). Our interest is thus to merge both types of measurements to have a large overview of temporal g changes in the south of Taiwan.