Geophysical Research Abstracts, Vol. 8, 07017, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07017

Crustal viscosity in eastern Taiwan inferred from modeling of Chihshang fault post-seismic creep behavior following Chengkung earthquake.

Y. Mazabraud (1), J-C. Hu (1) and J. Angelier (2)

(1) National Taiwan University, Geoscience Department, Taipei, Taiwan (mazabraud@ntu.edu.tw), (2) Géosciences Azur, UMPC, Villefranche sur Mer, France

On December the 10^{th}, 2003, a M_w = 6.5 earthquake occurred in eastern Taiwan, near Chengkung city. It was located at about 20 km depth, on the Chishang fault. The co-seismic slip reached 60 to 80 cm at depth (5-25 km) whereas it only reached 10 to 15 cm at shallow depth (0-5 km). This difference among the amount of slip along the fault plane induced increased stress on the near surface part of the fault. This stress has then been released by means of post-seismic creep. Indeed, the surface deformations related to this event reached $\sim$15 cm six month after the rupture whereas surface the co-seismic deformation is of only 2 cm. Thus, during the rupture, the superficial part of the fault most likely behaved as a locked fault. Then, the mechanical properties of the quaternary alluvial deposits from the longitudinal valley might have enable stress release through creeping. In order to verify these assumptions and to define local crustal viscosities, we went through numerical modeling of stress change in a 1D elastic and visco-elastic layered earth model (VISCO1D, Pollitz 1996 and 1997). The source parameters from Chengkung earthquake were used to reproduce the perturbation in the GPS velocity field during and after the event, with regard to the regional geodynamics.

Preliminary results tend to indicate that the short-term ($\leq$ 6 months) GPS velocities can only be reproduced when visco-elastic stress transfer is induced into the upper part of the crust, involving visco-elastic properties for the quaternary alluvial deposits. For to reproduce longer-term GPS velocities (up to 2 years), visco-elastic stress transfer has to be induced, but in the lower, ductile, part of the crust.