Geophysical Research Abstracts, Vol. 8, 04847, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04847

A thermo-kinematic model of mountain-building in Taiwan: results and questions.

0.1 Martine Simoes (1,2), Jean Philippe Avouac (2), Olivier Beyssac (1), Bruno Goffe (1), Ken Farley (2), Yue-Gau Chen (3)

1 Laboratoire de Geologie, Ecole Normale Superieure, Paris, France.

2 Tectonics Observatory, California Institute of Technology, Pasadena, USA.

3 Department of Geosciences, National Taiwan University, Taipei, Taiwan (R.O.C.)

(simoes@gps.caltech.edu)

Because of its high rates of deformation and erosion, as well as the southward younging of the collision, Taiwan is an ideal place to investigate the interplay between tectonic and surface processes. Also, this case example has been key in the development of the popular critical wedge model for mountain-building processes. However, recent investigations indicate that this model does not account for the actual kinematics of deformation as well as for the metamorphic evolution of the Taiwanese range (see Beyssac *et al*, session TS7-2): our study aims at combining these quantitative and multi-disciplinary data within a new simple thermo-kinematic model.

Our model indicates that exhumation over the western (Hsueshan Range) and easternmost (Tananao Complex) portions of the central range (CR) is sustained by underplating at depth; interestingly, exhumation/underplating is minor within the central part of the CR (Backbone Range) where the highest topography is localized. It also appears that the range grew initially mostly by frontal accretion (60 to 80 % of the incoming fluxes), but that underplating beneath the internal portions of the range became predominant ($\sim$ 90%) over the last 1.5 Ma, that is since the early Pleistocene. In addition, changes in material density related to the PT conditions predicted by the model are able to account for the observed topography, so that the modeled kinematics

most probably reflects the wedge dynamics.

This study thus sheds new light on the long term evolution of the Taiwanese range. It also provides key geological and quantitative constraints to discuss and model the interplay between tectonic and surface processes in the case example of Taiwan. Finally, our results also emphasize the major role played by metamorphic transformations on mountain-building processes, although they are usually neglected in thermo-mechanical models.