Application of *In-situ* cosmogenic ^{10}Be Exposure Dating: Relationship between surface processes and tectonic activity

Rou-Fei Chen[a*], Florence Derrieux[b], Lionel Siame[b], Kuo-Jen Chang[c], Heng Tsai[d], Régis Braucher[b], Didier Bourlès[b], Jian-Cheng Lee[a], Der-Chung Lee[a]

The principle of a tectonic origin for topography is generally accepted. The importance of climate as a modulator between uplift and denudation has evolved into a strong willing for constraining geomorphic and tectonic rates (denudation/erosion and uplift rate), and their feedback mechanisms and relationships. Determining rates of sediment generation is thus an important step for understanding landscape evolution and fluvial response to rock uplift within the drainage basin. In the recent years, the western part of Taiwan has been a focus point in seismological researches. Since this region is characterized by several active faults, one very important issue is investigating the seismic hazard potentials associated to these active faults.

A new approach of cosmogenic isotope analysis involves the measurements depth profiles of *In situ* produced cosmogenic nuclide ^{10}Be concentrations (half-lift= 1.5 million years), that is deposited on the upper few meters of the earth's surface to a depth of 10 m. The concentrations of these cosmogenic nuclides can provide quantitative estimates of the timing and rate of geomorphic processes. In dating applications the concentration of cosmogenic nuclides is interpreted as reflecting the time elapsed since a surface exposure event. The past decade has seen a rapid growth in applications of cosmogenic isotope analysis to a wide range of geomorphological problems, and the technique is now playing a major role in dating and quantifying rates of landscape change over timescales of several thousands to several millions of years.

The Taichung-Pakua area has undergone serious earthquake damages in the past century (e.g., the 1999 Chi-Chi earthquake). This study was undertaken to describe the active fault associated with the folding and the earth's crust deformation in response to tectonic uplift or surface deposits. We study the relationships between geomorphology and tectonic activity. First, the neotectonic features are investigated by means of DTM analysis and aerial photographs interpretation. These analyses highlight the geomorphic development of the thrust fronts. The surface location of faults can be located first by identifying lineaments in the satellite and airborne images, and second by geomorphologic and geological site investigation in the field.

Keyword: Neotectonics, In situ cosmogenic nuclides, fluvial deposition, Boulder canyon, aerial photographs, Remote Sensing, western Taiwan.

[a]Institute of Earth Sciences, Academia Sinica, P.O. 1-55 Nankang, 115, Taipei, Taiwan.
[b]CEREGE, UMR 6635, Université Aix-Marseille III, P.O.80,13345, Aix-en-Provence Cedex 04, France
[c]Department of Civil Engineering, National Taipei University of Technology, Taipei, 106, Taiwan.
[d]Department of Geography, National Changhua Universtiy of Education, Changhua 50018, Taiwan