# Cosmogenic nuclides and surface processes in Taiwan

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Orogenic settings are particularly well suited to study and quantify the coupling relations between tectonics, topography, climate and erosion since they record tectonic evolution along convergent margins and the connection between deep and surface processes. However, the interaction of deep and shallow processes is still poorly understood and the role they play in the exhumation of rocks, the structural and kinematic evolution of orogenic wedges, and the relation between tectonics and climate-dependent surface processes are still debated. Therefore, quantification of denudation rates in a wide range of climatic and tectonic settings, as well as at various time and space scales, is a critical step in calibrating and validating landscape evolution models. Since 25 years, cosmogenic nuclides, which are produced within the Earth's environment through nuclear reactions involving secondary cosmic ray particles and nuclei of target minerals in rocks and soils, have literally revolutionized the way geologists can now quantify rates of surface processes. These last ten years, French and Taiwan teams collaborated to address an important aspect of the Taiwanese orogenic wedge dynamics: the topographic evolution of the wedge and the relationship between the development of the relief by internal processes and the rates of surface lowering due to erosion. In this presentation, I will briefly expose the basic aspects of cosmogenic nuclides applied to quantification of denudation rates. Then, I will focus on our investigation of the pattern and magnitude of denudation rates at the scale of the orogenic system, deriving denudation rates from in situ-produced cosmogenic nuclide $^{10}$Be concentrations measured in (1) river-borne quartz minerals sampled at major watersheds outlets, and (2) bedrock outcrops along ridge crests and at summits located along the major drainage divide of the belt. Altogether, the cosmogenic-derived denudation pattern at the orogen-scale reflects fundamental mountain building processes from frontal accretion in the Western Foothills to basal accretion and fast exhumation in the Central Range. Applied to the whole orogen, such field-based approach thus provides important input data to validate and calibrate the parameters to be supplied to landscape evolution models.