Overview of geo- and thermo-chronology applicable to unravel the earth's surface evolution

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The earth’ s surface has been evolved dynamically since its birth, and predominantly governed by the plate tectonic regime in Cenozoic time. While the passive continental margin reflects lithosphere’ s continued cooling associated with the ocean floor’ s spreading after breakup and rifting, the active margin exhibits more dynamic geological phenomena, such as widespread magmatism, earthquake and crustal deformation, accretionary growth/erosion, etc. As a result, the structure and topography of plate convergence zones, i.e., island arc and marginal sea, continental arc and collisional orogens, represent dynamic spatial and temporal geological developments. In addition, the geomorphological features of the earth’ s surface have been modified by denudation (i.e., erosion and tectonic denudation), sediment transportation and deposition. The denudation, in particular, has also been significantly controlled by orbital forcing and resultant climatic episodes coupled with global sea level changes.

Many of those geological developments have been recorded in geological materials and can be decoded by modern geo- and thermo-chronological techniques (e.g., Kelly, 2002; Schmitt, 2011; Tagami, 2012; Herman et al., 2013; Sueoka et al., 2016; Ault et al., 2019; Malusa and Fitzgerald, 2019). In this presentation, we give an overview of geo- and thermo-chronology to tackle those geoscientific targets, especially focusing upon the plate convergence zone developments. These techniques, coupled with other available geophysical, geological and geomorphological information, place important constraints on the earth’ s surface evolution.

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