Basin-mountain system comprises multistage-evolving structures whose behavior is either controlled by internal factors, e.g., tectonic frameworks, or external ones, e.g., intensity of erosion and sedimentation, resulting to a coupling between structures and surface processes. Documenting the coupling has thus the potential to yield critical insights on the dynamics of the whole basin-mountain system. The Micangshan located at the eastern margin of the Tibetan Plateau is an intracontinental mountain belt (Fig.1), which was shaped during multiple

Wedge-thrust Folding In Micangshan at Eastern Margin of the Tibetan Plateau, Constrains from Lower-temperature Thermochronometer Model

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Fig.1 Lower-temperature thermochronometer data in the Micangshan. It should be noted that there is no distinctly partitioning effect in ages along each fault, and no correlation between elevation and lower-temperature thermochronological ages across the Micangshan.

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phases of intense mountain building and associated denudation throughout the Mesozoic and Cenozoic (Xu et al., 2010; Liu et al., 2012). However, the coupling between surface processes recorded by lower-temperature thermochronometer and mountain-building has been controversial (Cang et al., 2010; Tian et al., 2011; Lei et al., 2012; Xu et al., 2009; Wu et al., 2011; Liu et al., 2012; Wen et al., 2013). In general, the lower-temperature
thermochronology data in the Micangshan shows that a progressively southward (basin-ward) decrease in all the ages occurs, and apatite (U-Th)/He ages (AHe) with a range of ~110-30Ma contrasting to apatite fission track ages (AFT) with a range of ~120-70Ma (Fig.1). It indicates no partitioning effect in ages along each fault, as well as no correlation between elevation and lowertemperature thermochronometer data across the Micangshan (Fig.2d).

Rocks at different structures will experience different Time-temperature (T-t) histories, the thermal histories recorded by lower-temperature thermochronometer will thus vary with structural position (Metcalf et al., 2009). If in a unique structure and/or tectonic framework, rocks will experience similar T-t histories showing systematically correlated with each others (Sueoka et al., 2012). Thus, we could decipher a coupling/uncoupling between the tectonic construction and the landscape evolution based on quantitative models of lower-temperature thermochronometer (Fig.2). Based on seismic profile, apatite fission track (AFT) data, a simplified one-dimensional, titled topography model resulted by wedge-thrusting folding across the Micangshan was developed (Fig.2a, b). In the model, the paleo-topography and paleo-geothermal gradient immediately before initiation of the wedge-thrust fold deformation can be estimated by using present sample elevations, the cooling ages and the closure-temperature of each sample (Reiners and Brandon, 2006; Sueoka et al., 2012). By the coefficient of determination (Fig. 2c) and suitable geological features (e. g., geothermal gradient), we can decipher the coupling/uncoupling relationship between the tectonic construction and the landscape evolution (e. g., a specific slope in topography). Our model shows that the inherited structure as a wedge-thrust folding, played a predominant role during the Late-Cretaceous uplift and exhumation in the Micangshan. It suggests a steady state, slow uplift and exhumation with rate of 0.03-0.05 mm/yr during Late Cretaceous time across much of the Micangshan, with a southern (or basin-ward) ~4° titled topography (Fig.2f).

Key words: Lower-temperature thermochronometer, wedge-thrust folding, Micangshan, eastern margin of the Tibetan plateau

References