Extrusion tectonics, where do we stand 40 years later?

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Résumé

In seminal papers Paul Tapponnier revealed the existence of several hundred-km-long active strike-slip faults in and around the Tibetan plateau where, the India-Asia collision was expected to only produce reverse faults and folds (e.g., Tapponnier et Molnar, 1977). He latter further stressed out the role of such large strike-slip faults in the long-term building of the plateau, especially on its eastern side, (e.g., Tapponnier et al., 1982; 1990; 2001). the so-called extrusion tectonics model rises major discussions in particular on how SE Tibet evolved through time and in a more general way how the continental crust deforms. Completely different, sometime antagonistic, models have since been proposed for the geological and topographic evolution of SE Tibet, such as the channel flow hypothesis (e.g.; Royden et al., 1997; Clark and Royden, 2005). Central to this discussion are the Ailao Shan – Red River (ASRR) metamorphic belt and the eastern topographic margin of the Eastern Tibetan plateau.

The ASRR has been interpreted as a major left-lateral faults allowing the 700±200 km lateral escape of Sundaland toward the SE during the Miocene (e.g.; Tapponnier et al. 1990, Leloup et al., 1995, 2001), linked with the opening of the South China Sea (Briais et al., 1993). On the other hand, other propose that the ASRR as a limited offset and / or is an exhumed piece of a lower crustal channel (e.g. Searle, 2006; Mazur et al., 2012; Chen et al., 2023).

At the light of the thermochronological and geochronological data allowing to better constrain the timing of exhumation and deformation in the ASRR, we will discuss how the channel flow model appear flawed and how large strike-slip fault have interacted with reverse faults to shape eastern Tibet since the Oligocene.

Mots-Clés: Asia, Ailao Shan, Red River, Strike, slip tectonics

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