The paleogeography of the India-Asia collision: a review of ongoing models and controversies

Guillaume Dupont-Nivet*[1] and Pierrick Roperch[1]

[1]Géosciences Rennes – Université de Rennes, Institut National des Sciences de l'Univers, Observatoire des Sciences de l'Univers de Rennes, Centre National de la Recherche Scientifique – France

Résumé

The reconstruction of the "India-Asia Collision" and the development of the Tibetan-Himalayan orogen remain highly controversial despite over a century of research on the shoulders of early giants such as Emile Argand (1922). The motivations for reconstructing the evolution of the most dramatic ongoing geodynamic event forming the highest and largest orogenic plateau, is not only "because it's there". It also holds clues to constrain proposed models of underlying geodynamic and surface processes as well as associated climatic and biotic impacts. As such it represents, arguably, the most important conundrum challenging the Earth Science community today.
We present here a review of reliable constraints, with a focus on paleomagnetic data, selected in the current overwhelming tsunami of related publications on (1) the convergence between the Indian and Asian plates with intermingled terranes; and (2) the growth of the Himalaya-Tibetan orogen. Results are integrated into Terra Antiqua, a plugin for QGIS to make paleogeographic reconstructions with a user-friendly graphical interface (Aminov et al., 2023). Three major types of collision models are currently competing with a plethora of variations that make contrasting predictions on the timing, amount and location of tectonic deformation and associated rock and surface uplift. These predictions compared to a review of various constraints on the Himalaya-Tibetan orogen paleogeography enable, together with plate configuration considerations, to evaluate the most likely collisional models and propose a new one.

Argand, E., 1922, La tectonique de l'Asie, Congrès géologique international (XIIIe session), Extrait du compte rendu, 372pp
Aminov, J., Dupont-Nivet, G., Ruiz, D., Gailleton, B., (2023), The Terra Antiqua QGIS plugin for palaeogeography: application to 30 and 50 Ma reconstructions, Earth Science Reviews, https://doi.org/10.1016/j.earscirev.2023.104401.

Mots-Clés: Collision Inde, Asie, plateau du Tibet, Himalaya, paléogéographie, paléomagnétisme

*Intervenant