U-Pb ages of the Himalayan foreland basin Northeast India: Implications for the India-Asia collision

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SUMMARY

Syn- and post-collision between Indian and Eurasian plates, several peripheral foreland basins were formed that accommodate the detritus from the adjoining regions. The geochronological study is a precise tool for understanding the provenance in this regards several studies have been carried out in the central and western Himalayan foreland basin, while very little in the eastern Himalaya. The present study carried out in the Siang river valley, eastern Himalaya by means of detrital zircon U-Pb geochronology. The Late Paleocene to Early Eocene Lower Yinkiong Formation and Early to Mid-Eocene Upper Yinkiong Formation, deposited in the distal foredeep and foredeep deopzone of the foreland basin respectively. The detrital ages of the Lower Yinkiong Formation are dominantly older than late Paleozoic, resembling the cratonic and early Himalayan Thrust Belt (HTB) affinity. However, there is the presence of Cenozoic age grains in Upper Yinkiong Formation indicate the HFB source and possible the granitic body within the Asian plate. This shifting of source regions signifies the India-Asia collision in the Eastern Himalaya began before or immediately after the Early Eocene (~56-50 Ma).

Key words: Yinkiong Formation, Siang window, Eastern Himalaya, India-Asia collision, Provenance Analysis.

INTRODUCTION

When and where the first time Indian and Eurasian plates come in contact is immensely studied in different sections along the collisional belt. However, still, this is a hot topic of debate. Existing research highlighted that the collision age with in a range between ca. 65 Ma and 58.5 Ma (Cai et al., 2011; DeCelles et al., 2014), ca. 51 Ma (Ding et al., 2017; Ding et al., 2016b) and even younger ~34 Ma (Aitchison et al., 2007). Similarly, the collision first took place in the western section between ca. 65 Ma and 55.5 Ma, and in eastern section at ca. 49 Ma (Beck et al., 1995). Where some research argue that the first contact was in central Himalaya at ca. 65 Ma and later on eastern and western section (e.g. Cai et al., 2011; Ding et al., 2016a; Ding et al., 2005). There are numbers of studies in central and western Himalaya however, limited studies in eastern Himalaya. The present study in based on the widely used detrital zircon U-Pb geochronology for the provenance analysis, and the petrography on the Paleogene foreland basin sequence in Siang valley NE India. The results show that the collision between these two plates in this region took place within the Early Eocene (~56-50).

METHOD AND RESULTS

A petrography study; Gazzi-Dickinson point counting method (Dickinson, 1985; Ingersoll et al., 1984), in which >300 grains from each thin-section was counted and the results plotted in the ternary diagram. By following the heavy mineral separation techniques, zircons grain were extracted from each sandstone samples, mounted in epoxy. About 100-150 zircon grains from each sample were run through LA-ICP MS and further data were analyzed from Glitter and Isoplot software. For detail description follows Cai et al. (2012).

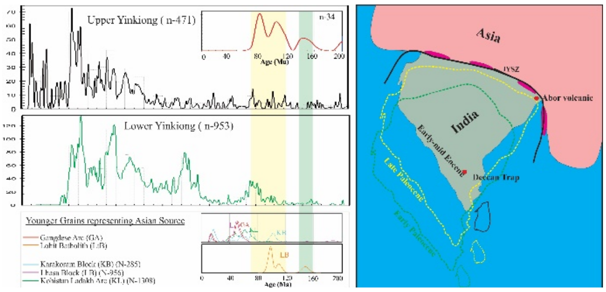

Figure 1. Detrital zircon U-Pb ages of Yingkong Group with geochronological ages of the possible provenance (left section of the map) with a tectonic model.

CONCLUSIONS

The Yingkong group contrasty have two different sets of U-b ages. The late Paleocene to early Eocene Lower Yinkiong Formation yielded dominant numbers of late Paleozoic and older detritus indicating the cratonic and HTB affinity. Where, mid-Eocene Upper Yinkiong Formation yielded the Cenozoic detritus, which are similar to the granitic body within the Asian plate along with the HFB source. This shifting of the source is possibly due to the change in the topography of the Himalaya and Tibet that concluded the possible India-Asia collision happened in this section during or before early Eocene (i.e., ~56-50 Ma) in eastern Himalaya which is younger age than age given by past studies in the central section. Therefore, the India-Asia collision initially occurred in the central and laterally migrated east-west.

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