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Transition From Forearc Basin to Syn-Collisional Basin in Southern Tibet (Paleocene Cuojiangding Group): Implication to Timing of the India-Asia Initial Collision and of Yarlung Zangbo Ophiolite Emplacement

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Timing of the initial India-Asia collision and emplacement of the Yarlung Zangbo ophiolite are two key scientific issues concerning the Himalayan orogeny. One of the consequences of continental collision is the development of syn-collisional sedimentary basins. Foreland-basin successions have been thoroughly studied south of the Himalayan range in Pakistan, India and Nepal, including shallow-marine Paleogene strata (e.g. DeCelles et al., 2004; Najman et al., 2004) and Neogene fluvial deposits of the sub-Himalaya (Siwalik Group; e.g. Burbank et al., 1996; Cina et al., 2009). The early foreland basin development has been less extensively documented in southern Tibet, including marine Paleogene strata in Saga and Gyangze (Ding, 2003; Li et al., 2005; Cai et al., 2008; Wang et al., 2011). Recently, Hu et al. (2012) and Zhang et al. (2012) interpreted the Zongpu Formation in the areas of Tingri-Gamba as indicating the passage of a flexural bulge on Indian crust, and consequently proposed that the India-Asia collision began at either ~62 Ma or ~56 Ma, respectively.

The Cuojiangding region (Zhongba County, southern Tibet) recorded forearc sedimentation (Xigaze Group) and the subsequent sedimentary evolution during initial development of a syn-collisional basin in the southern Asian margin (see Meng et al., 2012). This unit, first noticed by Qian et al. (1982), is a syncline separated by thrusts from the Gangdese batholith and Linzizong volcanic succession in the north and from the Zhongba ophiolitic mélange unit in the south. Its lithostratigraphy and sedimentary petrology was studied by Liu et al. (1998), whereas several paleontological studies were carried out on larger benthic foraminifers, ammonites and

pollens (Li et al., 2008). Ding et al. (2005) presented new data on geological structure, geochronology, and geochemistry of detrital Cr-spinel.

In this study, we combine detailed stratigraphic, sedimentological and micropaleontological data on the Upper Cretaceous to Eocene succession of the Cuojiangding area, with sandstone petrography, detrital zircon U–Pb, and detrital Cr-spinel geochemistry data to reconstruct the paleotectonic evolution of the southern margin of Asia during the earliest stages of the India-Asia collision. Our data show that the Upper Cretaceous Padana and Qubeiya formations, deposited in deltaic to inner shelf environments, represent the final filling stage of the Xigaze forearc basin. The disconformably overlying Cuojiangding Group (Quxia and Jialazi formations), deposited in fan-delta environments during the Thanetian of Late Paleocene, represents the earliest syn-collisional stage. Petrographic data document progressive unroofing of the Gangdese arc, which was the main source of detritus during the Late Cretaceous to Paleogene. Detrital Cr-spinels in the Cuojiangding Group are geochemically similar to those of Xigaze forearc strata rather than to those of the Yarlung Zangbo ophiolites. The timing of the India-Asia initial collision should be older than the deposition of the Cuojiangding Group (>56 Ma), while the emplacement of the Yarlung Zangbo ophiolites is mostly post-middle Eocene.

Key Word: India-Asia collision; syn-collisional basin; forearc basin; southern Tibet

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