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Provenance and sediment fluxes in the Irrawaddy (Ayeyarwadi) River

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The Irrawaddy (Ayeyarwadi) River, still a natural system scarcely affected by human activities, ranks among the five major rivers in the world for its annual suspended load, estimated as 364±60 million tons (Robinson et al., 2007). Sourced in Himalayan glaciers southeast of the eastern Himalayan syntaxis at ca. 28°N, the Irrawaddy originates from the confluence of the Nmai and Mali Rivers, flows southward to receive its major Chindwin tributary in the middle of the central Myanmar Basin, and eventually empties through a nine-armed delta into the Andaman Sea.

The compositional fingerprint of bedload sand in the upper Irrawaddy is characterized by common feldspars, medium/high rank of metamorphic rock fragments and high heavy-mineral concentration, reflecting provenance from mid-crustal granitoids, amphibolite-facies and subordinately greenschist-facies rocks widely exposed in the Mogok Belt and Lohit Plutonic Complex. Minor volcanic/metavolcanic and serpentinite grains indicate additional supply from volcanic-arc remnants and the Neotethyan ophiolitic suture.

Sand of the Chindwin River has much higher quartz/feldspar ratio and much lower metamorphic indices and heavy-mineral concentration, reflecting provenance mainly from upper crustal sedimentary and very low-grade metasedimentary rocks exposed in the Indo-Burman Ranges (Garzanti et al., 2013). Feldspatho-litho-quartzose to litho-feldspatho-quartzose composition in the lower Irrawaddy is intermediate between that of Chindwin and upper Irrawaddy sand. The slight progressive downstream increase in volcanic rock fragments and chert, and decrease in metamorphic indices, point to additional local supply from volcanic and sedimentary cover rocks.

U-Pb age spectra of detrital zircons are characterized by a major cluster between 30 and 150 Ma, corresponding to the long-lasting magmatic activity of the Western Myanmar Arc (Wang et al., 2014), with other clusters at 500-600 Ma and 800-1200 Ma, and a few ages between 1.5 and 2.0 Ga (Limonta et al., 2016). Forward mixing calculations based on integrated petrographic and heavy-mineral data (Garzanti et al., 2012) indicate that 60±10% of the total sediment flux is supplied by the Chindwin River and that upper Irrawaddy sand is supplied mainly by the Nmai headwater branch but also significantly from the Mali branch and left-bank tributaries sourced in the northern Shan Plateau.

CITED REFERENCES

Garzanti E., Resentini A., Vezzoli G., Andò S., Malusà M., Padoan M. 2012. Forward compositional modelling of Alpine orogenic sediments. Sedimentary Geology 280:149-164.

Garzanti E., Limonta M., Resentini A., Bandopadhyay P. C., Najman Y., Andò S., Vezzoli G. 2013. Sediment recycling at convergent plate margins (Indo-Burman Ranges and Andaman–Nicobar Ridge). Earth-Science Reviews 123:113-132.

Limonta M., Resentini A., Carter A., Bandopadhyay P.C., Garzanti E. 2016. Provenance of Oligocene Andaman Sandstones (Andaman-Nicobar islands): Ganga-Brahmaputra or Irrawaddy derived? In: Bandyopadhyay P., Carter A. (Eds.). The Andaman-Nicobar accretionary ridge geology, tectonics and hazards, Geological Society of London Memoir, in review.

Robinson R.A.J., Bird M.I., Oo N.W., Hoey T.B., Aye M.M., Higgitt D.L., Lu X.X., Swe A., Tun T., Win S. L. 2007. The Irrawaddy River sediment flux to the Indian Ocean: the original nineteenth-century data revisited. The Journal of Geology 115:629-640.

Wang J.G., Wu F.Y., Tan X.C., Liu C.Z. 2014. Magmatic evolution of the Western Myanmar Arc documented by U–Pb and Hf isotopes in detrital zircon. Tectonophysics 612:97-105.