



Distal deltaic deposits document hydrological variability during the past 30 kyrBP in Lake Towuti, Indonesia

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Lake Towuti (2.75° S, 121.5° E; 318 m a.s.l.) is a, 560 km², 200-m deep tectonic lake at the downstream end of the Malili lake system, a set of five, ancient (1-2 MYr) tectonic lakes in central Sulawesi, Indonesia. The Mahalona River constitutes the largest tributary and connects Lake Towuti with the two upstream lakes Matano and Mahalona. The Mahalona River Delta is prograding into the >200m deep northern basin of Lake Towuti. Tracing past variability of Mahalona River discharge is therefore an important puzzle piece for the understanding of depositional dynamics in Lake Towuti as well as catchment hydrology and hydrological connectivity between the Malili Lakes.

Distal deltaic deposits can help identifying past variability in river discharge and delta dynamics. Using highly resolved seismic reflection data collected between 2007-2013 we identified a stack of acoustically laminated reflections in Towuti's extensive and morphologically flat deep northern basin. For detailed characterization of these acoustic features we collected a c. 20m long piston core from the basin centre at 200 m water depth reaching back to c. 30 kyrBP. Sediments in this piston core consist to 75% of mass wasting deposits (MWD) of variable thickness that are intercalated with pelagic muds (25%). MWD appear mostly homogenous (silt- to finesand-sized siliciclastics with high amounts of terrestrial plant macrofossils) with only thin (1-3 cm) basal sand layers and clay caps (<1 cm). Pelagic muds appear as thin to medium bedded slightly silty clays that are clearly distinguishable from MWD. The position of MWD identified in our piston core nicely correlates with acoustically laminated reflections identified in seismic profiles crossing the coring site. Based on these combined sedimentological and acoustic datasets we interpret MWD in Towuti's northern basin as distal deltaic deposits originating from the Mahalona River Delta.

Frequencies and percentages (in terms of lithofacies contribution) of distal deltaic deposits differ substantially between the Holocene (56%) and last glacial (88%) sediment succession. In combination with data from hydrological proxies and seismic reflection data indicating dry climate conditions and lake level lowstands, respectively, we interpret the higher frequency of distal deltaic deposits during the last glacial as a result of subaerial exposure and erosion of Mahalona River Delta sediments. These findings imply that frequencies and percentages of distal deltaic deposits in Lake Towuti may be an additional indicator for hydrological variability in this particular system.