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A first order sedimentary history of Lake Tana, northern Ethiopia, from high resolution seismic data

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Data from a Seistec boomer single-channel seismic survey off the north coast of Lake Tana, northern Ethiopia are presented which partly reveal the lake's Late Quaternary evolution. Data quality is good, with typical vertical resolution of $<$ 10 cm and penetration up to 140 ms two-way-time c. 110 m below present lake level (bpll). Bedrock, in the form of a steep dipping, high amplitude, reverberating reflection event forms the seismic basement, though it is not readily visible below 70 ms Two-Way-Time (TWT), c. 55 m bpll. The data implies a complex depositional history, but synoptic inspection yields a relatively simple three stage first-order evolutionary model for the lake. The oldest sequence comprises of concordant, gently basinward dipping units, locally steepening to the bedrock event and onlapping on to it. Bounding surfaces of the units are of medium amplitude and are continuous. Internal reflectors are parallel to unit boundaries. The sequence exists between 30 ms TWT, c. 23 m bpll, at its shallowest near the coast, to c. 110 m bpll, the limits of seismic penetration. Because of the lack of lateral directionality to the implied sediment architecture, it is postulated that this sequence represents a period of relatively quiescent conditions of gradual lake floor differential subsidence and relatively low terrigenous input. The intermediate sequence comprises two episodes of 5 - 10 m thick sediment progradational wedges, building from the coast in a basinward (southerly) direction, with both wedges hav-

ing erosional bounding contacts. The earlier episode displays sigmoidal progradation which is visible up to an upper erosion surface. The second episode rests on this surface and is initially manifest by a basinward and downward shift in onlap (lowstand), gradual aggradation of onlap and finally the construction of the second prograding wedge. It is suggested that these episodes represent the start of evolutionary change in the lake: water level and sediment input variation dominating over tectonic control. These lowstand events and higher sediment input lead to the formation of the prograding wedges, postulated to be delta-type features, bounded by an upper erosion surface. The youngest sequence comprises three units. The first represents a return to the basin fill facies seen earlier, but the second and third are base-bounded by a very high amplitude, very gently basinward dipping, continuous reflection. In both cases, these are overlain by 8-12 m thick units of concordant reflections incised by channel-like depressions which subsequently experience further fill. Previous work on the uppermost strong basal reflector (8 m bpll) suggests it to be a desiccation event (at 15.1-18.7 ka BP). Given the similarity of the seismic facies, it is postulated that the base of the second unit also represent a desiccation episode. In total, five lowstand events are identified in 110 m of lake infill. A 70m core has been acquired subsequent to these data and it is hoped that evidence can be sought to test the hypothetical history outlined herein and to ascertain dates for the lowstand events in the context of climate change both regionally and in the northern hemisphere.