An integrated approach to recognizing lake cycles and their controls: using trace fossils and stratigraphy in lake basins from Kenya and North America. International Paleolimnology Association-International Association of Limnogeology Meeting, Stockholm, Sweden June 18-21, 2018

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The use of trace fossils with sedimentology to intepret the stratigraphic packaging of lake-basin successions helps to provide the physical framework needed to integrate multi-proxy datasets from lacustrine systems. The packages can represent relatively short-term cyclical orbitallyforced successions of lake level rise-and-fall, and sets of stacked packages can represent longerterm changes in basin configuration, drainage capture, or lower-frequency orbital cycles. Examples from the Eocene Green River Formation, Pliocene to Recent Kenya Rift Valley lakes, and the Cretaceous early foreland basin of Canada each demonstrate how trace fossils in shallowlake to terrestrial settings can be used to help package lacustrine successions in order to answer questions about tectonics and climate in lake basins. In examples with high-resolution geochronology, we can recognize climate-control on transgressive-regressive packages, and begin to differentiate climate from basin-scale tectonic influences on lake-type. The distribution and composition of trace fossil assemblages can also help to determine the lake-type basin and its deposits by providing clues to hydrochemical conditions (e.g., oxygenation, salinity). Terrestrial trace fossils, of termites and beetles for example, can also rework sediments metres below exposure surfaces and disrupt paleoecological and geochemical information, even from profundal sediments. The delineation of lake-cycle packaging using a sequence stratigraphic approach that includes trace fossils can thus provide the framework from which we can recognize cyclicity as well as departures from predictable cycles at different scales.