MS Thesis
Department of Environmental Science and Policy
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Title: Biostratigraphic and Stable Isotopic Study of Selected Foraminifera from the Tanzanian Lindi Formation, Southeastern Tanzania (Tanzania Drilling Project Site 34 Drill Core)

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ABSTRACT

This thesis examines samples of foraminiferal specimens from selected depths (~ 8 m to ~ 100 m) within the site 34 drill core of the Tanzanian Drilling Project (TDP), including 3D imaging. The foraminifera from the Lindi Formation of the Kilwa Group are among the best preserved fossil foraminifera in the geological record. The site 34 drill core includes part of the Upper Cretaceous Kilwa Group, specifically strata from lower Turonian including the Lindi Formation. This study includes biostratigraphic analysis of two planktic foraminiferal species, Helvetoglobotruncana helvetica and Helvetoglobotruncana praehelvetica. In addition, this study includes biostratigraphic analysis of percent biserial to total planktic analysis and planktic/benthic ratio counts. The associated geochemical part of this study, δ13C and δ18O isotopic analyses, focuses on two selected planktic species (Dicarinella hagni and Helvetoglobotruncana praehelvetica) and four benthic taxa (Berthelina berthelini, Epistomina sp., Lenticulina sp., and Lingulogavelinella convexa). Analysis of percent biserial forms shows that the percent ranges from zero to about 25 percent for the selected depths studied. The ratio of Hv. helvetica to Hv. praehelvetica in samples from the site 34 drill core indicates that the base of the Hv. helvetica Biozone occurs at 62.87 m depth, which is lower than previously known. The planktic/benthic ratio varies widely from sample to sample. The simplest explanation for the observed wide variations in compositional counts of biserials and planktic/benthic ratios is that there is a noteworthy contribution of shallow water foraminifera

from gravity-emplaced sedimentary units in an overall deep-water setting. Isotopic analysis of the six selected species shows that all samples studied have similar δ13C and δ18O ratios, except the specimens from the sample at depth 66.18 m. At that depth, all specimens show noteworthy negative shifts in both δ13C and δ18O values. This depth coincides with a minor negative shift in bulk sample δ13C and δ18O as reported previously.