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Geologic Setting of the Abdur Archaeological Site, Southern Red Sea Coast, Eritrea, Africa

Stone tools discovered within uplifted marine terraces along the southern Red Sea coast of Eritrea, near the small village of Abdur, are dated to 125+/- ka. These tools represent the earliest well-dated evidence for human occupation of coastal marine environments (Walter, et al., 2000). The Abdur Archaeological Site lies along the northern extension of the Danakil Depression in an active rift graben system that extends from Bada northwest to the Gulf of Zula (Zula-Alid-Bada graben). The Site is located on the Buri Peninsula along the eastern shoreline of the Gulf of Zula and covers an area approximately 6.5 km by 1 km. Three main stratigraphic units are defined:

1. The **Buri Sequence** is a series of estuarine and fluvial-deltaic sediments consisting of limestones, mudstones, sandstones and conglomerates with ash and pumice beds. It is exposed only in Abdur North. Ar-Ar dating of pumice and tephras put the time of deposition of this unit from about 0.90-0.72my. These layers were faulted, folded and eroded prior to the deposition of the overlying Abdur Reef Limestone (ARL). Sedimentary deposits that we tentatively correlate with the Buri Sequence also occur north of the Abdur area on the Buri Peninsula, while rocks of similar age and origin occur further south along the base of the Eritrean escarpment, south of Alid volcano, where a hominid skull and numerous tools were discovered by an Italian research team.

2. The **Abdur Volcanic Complex** is a small basaltic shield complex that forms the highlands along the eastern part of the Abdur study area. Basaltic lavas from this center overlie the Buri Sequence and, in turn, are overlain and onlapped by the ARL. Basalt samples collected from the area, however, were dated from 0.16-2.14Ma, indicating that the Complex has been tectonically and magmatically active prior to, during and after deposition of the Buri Sequence.

3. The **Abdur Reef Limestone** (ARL) is the remnant of a shallow marine reef system deposited approximately 125,000 years ago (last glacial highstand, isotope stage 5e) along the margins of the Abdur volcanic highlands (Bruggemann, et al., 2004). The ARL consists of a basal transgressive lag deposit overlain by an extensive build-up of mollusks, echinoderms, bioclastic sands and corals up to 11m thick. It can be subdivided into 3 subunits related to different stages of the stage 5e sea level highstand.

At Abdur North the ARL is uplifted and tilted 1-2 degrees in a seaward direction. The top of the terrace is now about 10m above sea level along the coast and rises to about 20m further inland. To the south the top of the terrace rises from near sea level at the coast to an average of 15m near the contact with the volcanics. The area is cut by numerous faults, mainly NNW-trending, that is part of the fault system forming the northeastern edge of the Zula-Alid-Bada graben system. At Abdur Central and South, the ARL overlies hard grounds capping older reef sequences of unknown age, but which likely represent previous sea level highstands. Equivalent reefs covered large parts of the adjacent Buri Peninsula and Dahlak Archipelago to the north.

Biography: Dr. Richard T. Buffler received his B.S. in Geology from the University of Texas at Austin in 1959 and his Ph.D. in Geology from U.C. Berkeley in 1967. After short stints with Shell Oil Co. and the University of Alaska, he joined the University of Texas Institute for Geophysics and Department of Geological Sciences, where he began his career as a marine geologist/geophysicist and his long-term studies of the geologic history of the Gulf of Mexico basin. Recently, he returned to his land roots with field projects in Eritrea, Africa, Eastern Java, and New Mexico/Arizona. Buffler retired from the University of Texas in early 2003 after 28 years of service. He currently lives in Berkeley, where he continues to pursue his geologic studies.