

Identification of the Reunion II Event at the Ounda Gona section, Gona Paleoanthropological site, Afar Depression, Ethiopia.

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Paleomagnetic investigation has been carried out on fluvio-lacustrine sediments in the Gona paleoanthropological site for stratigraphic purposes. The sediments of the studied region are known to be rich in fossil fauna and archeological stone tools, which are well exposed at different locations. Three major formations; known as the Busidima, Hadar, and Sagantole, outcrop in the study area. The current study was made at the Ounda Gona section with in the Plio-Pleistocene Busidima formation.

Up to four standard cylindrical core samples were collected from 11 lithostratigraphic units, each a paleomagnetic site, at two separate but stratigraphically continuous sections totaling a thickness of 35 meters. Stepwise (24 steps) thermal demagnetization up to 680°C was performed for each specimen in order to isolate the Characteristic Remanent Magnetization (ChRM). The average Natural Remanent Magnetization Intensity (NRM) has been found to be strong (mean= 0.13 A/m) with good magnetic remanence behavior upon demagnetization. One or two components of magnetization were identified having small to significant overlap of unblocking temperatures. The ChRM is represented by the second component and often isolated after heating to temperatures of above 300°C. An estimation of the magnetic mineralogy from the magnetization decay curve indicates titanomagnetite, detrital magnetite and hematite are the possible major minerals that contributed to the magnetization. An overall mean direction ($D_s = 357.2^\circ$, $I_s = 6.1^\circ$, $\alpha_{95} = 4.9^\circ$, $N = 11$) computed for all the sites is statistically identical, if shallow inclination can be attributed to the effect of compaction and diagenesis, to the mean dipole geomagnetic field expected ($D = 1.0^\circ$, $I = 20.4^\circ$, $\alpha_{95} = 2.3^\circ$, $N = 26$) at this position (Besse & Courtillot, 2003). The following sequences of magneto-zones were identified in the two sections: bottom section, reversed (bottom 12.8 meters), normal (next 0.4 meters), and reversed (next 2.3 meters); top section, normal (bottom 0.4 meters), reversed (top 14.8 meters). Available radio-isotopic age determinations made by using $^{40}\text{Ar}/^{39}\text{Ar}$ technique on an intervening ash layer (Gonash-21), in the bottom normal polarity interval, resulted an age of 2.17+/-0.09 Ma. Using this age information and the geomagnetic polarity time scale (GPTS) of Cande and Kent (1995) one could identify the bottom N1 event as the Reunion II event while N2 could represent the Olduvai event. This result would imply that the oldest age limit for the OGN-3 (hominid fossil) discovered in the siltstone (reversed polarity) just overlying the dated normal polarity ash layer would be younger than 2.14 Ma.