Geophysical Research Abstracts, Vol. 8, 10517, 2006
SRef-ID: 1607-7962/gra/EGU06-A-10517


# Paleomagnetic results of the tilted sediments, Meteor crater, Arizona

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The ∼49 kyr Meteor Crater, Arizona, is the classical example of a simple bowl-shaped impact structure (D ∼1.2 km, apparent depth 0.2 km); its projectile is probably the Canyon Diablo asteroid/meteorite. The target rocks (from bottom to top are the Coconino, Toroweap and the Kaibab formations (all Permian), and the Triassic Moenkopi formation, respectively. The crater formation has produced variously tilted rock strata so that in the present day walls of the crater, the strata are nearly horizontal at the bottom but show an increasing tilt angle upwards. Since the crater has exposed walls of sediment strata which show directions of tilting varying nearly 360 degrees and with a large variation of tilt angles, the crater is a unique site to carry out two paleomagnetic field tests: First, the tilt test in order to verify that the remanences of the tilted sediments are stable and carry their Permian (Kaibab) or Triassic (Moenkoepi) pre-impact directions. Second, the impact test as proposed by Pesonen (2001). This one includes sampling of rocks from the more shocked bottom up to the less shocked material at the crater rim in order to detect the decrease in the shock-induced remanence component in the rocks with increasing distance from the origin of the shock wave (i.e., ground zero). Here we report preliminary paleomagnetic and rock magnetic results of a pilot study where the tilt-test has been applied. Ten oriented hand samples were collected along a vertical profile from the Kaibab strata (middle part) to the Moenkoepi limestone (upper part). In this profile the amount of the impact produced tilt of the rocks varies from 0 to ca. 140 degrees (overturned strata). The paleomagnetic directions are widely scattered but become generally more coherent and closer to the Permian/Triassic directions when restored into their pre-impact position. However,

the remanence directions of the overturned samples depart considerably from those of less tilted directions. This could be due to the fact that the respective tilting is more complex in nature.