

**A POSSIBLE HOLOCENE IMPACT STRUCTURE IN THE AL 'AMARAH MARSHES, NEAR THE TIGRIS-EUPHRATES CONFLUENCE, SOUTHERN IRAQ.** S. Master. Impact Cratering Research Group, Dept. Geology, Univ. Witwatersrand, P. Bag 3, WITS 2050, Johannesburg, South Africa, 065sha@cosmos.wits.ac.za.

A ~3.4 km-diameter near-circular, slightly polygonal, structure is found in the Al 'Amarah marshes, at 47°4'44.4"E, 31°8'58.2"N, ~17 km NW of the Tigris-Euphrates confluence, in southern Iraq (Figure 1). Prior to the militarily-inspired draining of the marshes in 1993 [1], the structure was filled with a lake enclosed by an elevated rim, surrounded by a ~500 m-wide dark annulus. After the partial draining of the marshes, the lake has shrunk, and it now appears as a light coloured spot, due to salt encrustations following evaporation of the surface waters.

**Geological setting:** The alluvial plains of Iraq occupy a structural trough related to active orogenic processes in the Zagros mountains [2]. Near the Tigris-Euphrates confluence, marine sediments of the Miocene-Pleistocene Dibdibba Fm [2] and Holocene Hammar Fm [3] are overlain by Recent delta plain and delta front deposits of the Mesopotamian Plains, in which there are numerous marshes and permanent lakes [2]. The Recent sediments of the Tigris-Euphrates plains were deposited in the last 5000 years, during which 130-150 km of seaward progradation has taken place [2].

**Formation of the Al Amarah structure:** The strikingly circular shape of the Al 'Amarah structure, contrasts markedly with the highly irregular shapes of the other marsh lakes in the region. Because of the extremely young nature of the sediments in the marshlands, an origin of the structure by karst solution, salt doming, tectonic deformation or igneous intrusion can be ruled out. The structure predates the Iraq-Iran and Gulf wars of the 1980's to 1991, since it is present on satellite imagery from 1984. It is postulated that the structure was formed by a Recent bolide impact in the marshlands of southern Iraq, thus accounting for its geometry, and the apparent rim and annulus visible in pre-1993 imagery.

**Quasi-historical reference?:** The formation of such a young impact structure may have had a catastrophic effect on the people living in the region, and there is a possible quasi-historical reference to such an event in the account of the Deluge from the Epic of Gilgamesh, dating from ~2000 BC: "...and the seven judges of hell, the Annunaki, raised their torches, lighting the land with their livid flame. A stupor of despair went up to heaven when the god of the storm turned daylight into darkness, when he smashed the land like a cup. One whole day the tempest raged, gathering fury as it went, it poured over the people like the tides of battle" [4]. Could this be a reference to a bolide impact which triggered a tsunami?

**References:** [1] North, A. (1993). *The Middle East*, London, No. 227, Oct. 1993, 22-23. [2] Larsen, C. E. and Evans, G. (1978). In: Brice, W. C. (Ed.), *The Environmental History of the Near and Middle*

*East Since the Last Ice Age*. Academic Press, London, 227-244. [3] Hudson, R. G. S. et al. (1957). *Geol. Mag.*, 94, 395-398. [4] Sandars, N. K. (1960). *The Epic of Gilgamesh*. Penguin Books, Harmondsworth, 128 pp.

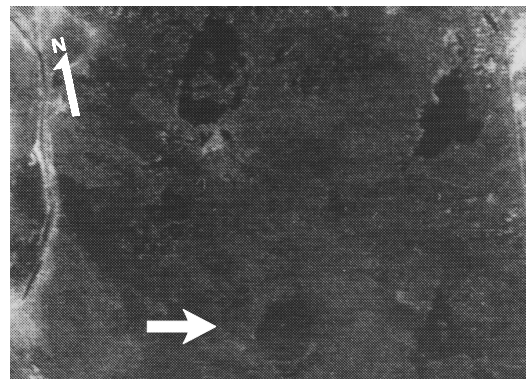


Figure 1: Close-up of Landsat image 166-38, showing the Al 'Amarah Structure (arrow) in relation to other marsh lakes of southern Iraq.