THE RING STRUCTURE OF WEMBO-NYAMA (EASTERN KASAI, R.D. CONGO): A POSSIBLE IMPACT CRATER IN CENTRAL AFRICA. G. Monegato[1] , M. Massironi[1] , and E. Martellato[2], [1]University of Padova, Geoscience Department, Via Giotto, 1-35127 Padova, Italy (e-mail: giovanni.monegato@unipd.it) [2]CISAS, Università di Padova, via Venezia, 15-35100, Padova, Italy.

Introduction: The crater record of the Earth is still incomplete since the known impact structures are far behind the total presumably preserved on the land. We present a new ring structure found in Central Africa that has not been documented yet in updated world and African databases [1, 2, 3, 4]. The size of the structure, as well as topographic and geologic considerations suggest that this could be one of the larger impact crater discovered in the last decade and one of the largest ever [1].

Description of the structure: The ring structure is located in the Eastern Kasai province (R.D. Congo) and is centered at 3°37'50''S, 24°31'00''E (Fig. 1), 37 km north of Wembo-Nyama. It is recognizable from satellite images for the perfect roundness of the ring underlined by the Unia River, a tributary river of the Lomami River. If the external rim of the thalweg is taken into account, the annulus has a total diameter of 36 km,. The central part of the structure is irregular and about 550 m in elevation a.s.l., 50-60 m higher than the depression where the river flows. Externally the landscape has an elevation of about 560 m a.s.l., forming a continuous ridge towards the south-west and irregular towards the north as evidenced by ASTER-DEM topography model (Fig. 2).

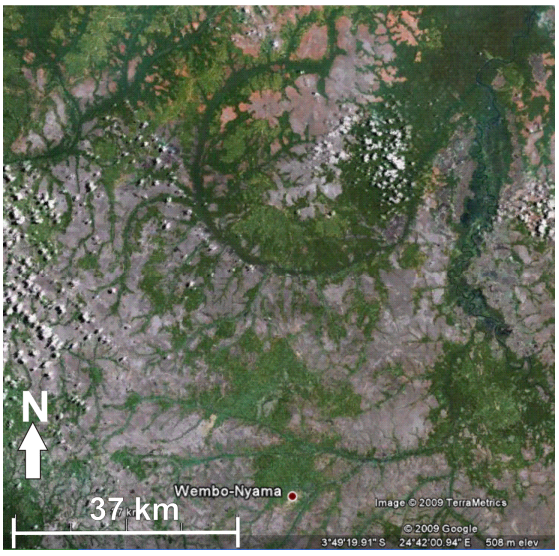

Fig. 1*: GoogleEarth image of the Ring of Wembo-Nyamba, the town (red spot) is located 37 south of the ring.*

Observation: Drainage pattern along the structure is made by the circle shape of the main river whose thalweg is 1,2 km wide and makes a continuous arc for about 300 degrees. Radial tributaries irregularly depart from the centre of the ring, while centripetal tributaries flow from the outer rims, this characteristic is better developed in the south-western part of the structure. The configuration of the drainage pattern is very similar to those of large impact craters in humid environments [4].

The stratigraphy of the area, where the structure occurs, consists of a Precambrian Basement covered by the Karoo Supergroup [5] of late Palaeozoic – Triassic age (~800 m thick), in turn overlaid by a Jurassic-Cretaceous sedimentary succession [6]. The whole succession is characterized by continental deposits (sandstones to clay, tillite and conglomerates) and is buried by Plio-Pleistocene fluvial and colluvial deposits.

The topography indicates a diameter of the structure from 36 to 46 km, but the outer ridge is not well developed, likely deeply weathered and eroded by the low-latitude climate.

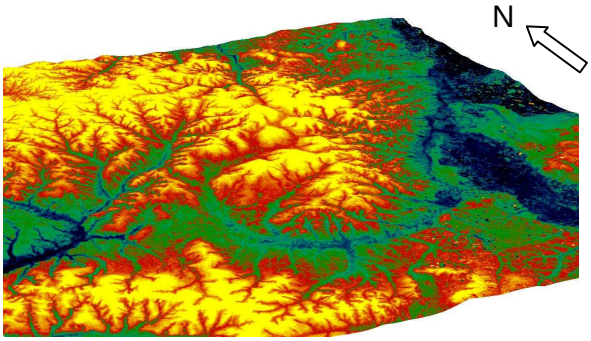

Fig. 2*: ASTER-DEM perspective view of the Wembo-Nyamba structure. Vertical exaggeration: 50.*

Discussion and Conclusion: The geology of Wembo-Nyama area suggest that non-impact origin for the ring can be rouled out. In detail, the stratigraphy of the succession, mostly made by continental sediments over Precambrian basement, no matches for a salt-diapir origin of the ring, considering also the large diameter. Kimberlitic pipes are present in the south-west (i.e., Mbuyi-Mayi Mine [7]), nevertheless the diameter is once again too large for such a structure which, nor-

mally reachs 2 km. Post-Cretaceous volcanism is located far eastwards along the rift valley [7], for this reason caldera structure can be excluded. As well, Batolith is unlikey because it is not reported in geologic maps [7] and reconstruction of pre-Cretaceous volcanism [8]. For all these reasons we infer that the impact origin may be the more valuable solution.

If this is an impact crater its wide diameter pinpoints to a major impact event happened during Cretaceous-Cenozoic time span. Considering the minimum diameter of 36 km the crater should be a real peak-ring basin and the relative diameter of the impactor should have been of about 2 km. According to Melosh (1989) [9] most of the ejecta should be limited to a blanket extending up to 5 crater-radius away from the basin. Hence in our case a blanket of 90 Km from the rim is expected, however for basin as large as the Wembo-Nyama structure distal ejecta can be found even at greater distance as proved by the case of the Manson structure (Iowa) (diameter: 36 km) whose distal ejecta were found up to 250 km away from the basin [10].

The depth and slope of the crater will be estimated by Hydrocode models, however this hypothesis should be supported by field studies, geophysical analysis and drillings to find unumbigous proves of an impact event, evaluate the thickness and distribution of impact melts and breccias, and detect horizons of ejecta in the stratigraphic succession in order to constrain the age of the impact.

References:

[1] Spray, J. (PASSC director): Earth Impact Database (EID), website: http://www.unb.ca/passc/ImpactDatabase/index.html [2] Hamilton, C.J.: Terrestrial Impact Craters (website): http://www.solarviews.com/eng/tercrate.htm [3] Rajmon D. and Shaulis B. (2007) XXXVIII LPSC [4] Master S. and Reimold W. U. (2001) Catastrophic Events Conference [5] Mihályi, K. et al. (2008) XXXIX LPSC [6] Catuneanu, O. et al. (2005) *J. Afr. Earth Sci.* 43, 211-253 [7] Milesi, J.P. et al. (2006) *J. Afr. Earth Sci.* 44, 571-595 [8] Ngako V. et al. *J. Afr. Earth Sci.* 45, 241–256.[9] Melosh (1989) *Impact Cratering: a geological prcess. Oxford Univ*, 245 pp. [10] Inzett et al. (1993), *Science*, 262, 729-732.