

SIRENTE: A POSSIBLE SMALL IMPACT CRATER IN ITALY. J. Ormö¹, A. P. Rossi¹ and G. Komatsu¹,
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Introduction: The Sirente structure (UTM 33T0384094 4670350) is located in the Prato del Sirente karstic plain, Abruzzo, on an altitude of about 1100 m. Our study of the structure has revealed a morphology inconsistent with a karst formation. The structure contains a lake encircled by a prominent ridge. The slope of the inner side of the ridge and the flat floor of the shallow lake generates a bowl shaped morphology. The ridge is about 10 m wide and rises prominently 3 m above the flat plain. The rim-to-rim diameter of the structure is about 100 m. The structure is subcircular droplet shaped with the apex towards the WNW. The ridge is in this part only half a meter high. The ridge rises rapidly towards the ESE and is highest and most volumous on the northern and southern sides of the lake. The ESE part is lower, maximum height is about 1.5 m, but forms a low and wide bulge sloping with a low angle towards the plain. The plain and the ridge are covered by an up to 20 cm thick humus layer. The structure is formed entirely in coarse clastic valley fill. Limestone boulders are outcropping on the rim.

Discussion: We see only three possible causes of formation for the Sirente structure; (i) an impact of a small cosmic body, (ii) a periglacial pingo, or (iii) the result of human activities, present or ancient. Pingo can likely be excluded due to inconsistency between the necessary high age (>10 Ky) and the apparent minor erosion of the structure. It is also the only structure of its kind in the area. The volume of the ridge requires extensive manpower or machinery for its construction. Neither the Sirente park authorities, nor the local community know of any use of machines at the lake for this purpose. Human activity is indicated by the presence of low stone rows on the surrounding plain, as well as a circle of 1.5 m boulders on a small hill 200 m from the structure. The low stone rows are property borders indicated on the local land register map [1], which shows the lake resided in the historical property outline established over centuries. In the map the lake is mentioned as a natural lake "lago naturale", which tells against the lake as created by human activity in recent historical time.

At present the morphology of the structure is the strongest evidence for the impact hypothesis. The ridge may represent a rim wall formed by excavation of the loose plain material. The size of the structure is in the lower range of explosion craters formed by hypervelocity impacts. Impacts of this size occur on Earth about once per a couple of hundred years [2]. Craters of the size of Sirente are known from many locations on Earth. In Europe the most well known example is

the Kaali crater field in Estonia [3].

The slightly asymmetric rim wall connected to the droplet shape of the Sirente structure is in accordance with the morphology of craters from oblique impacts. If the structure is an impact crater it is very well preserved, which makes it likely not older than a few thousands of years. Our ongoing research activities include magnetic separation of soil to find traces of an impactor, a detailed levelling of the morphology, as well as a sediment coring of the infill, which hopefully will give the age of formation, and thus, assist in understanding the origin of the structure.

References: [1] Land Register Map (Catasto map), Comune di Secinaro (1977), sheet 1 (1:5000) and sheet 2 (1:2000).

[2] Chapman C.R. & Morrison D. (1994) *Nature*, 367, 33-39.

[3] Czegka, W. & Tiirmaa, R. (1998) *Meteoritics & Planet. Sci.*, 33, A37.