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Water and cosmology in the prehistoric Maltese world: Fault control on the hydrogeology of Ġgantija, Gozo (Maltese Islands)

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ABSTRACT

The dry limestone geology of the Maltese islands presented a challenging environment to prehistoric communities, who required reliable water sources to support agricultural subsistence. Ġgantija, one of the iconic Maltese Late Neolithic Temples on Gozo, and now a World Heritage Site, was surveyed using Ground Penetrating Radar to reveal a significant line of geological faulting running beneath the megalithic structure. The seepage of water from this fault had major implications for the siting of the monument. This seems to reflect a pattern of situating many of these key sites adjacent to ancient sources of water, as is shown by the close association of two thirds of these sites with toponym evidence for the presence of springs in the medieval period. It is possible that the prehistoric Maltese embraced this natural resource as part of the cosmology of their ritual sites.

1. Introduction: water sources and prehistoric temples in the Maltese Islands

The so-called Temples of the Maltese Islands (~3600 BCE to ~2500 BCE) have been objects of antiquarian and more latterly archaeological curiosity for more than two centuries (reviewed in Bonello, 1996; Grima, 2004b; Malone et al., 2009; Vella, 2013). The Temples are remarkable for the size and weight of the blocks (some weigh up to 50 tonnes and are over 6 m in height), the complexity of the structures and the technical skill that would have been needed to transport, design and erect these features (Clark, 2004). The makers of the temples were knowledgeable about stone quality, in that they used the harder Coralline Limestone for the outer structure and the softer, easily-carved Globigerina Limestone for the interior, more decorative features, (geological terminology follows Pedley et al., 1976, 2002) and produced a plaster-like substance derived from pounded stone, mixed with water, and used to render the floors and walls of the temples (Evans, 1971).

These massive megalithic structures are some of the oldest human-made upstanding structures known, with only tumuli and passage graves of France (e.g. Barnenez and Bougon at 4700 BCE) known to be older, and are generally still claimed to be the oldest free-standing monuments in Europe (e.g. Malone et al., 2009; Vella, 2013). They were produced by what, by many accounts (Evans, 1971; Malone et al., 2009), were relatively isolated Late Neolithic communities on a group of small, semi-arid, resource-poor islands. Although some recent scholars have emphasized the connectivity of the islands with the outside world (e.g. Robb, 2001), there was always a level of risk in reaching the islands. Several hypotheses have been put forward to account for the construction of the Temples (Evans, 1959; Stoddart et al., 1993). This paper describes evidence that appears to link a significant proportion of the Late Neolithic Maltese Temples -and particularly the important complex on the Xagħra Plateau on Gozo - to water resources, suggesting that control of access to scarce resources, including water, may have been one of the drivers that led to the foundation of the temples.

The present research was informed by earlier GIS-based work on the different factors in the landscape that may be influencing the location of the "temples" (Grima, 2004a, 2005). One of the factors considered was the presence of fresh-water springs. Medieval and early modern toponyms referring to an "Għajn" (Maltese for fresh-water spring) were taken as a proxy indicator of the presence and distribution of springs in the prehistoric landscape. When the horizontal distance and the cost-distance from the location of such toponyms and the location of "temples" were subjected to a Kolmogorov-Smirnov test, "temples"

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Fig. 1. a. View of the megalithic structures at Ġgantija, from north-east to south-west (location of view on Fig. 4), with the entrance projecting from the main structures to the left of the image.
b. View from inside the structure at Ġgantija, from north-west to south-east (location and direction of view shown on Fig. 4).

were found to be distinctly concentrated in areas nearer to fresh-water springs. This pattern was even more marked for cost-distance than for horizontal distance (Grima, 2005).

2. The geology of the Maltese Islands

2.1. Tectonics and structural geology

The Maltese Islands are a group of small, low-lying islands in the central Mediterranean. The combined area of the archipelago is 316 km^2, with a highest point of 253 m at Ta' Dmejrek, on the main island of Malta. The second island of Gozo (Fig. 1) has an area of 67 km^2 and a highest point 187 m at Ta' Dbieġi. The archipelago is oriented SE – NW. The islands lie on a submarine shelf that extends from Libya to the southwest to Sicily to the north-east (the Malta-Ragusa Rise: Schembri, 1997; Schembri and Lanfranco, 1993; Pedley et al., 1976, 2002). This shelf is intersected by two main types of fault systems, where the dominant is normal, arranged often as NW – SE graben, and strike-slip structures in a variety of orientations. Gardiner et al. (1995), show the Malta-Ragusa Rise as intersected to the south-west of the islands by the NW – SE oriented Malta Graben (see Gardiner et al., 1995). This graben is separate from, but in the same orientation and possibly associated with the Pantelleria Graben to the north-west. North-west of Gozo, the Malta Shelf (the north-eastern portion of the Malta-Ragusa Rise) is split by the NE – SW oriented North Gozo Graben, forming the south-eastern margin of the Gela Basin, south of Sicily. Malta itself is dominated by northeast – southwest oriented normal faults, arranged as horst and graben structures (the classic example being the Great Fault, or Victoria Lines, along the Binġemma Valley, Malta), dominant in the north of the island. Gozo by contrast has no evidence of such strong structural control, albeit that a strike-slip fault (the Scicli, Ragusa, Irmino Line) is conjectured by Gardiner et al. (1995) and Yellin-Dror et al. (1997) to run south-west to north-east to the north of Gozo. Thus our work (below), that invokes a structural geological influence on water sources on Gozo, is somewhat surprising.

2.2. Stratigraphy

The stratigraphic geology of the Maltese Islands is relatively simple, comprising the following succession (oldest at the base) Table 1.

Unlike Malta, where the stratigraphy is juxtaposed by normal faults, arranged as graben and half-graben, Gozo is structurally less complex,