



Optically stimulated luminescence (OSL) dating and spatial analysis of geometric lines in the Northern Arabian Desert



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ARTICLE INFO

Article history:

Received 18 June 2015

Received in revised form

9 September 2015

Accepted 18 September 2015

Available online 21 September 2015

Keywords:

Stone structures

Neolithic

Jordan

Wheels

OSL

Quartz

Pattern analysis

ABSTRACT

In this paper we generate chronological constraints through optically stimulated luminescence (OSL) dating on extensive prehistoric stone structures that stretch out in the Arabian Desert and appear as geometric lines, known as the “Works of the Old Men”. Two major types of the “Works” that are common throughout the Arabian Desert are the “wheels” and the more intensively investigated “desert kites”. Here, OSL dating was applied to “wheels” in the Wadi Wisad area, in the eastern badia of Jordan. OSL dating generated ages that fall into the Late Neolithic to Chalcolithic and Early Bronze Age periods. This chronological spectrum is consistent with the well-documented prehistoric activities at the archaeological site of Wisad Pools, also located in the Wadi Wisad area. Spatial analyses of the “Works” in Wadi Wisad and in the Azraq Oasis revealed that: 1) the wheels are organized in clusters, 2) the spatial distribution of the wheels is predetermined by the kites, 3) the kites were most probably created earlier than the wheels in the study areas and 4) a cluster of wheels nearby the Azraq Oasis tentatively demonstrates ranking and, perhaps, tendency for alignment, although this is not the case for the other wheel-clusters studied. Despite the progress toward understanding the chronological and spatial aspects of the wheels, a great deal of research remains to resolve the actual nature of these enigmatic stone structures.

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1. Introduction

Soon after the Arab Revolt (1916) pilots of the Royal Air Force witnessed, during their regular flights between Cairo and Baghdad, extensive geometric lines running across the Black Desert of Jordan (Maitland, 1927). These features, collectively named by the Bedouin tribes as the “Works of the Old Men” (Maitland, 1927; Rees, 1929), are not restricted to the northern Arabian Desert but occur throughout the entire Arabia region, from Syria across Jordan and Saudi Arabia to Yemen, as aerial and satellite imagery proved later (Kennedy and Bewley, 2009; Kennedy, 2011 and references therein).

They are more likely to be seen on the great basaltic plateaus of Arabia (*harrā* in Arabic) than in claypans (*qa'a*), and with higher incidence in the Harrat ash Sham region, i.e. the great lava field stretching from southern Syria to NW Saudi Arabia. The most startling thing about the “Works” is that they are difficult to identify from the ground. This stands in contrast to their apparent visibility from the air. In addition, they demonstrate specific geometric patterns (Fig. 2) and extend from a few tens of meters up to several kilometers, evoking parallels to the well-known system of geometric lines of Nazca, Peru.

The “Works” are entirely made out of the basaltic rock of the harrats (plural of *harrā*), the standing remains of which are today seen as stacks of 2 or 3 slabs. They are classified in four main categories based on their shape as seen from above (Kennedy, 2011; Kennedy et al., 2014) and correspond to “kites”, “meandering walls”, “wheels” and “pendants”. Kites are extensive (i.e. several

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Fig. 1. Snapshot of the Middle East, including the study areas. (Base map from ArcGIS. Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User community).

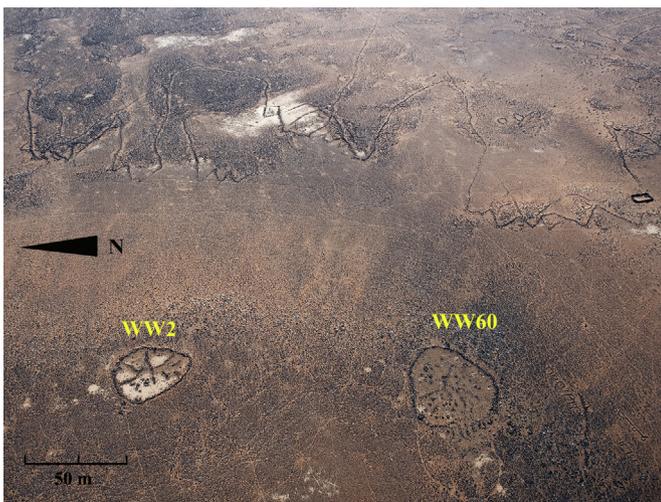


Fig. 2. The “Works of the Old Men” at Wadi Wisad: the studied wheels and a meandering wall to the east. (Aerial photograph by D. Kennedy).

hundred-meters up to kilometers long) stone structures (Fig. 3) named after their resemblance to the kites used for recreation. Several possible functions for the kites have been suggested, from cultic to herding, with the latter seeming as the most likely (cf. Zeder et al., 2013). Kites would funnel large fauna and trap it into an enclosure for slaughtering (Zeder et al., 2013). Little is known about the use of meandering walls. However, they frequently appear as part of the kite system, probably used for “stock herding and control” (Kennedy, 2012). The wheels constitute circular stone arrangements with spokes radiating out of an approximate center. Their function is the subject of debate: although initially proposed to be a type of prehistoric settlement (Kempe and al-Malabeh, 2010, 2013), examination of variants on the basic style challenge that speculation in favor of funerary or ritual use (Kennedy, 2011), as suggested by sepulchral cairns that are enclosed by or encompass the wheels. Pendants (arrays of cairns) frequently intermingle among the other types of the “Works”.

Evidence for chronometric dating is rarely unambiguous with the “Works”. The established concept that the oldest kites date back to the 7th millennium BCE is the product of association with artifacts of familiar typology, or through correlation with adjacent structures where ^{14}C dating on archaeological remains was feasible (cf. Betts, 1999; Helms and Betts, 1987; Kennedy, 2011). Recently,

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