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Architectural energetics for tumuli construction: The case of the medieval Chungul Kurgan on the Eurasian steppe

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ABSTRACT

The present work introduces the first architectural energetics analysis of a medieval tumulus from the Eurasian/Pontic steppe. In contrast to New World earthworks, tumuli on the steppe were constructed 1) with sod taken from the environment immediately surrounding the construction site, 2) with the use of draft animals and metal tools, and 3) in identifiable phases as part of funerary rituals over a period of weeks or months. These variables introduce problems which are confronted through 1) the application of novel historically attested rates for construction and 2) the creation of new, replicable mathematical methods for modeling materials transport.

1. Introduction: energetics on the Eurasian steppe

Earthen mounds and earthworks constructions are encountered all over the world (Renfrew, 1973; Ortmann and Kidder, 2013). But the Chungul Kurgan (CK) is one of the few tumuli – from any period – which has been excavated stratigraphically on the western Eurasian steppe (Fig. 1, Sec. 1.2, Otroshschenko and Rassamakin, 1986; Boltryk, 2011; Mozoloevskyj and Polin, 2005; for examples of funerary tumuli further east in the Eurasian steppe, see Parzinger, 2003). The high quality of documentation from its excavation made possible not only a qualitative assessment of grave goods and ritual accompanying the burial of a Ḳipčaḳ 'prince' in this tumulus c. 1200 CE; but also a quantitative or *energetic* assessment of how materiel and labor were organized by that ritual for a specific form of medieval commemorative architecture in a particular environmental, social, and historical context (Sec. 1, Woodfin et al., 2010; Holod and Rassamakin, 2013, Holod and Halenko, 2015; Woodfin, 2016; Halenko et al., 2016).

1.1. Background: architectural energetics at the Chungul Kurgan (CK)

Architectural energetics is a method pioneered by New World archaeologists in the 1960s, who were interested in using architecture to better understand cultural hierarchies and settlement-ranking through assessments of labor investments in architecture (Erasmus, 1965; Aaberg, 1975). Energetics was updated by the Mayanist Elliott Abrams, who suggested that cost quantities in architecture could be the foundations on which comparative assessments of power or status within and among societies are based (Abrams, 1989). Abrams's work has inspired studies of architectural energetics for historical masonry and earth-works constructions all over the world (Kolb, 1991; Shelach et al., 2011; Sherwood and Kidder, 2011; Ortmann and Kidder, 2013; Kim, 2013). More familiar to Mediterraneanists is Janet Delaine, who took a slightly

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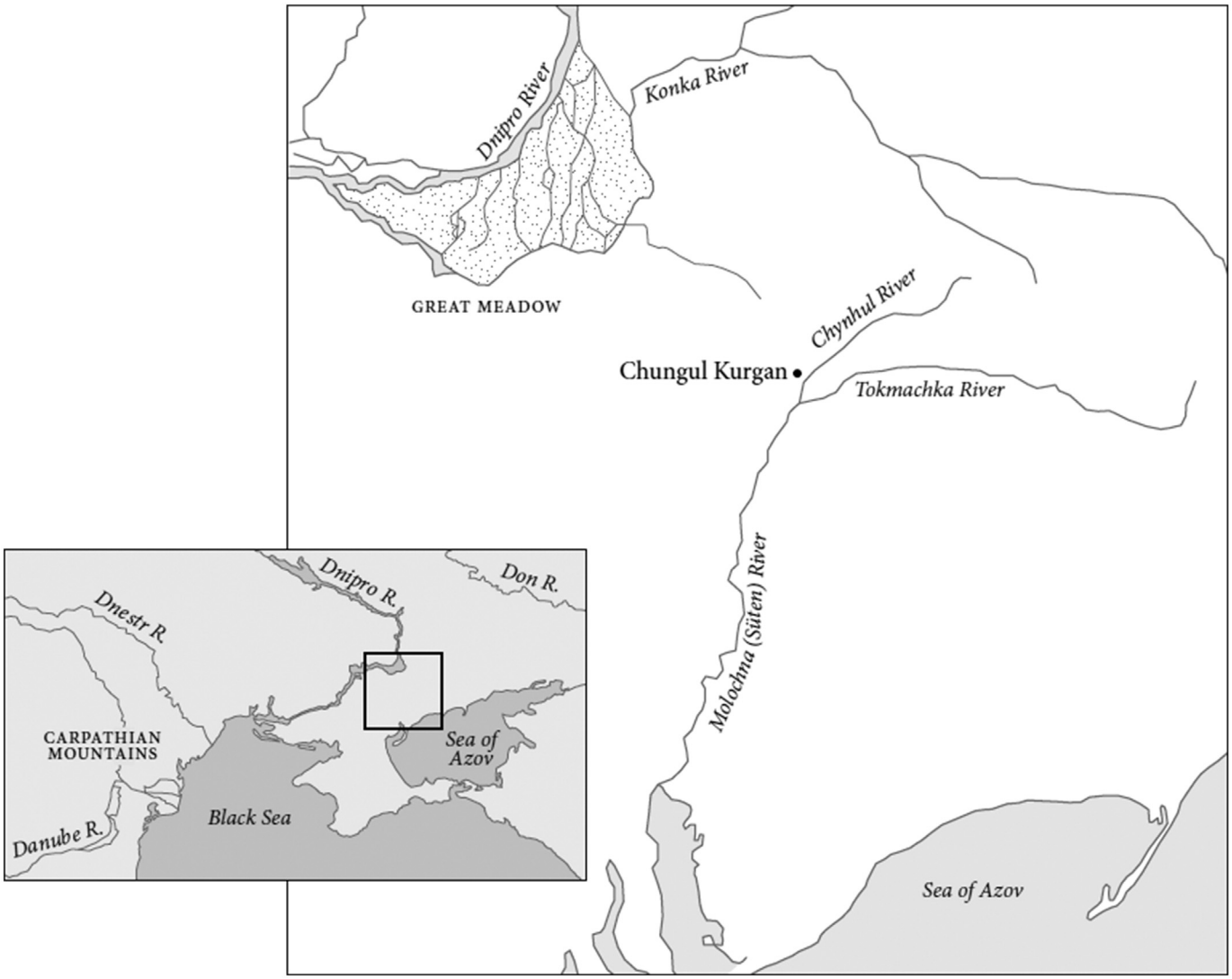

Fig. 1. Map of the Black Sea region, with enlarged detail showing Dnipro and Azov watersheds.

different approach: she adduced pre-industrial builders' handbooks that detailed labor rates for various activities, in order to understand the deep ties between design and construction processes in the Roman world (DeLaine, 1997; Pegoretti and Cantalupi, 1863). Earthworks construction on the Eurasian steppe occurred under very different circumstances of environment, labor organization, religion and culture. Still, by combining elements of the New and Old World approaches to energetics, Eurasian mound construction can be modeled using a different set of environmental constraints and cultural conditions for labor.

These constraints and conditions necessitated reference to novel historical sources for labor rates (see Sec. 1.3/Table 3) and the creation of new, replicable mathematical methods for modeling materials transport – applicable to mounds and earthworks from other cultures, periods, and regions – which are explained in this article (see Sec. 2).

1.2. Background: excavation of the Chungul Kurgan near Tokmak, Ukraine (CK)

The CK was a tumulus containing the burial of a Turkic (Ḳipčaḳ/Polovtsian/Cuman) prince or chief near Tokmak in the Molochna river valley of southern Ukraine, which was subject to rescue excavations before the construction of large-scale irrigation works in 1981 (Otroshchenko and Rassamakin, 1986; Otroshchenko, 1983) (Fig. 2). Such tumuli or *kurgans* are common features not only of Ukraine but of the entire Eurasian steppe, extending between the Hungarian plains to the Caucasus and Mongolia (Rolle et al., 1991; Reeder and Jacobson, 1999; Aruz et al., 2006; Chochorowski, 2004). Many tumuli were looted during the nineteenth century; few have been scientifically excavated. At CK in 1981, the mound stood some 5.8m in height with a maximum diameter of 68m: this entire volume was leveled through excavations by hand and with bulldozers, driving seven deep trenches through the diameter of the tumulus (Fig. 2c). These rescue excavations revealed that CK's mound contained nine burials. Eight burials belonged to an older, smaller Eneolithic – Bronze Age mound on the same site (1.5m high and 55–56m diameter). The ninth and latest burial, sunk deep into the mound's center, contained the body of the medieval prince or chief (Fig. 3). The decedent was a tall, muscular male of about 55–60 years of age (Schultz, 1991, 41-2) surrounded by a rich assemblage of local and imported grave goods which included silks and brocaded textiles, metal weaponry and armor, two silver cups, gold and silver ornaments, glass, amphorae and ceramics, as well as pollen remains (Woodfin et al., 2010; Holod and Rassamakin, 2013; Woodfin, 2016). On-going analysis of these grave goods indicates