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# The growth of early social networks: New geochemical results of obsidian from the Ubaid to Chalcolithic Period in Syria, Iraq and the Gulf

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ABSTRACT

Obsidian artifacts are geochemically traceable to their geological sources of origin. The results of their analysis provide some of the most accurate testimonies of interaction, exchange and population movement. This article presents results of obsidian analyses of artifacts from twelve sites from the Middle Euphrates to the Arabian Gulf. We demonstrate that the Sıcaksu flow of Nemrut Dağ in eastern Turkey consistently supplied obsidian to the majority of sites across this region from the 7th to 4th millennia BCE. This outcrop predominated in analyzed assemblages and as a production material for the region, across all site positions, sizes and periods; this has been argued to be a result of the quality, quantity and accessibility of this flow (Robin et al., 2016). The analyses demonstrate the presence of mainly finished products from a variety of additional sources in eastern Anatolia and Armenia (average >4 sources) on northern Mesopotamian sites during this time span. We argue that the Nemrut region was a major economic node and chief actor in the establishment and dynamics of networks in the greater region. The diachronic persistence or breaks in obsidian supply from more minor sources are an additional source of information on the inner workings and development of subtle interregional socio-political and economic relations. Obsidian analysis provides a detailed picture of the contributions of increasingly complex networks and channels of communication to intensified adoption of common practices and styles across regions, to intensification of processes leading to urbanization and state formation, and to accentuating periods of stress and conflict. These data nourish and update existing models on social networks during the crucial Ubaid to Late Chalcolithic periods and advance debates on the role and impact of these networks on early state formation.



## 1. Introduction

Research on the dynamics and modelling of early interaction spheres is increasingly valuable in explaining socio-economic transformations. Within such modelling, developments in methods of geological sampling and obsidian fingerprinting allow us to look beyond simple formulations of raw material exploitation (Robin et al., 2016) and its distribution (Ortega et al., 2014) to include potential factors

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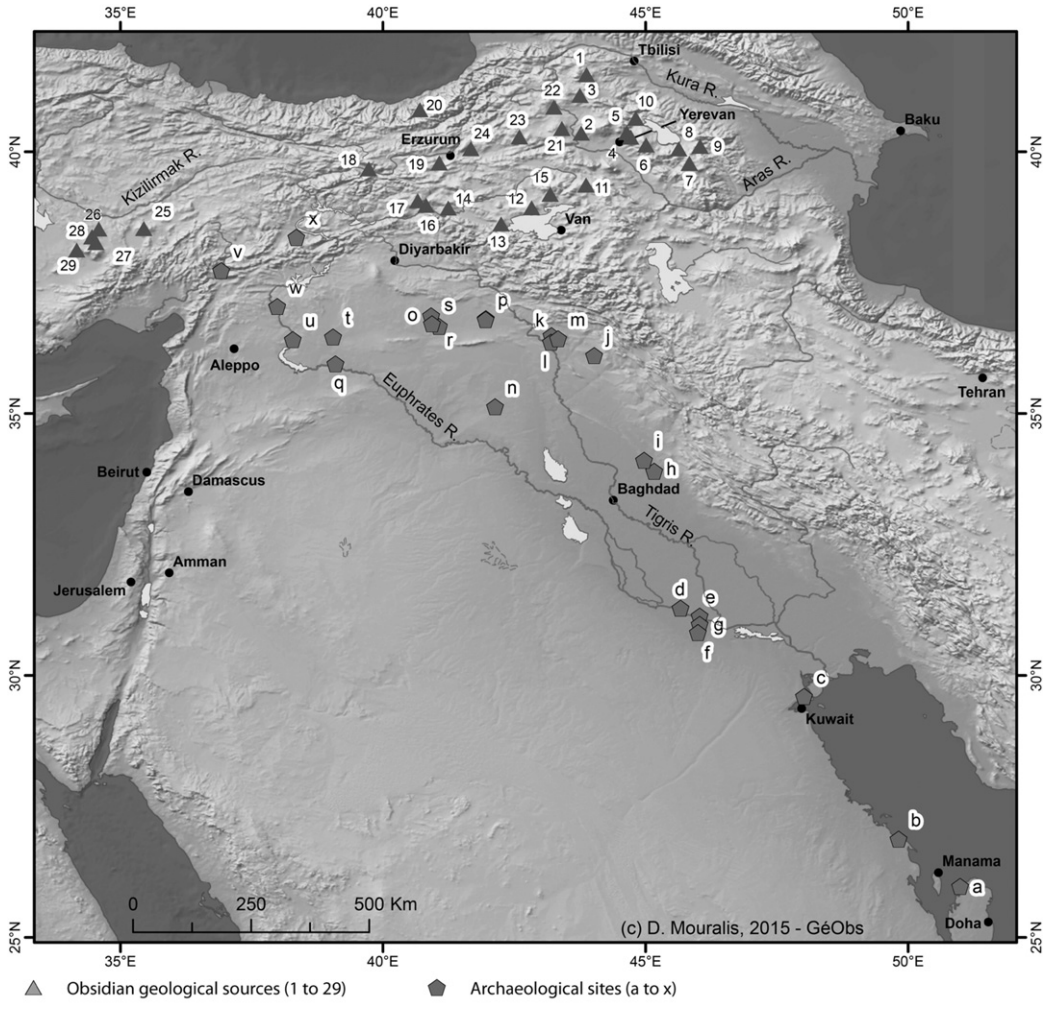
that may have had an impact on the configuration and functioning of social networks (Ibáñez et al., 2015).

In this paper, we evoke new data on obsidian source distinctions treated in more detail in Robin et al. (2016) and discuss these in relation to recent laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) analyses of archaeological obsidian recovered from Halaf/Ubaid to Late Chalcolithic period (6th–4th mill BCE) sites in Syria (Khirbat al-Fakhar, Tell Brak/Tell Majnuna, Tell Zeidan), Iraq (Kheit Qassim, Khirbet Derek, Umm Dabaghiyah, and Arpachiyah), Iraqi Kurdistan (Surezha) and the Arabian Gulf (as-Sabiyah, Dosariyah, Wadi Ḍebayʿan) (Fig. 1). We focus mainly on new data from the northern Mesopotamian sites of Tell Zeidan (Halaf-Ubaid to LC2), Surezha (LC1–LC3), Khirbat al-Fakhar (LC1–LC2) and Tell Brak/Tell Majnuna (LC2–LC3). We then compare these to new obsidian data from sites in northern Iraq and the Arabian Gulf. We discuss implications of these results for our understanding of the development of long-distance interaction spheres in the region on a diachronic scale that spans the crucial period between the onset of the Neolithic and the beginnings of state formation.

Formalized prehistoric interaction networks in the Near East are documented from as early as the Pre-Pottery Neolithic A (PPNA; 10,000–8500 BCE), and their growth and impact was increasingly visible thereafter. During the Pre-Pottery Neolithic B (PPNB; 8500–7000 BCE), social hierarchies develop in tandem with increasingly complex social networks, affecting the reach of cultural expressions and material goods, and encouraging genetic intermixing between regions (Ibáñez et al., 2015). PPNB networks traversed most of the Fertile Crescent, and comparable lithic technologies such as the naviform technique can be found in the southern Levant (Khalidi et al., 2013; Burian et al., 1999) and northern reaches of Arabia (Crassard and Khalidi, in press). During the early Neolithic, the source of Göllüdağ among others in central Anatolia prominently featured in obsidian assemblages but were




Obsidian geological sources: 1. Chikiani; 2. Arteni; 3. Ashotsk; 4. Gegham; 5. Gutansar; 6. Hatis; 7. Kecheldag; 8. Khorapor; 9. Syunik; 10. Tsaghkunyats; 11. Tendürek; 12. Süphan Dağ; 13. Nemrut Dağ; 14. Müş; 15. Meydan; 16. Bingöl-Solhan; 17. Bingöl-Alatepe; 18. Erzincan; 19. Erzurum; 20. Ikizdere; 21. Kars-Diggor; 22. Kars-Arpaçay; 23. Sarıkamış; 24. Pasinler; 25. Erciyes; 26. Acıgöl; 27. Göllüdağ; 28. Nenezidağ; 29. Hasandağ.

Archaeological sites: **a. Wadi Debay'an (QNHER 141)**; **b. Dosariyah**; c. **As-Sabiyah**; d. Uruk / Warka; e. Tell Oueili; f. Al 'Ubaid; g. Eridu; h. Choga Mami; **i. Kheit Qasim**; **j. Surezha**; **k. Khirbet Derek**; **l. Arpachiyah**; m. Tepe Gawra; **n. Umm Dabaghiyah**; **o. Tell Brak / Tell Majnuna**; **p. Tell Hamoukar / Khirbat al Fakhar**; **q. Tell Zeidan**; r. Chagar Bazar; s. Khaznah; t. Hammam et Turkman; u. Kosak Shamali; v. Domuztepe; w. Hacinebi; x. Arslantepe.
**In bold**, archaeological sites with obsidian artifacts studied in this paper

**Fig. 1.** Map of obsidian sources and Halaf to Late Chalcolithic sites referenced.
(D. Mouralis, GeObs)