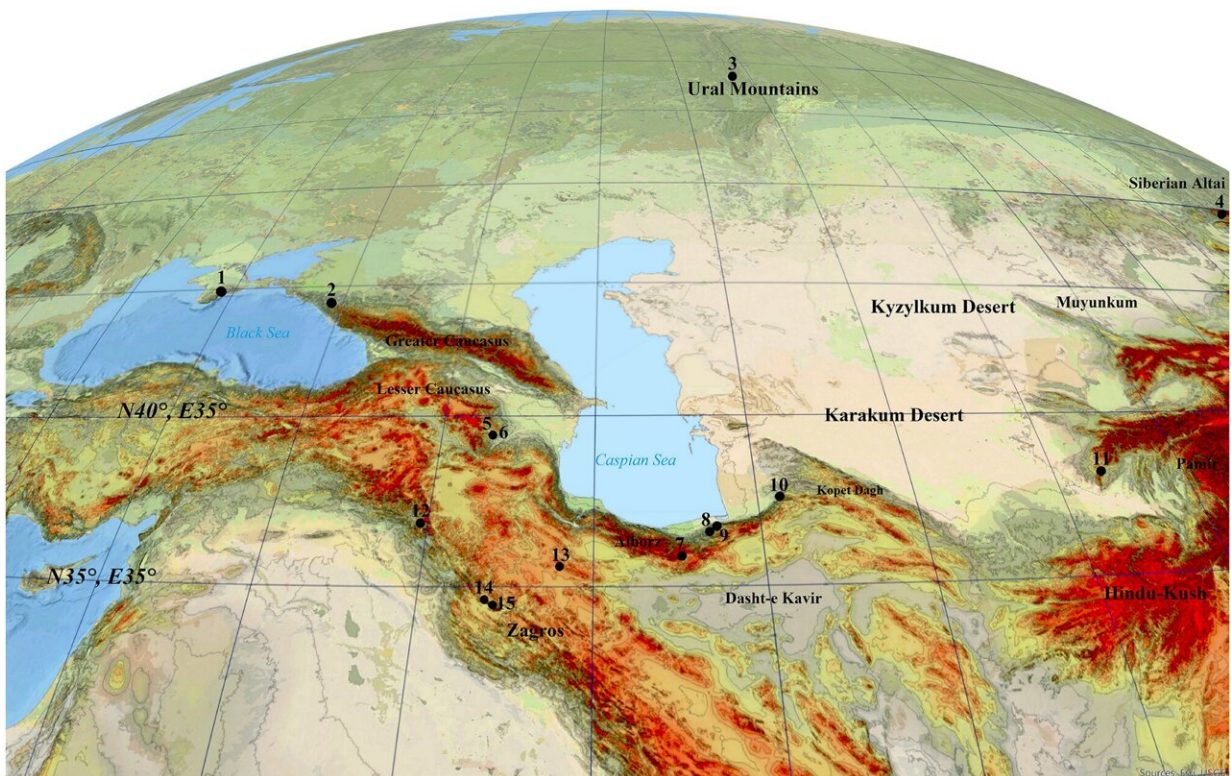


Modeling of European Neanderthal migration hints at hidden archaeological hot spots in Iran

March 1 2023, by Justin Jackson

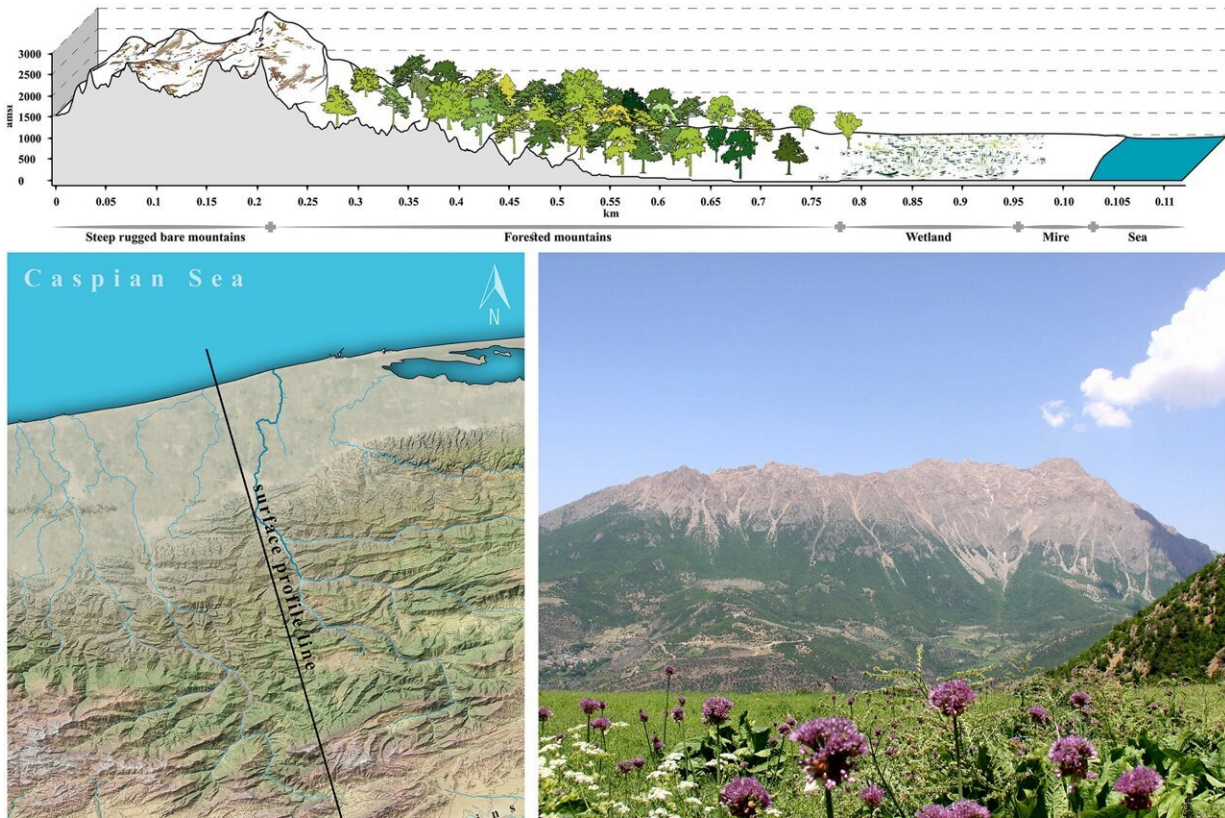


The study area and important Middle Paleolithic sites mentioned in the text: 1. Crimean sites, 2. Mezmaiskaya, 3. Trans Ural sites, 4. Siberian Altai sites (Chagyrskaya, Denisova, Okladnikov), 5. Azokh, 6. Taglar, 7. Liben, 8. Shoupari, 9. Wezwar, 10. Keyaram, 11. Teshik-Tash, 12. Shanidar, 13. Qale Kord, 14. Bawa Yawan, 15. Bisetun. Credit: *PLOS ONE* (2023). DOI: 10.1371/journal.pone.0281978

Researchers modeling eastern Neanderthal migration from Europe have found the area south of the Caspian Sea in northern Iran to be the most likely route, suggesting there could be significant yet-to-be-discovered archaeological sites hidden in less explored areas along the way.

The paper, published in the journal *PLOS ONE*, follows computer modeling of Neanderthal dispersal across hypothetical Northern and Southern Caspian routes based on available archaeological and [physiological data](#). These routes suggest potential research opportunities in little-known regions of Iran and Central Asia where the modeling predicts ideal paleolithic habitats.

A previous genetic study led by the Max Planck Institute for Evolutionary Anthropology, "Neanderthals in central Asia and Siberia," cited in the paper, has linked Neanderthals in Uzbekistan and the Altai region of southern Siberia to being of European origin. The question is, how did they get there?



Heterogeneous environment of Southern Caspian Corridor. Figure on top is the reconstruction of the surface profile line depicted in picture low left. Contrast of mountain and plain is depicted on photo low right (photo credit A. Bavand Savadkouhi). Credit: *PLOS ONE* (2023). DOI: 10.1371/journal.pone.0281978

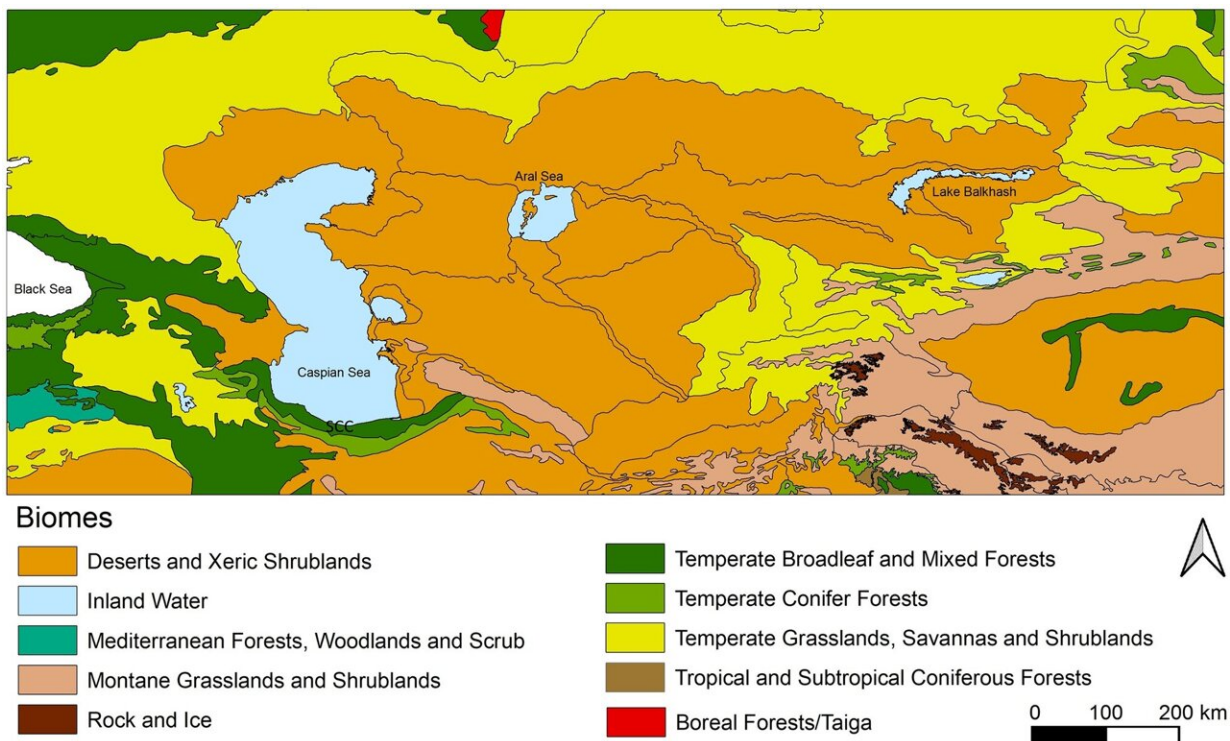
Mapping the corridor

Researchers used an open-source geographical information system, QGIS, layered with bio-geographical information of past climate conditions to construct a model to look for the Least-Cost-Path (LCP).

LCP models aren't always the most direct linear paths, as they take into account unobstructed paths and costly obstacles along the way, much like how a GPS system in a car will only direct you to a destination by

following roadways and might route you around traffic, construction or road closures. When GPS plots a route, the "cost" of the path is weighted by the time it takes to reach the destination. When plotting the course of ancient hominins, the "cost" is weighted by things like climate, resource availability, and subsistence benefits along the route.

Researchers applied LCP analysis to model the likely dispersal routes of Neanderthals between two archaeologically known cave sites in the Caucasus (one with Micoquian and the other with Mousterian cultural materials) and cave sites in the Altai Mountains of Russia. The two sets of cultural materials represent tool and artifact differences between sites separated by high mountains (Micoquian to the north and Mousterian to the south) and suggestively could represent two distinct lineages of Neanderthal migration into and out of the region.



Distribution of terrestrial biomes in the study area. The Southern Caspian

Corridor (SCC) is covered by Temperate Broadleaf and Mixed Forests. The biomes data is based on the World Wildlife Fund (WWF) Terrestrial Ecoregions [119]. Credit: *PLOS ONE* (2023). DOI: 10.1371/journal.pone.0281978

Using climate data downloaded from PaleoClim.org and other sources, the researchers looked for areas that experienced the most negligible climatic fluctuations and were most likely to provide stable environments for flora and fauna. Researchers focused on the Southern Caspian Sea corridor because it stood out as being relatively humid and mild compared to neighboring areas, making it an ideal route for expansion and settlement. Being the perfect route for exiting Europe, it would also have been an inviting gateway into Europe for migrations of current modern humans (*Homo sapiens*) traveling from Africa and via the Levant—leaving open the possibility that this could be a significant cross-cultural meeting point between our two species.

For several hundred thousand years, Neanderthals were the most modern humans in Europe. They created cave art, cared for their sick, controlled fire for warmth and cooking, and hunted the largest prey as an apex predator. Neanderthals were also the most widespread humans in their time, ranging from the furthest west and north of Europe to as far south as Israel and Palestine and east into Central Asia and Siberia. As we know from studying our own genomic history, current modern humans intermingled with Neanderthals multiple times and in different locations, making the history of Neanderthals a big part of our story as well.

More information: Elham Ghasidian et al, Modelling Neanderthals' dispersal routes from Caucasus towards east, *PLOS ONE* (2023). [DOI: 10.1371/journal.pone.0281978](https://doi.org/10.1371/journal.pone.0281978)

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Citation: Modeling of European Neanderthal migration hints at hidden archaeological hot spots in Iran (2023, March 1) retrieved 13 July 2024 from <https://phys.org/news/2023-03-european-neanderthal-migration-hints-hidden.html>

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