Taking climate archives from a lake

Palaeontologists study fossils to reconstruct the past sea level and the salinity, depth, oxygen content and temperature of the Caspian, Black and Mediterranean Sea basins (or Corridors). Some organisms lived on the bottom (we call them benthic), while others swam in the water column (we call them planktonic). They fall into different groups, such as single-celled foraminifera, ostracoda (microcrustaceans like the fossil on the left) and molluscs. These organisms grow hard shells made of calcium carbonate which are well preserved in sediments after they die. Foraminifera and ostracoda are usually as small as a grain of sand and can only be seen under a microscope.

The shells of planktonic foraminifera contain oxygen isotopes that enable scientists to determine the temperature of surface water, which is controlled by the state of the climate at the time. Molluscan shells contain radiocarbon (14C) isotopes that allow us to determine the age of the sediments in which they were buried. The presence of Mediterranean or Caspian fossils in Black Sea sediments indicates a connection with either basin.

Other microscopic planktonic fossils called dinoflagellates and diatoms are used to reconstruct the water's salinity and temperature due to the narrow range of tolerance many species demonstrate to these conditions. Remnants of plants, such as microscopic spores and pollen, provide direct evidence for Neolithic agriculture on shelves that were once exposed until sea level rose. Correlating the succession of pollen zones for the Late Pleistocene and Holocene with the pollen zones of surrounding upland areas helps us reconstruct the temperature and precipitation (rain- and snowfall) dynamics across these entire corridors.

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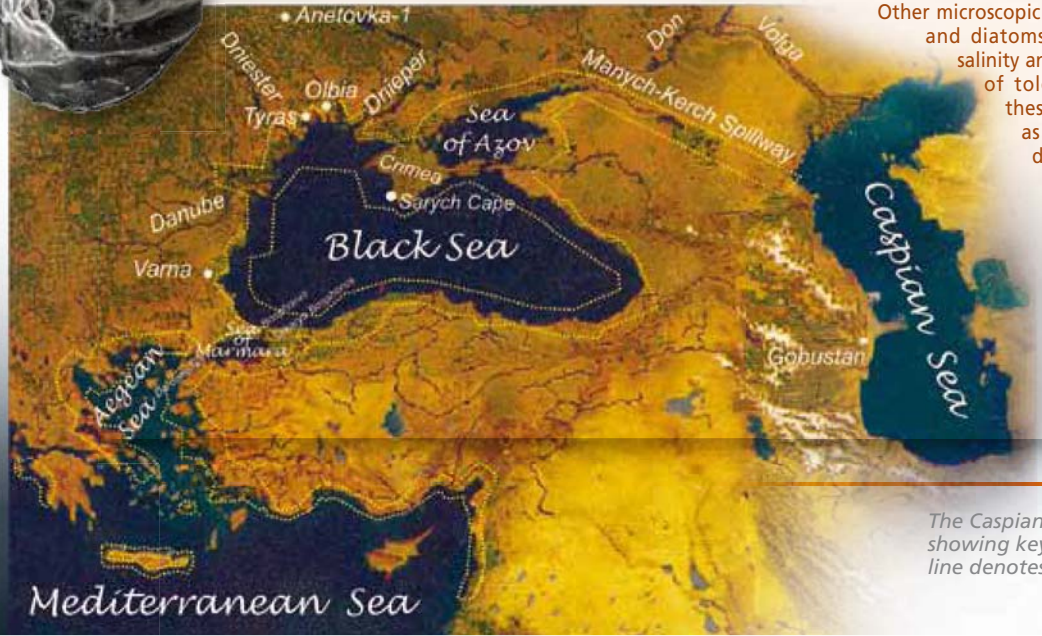

The Caspian–Black–Mediterranean Sea Corridor today, showing key archaeological sites. The dotted yellow line denotes the study area of the IGCP project.