Mediterranean isotope record reveals link between sapropel formation and climate change

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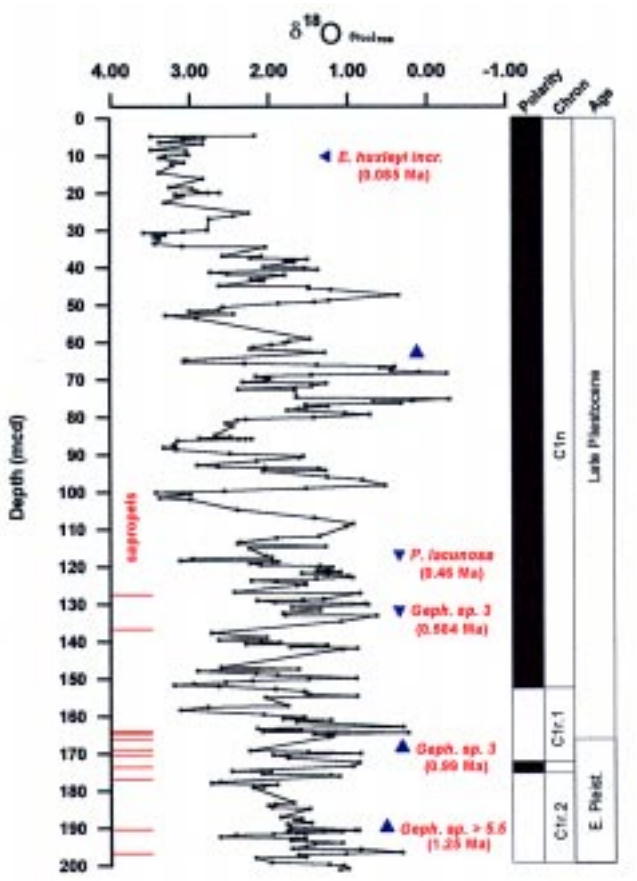
ODP Site 963, Strait of Sicily, Mediterranean Sea



Many paleoceanographic studies of the Mediterranean have focused on the formation of organic-rich sapropels which are believed to have formed under anoxic or reducing conditions. A key to understanding the origin of sapropels lies in ascertaining the hydrographic changes which occurred during their formation. Oxygen isotope studies of the planktonic foraminifer *Globigerina bulloides* from ODP Site 963, Strait of Sicily, Mediterranean Sea provided an opportunity to assess changes in surface water hydrography during sapropel formation. During the Early to Late Pleistocene the $d^{18}O$ record indicates that major climatic coolings occurred at approximately 0.98 and 0.45 Ma. In addition, the $d^{18}O$ record from this sites exhibits large amplitude fluctuations during the Late Pleistocene associated with the reduction of surface water salinities due to regional changes in evaporation and precipitation. The magnitude of these climatic events appears to have been strongly influenced by the extent of global cooling and increases in ice volume. In addition, not all reductions in surface water salinities resulted in the formation of sapropels in the Strait of Sicily. This is noteworthy, as the magnitude and timing of the isotope anomalies are strikingly similar to those found within sapropel units at other Mediterranean sites. The highest frequency of sapropels at Site 963 occur before 0.98 Ma, after which a major cooling event occurs. Only two sapropels occur between this time and 0.46 Ma, suggesting an inverse relationship between glacial intensity and the frequency of sapropel formation at this site.