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Holocene laminations in Mediterranean brine sediments- unlocking a new high resolution climate archive?

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Kilometer-scale brine filled depressions have been discovered on the Mediterranean Ridge, resulting from dissolution of underlying evaporites. The brines in these basins are stable, stratified, and anoxic. The potential for the formation of laminated unbioturbated sediments and the preservation of proxies such as organic matter has attracted paleoclimatological interest. In this study, Holocene-age laminated sediments have been recovered from l'Atalante basin, and analysed for their geochemical profiles.

Colourscan and digital image data clearly show intervals of light and dark laminations on the sub-millimetre scale, separated by a few distinct centimetre-scale intervals of turbidite emplacement from outside the basin. The turbidites provide reference layers against which component preservation in the laminated sections can be compared. Laminated intervals are shown by ICP-AES analysis to have a lower carbonate content than the turbidites, due to carbonate dissolution in the brine and dilution by other components. Organic matter and biogenic silica appear to be enriched in the laminations, suggesting that the anoxia and high salinity of the brine environment are favouring their preservation.

An XRF scan of the open core surface shows fluctuating elemental ratios within the laminated intervals, and radiocarbon dating indicates this variability in component fluxes to be sub-millennial in timescale. A higher resolution scan will be performed on a U-channel from the core, which has been prepared by a specially adapted method of resin impregnation.