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An annually-resolved palaeoenvironmental archive for the Eastern Boundary North Atlantic upwelling system: Sclerochronology of *Glycymeris glycymeris* (Bivalvia) shells from the Iberian shelf

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The seasonally variable western Iberia upwelling system, albeit placed at a crucial climatic boundary position to record high frequency climate events, lacks well-dated high-resolution records of environmental variability. Bivalve shells provide robust high-resolution archives of oceanographic and climatic variability on timescales of decades to millennia. In particular, the North Atlantic Ocean region has recently seen several noteworthy sclerochronological and geochemical reconstructions based on bivalve shells (mainly *Arctica islandica*) of high frequency oceanographic and climatic conditions during the last millennium. However, due to the absence of *Arctica islandica* and similarly long-lived bivalves, sclerochronological palaeoenvironmental studies of southern European coastal shelf seas are scarce. In particular, none of these studies focus on reconstructing the variability of an eastern boundary upwelling system.

The relatively long-lived bivalve (>100 years) *Glycymeris glycymeris* occurs in European and North West African coastal shelf seas and provides a valid annually resolved archive of environmental conditions during growth. Annual growth increment width series from living *G. glycymeris* shells, collected in 2014 on the western Iberian continental shelf (ca. 35 m water depth), were used to construct a statistically robust, ca. 70-year long absolutely-dated chronology. Sub-annually resolved (11 to 22 samples per year) oxygen stable isotope ($\delta^{18}O_{shell}$) data covering three years of shell growth, together with the direct evaluation of the time of growth mark deposition in shells collected during the autumn and winter months, were used to constrain the season of growth and to evaluate the seasonal bias of the sea-surface temperature signal preserved in the $\delta^{18}O_{shell}$data. The growth increment width and $\delta^{18}O_{shell}$ series, once robustly calibrated against modelled and instrumental oceanographic and climatic series, potentially provide novel insights into the variability of the western Iberia upwelling system and the associated mechanisms.

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