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## Recent Foraminifers and Stable Isotopes Records on a Bathymetric Transect off Portugal (Cruise JC089) and implications for the Palaeoxygenation proxy

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The oceanographic cruise 89 (RRS James Cook) sailed in 2013 off the Iberian margin in support of an IODP proposal centred on IODP Site 1385. JC089 collected a range of hydrographic data and recovered a set of short sediment cores. We focus on 11 of the later, sampling the hydrography of the last c.400 years along a bathymetric gradient (600-4600 m). The stable isotopes ( $\delta^{18}\text{O}$  &  $\delta^{13}\text{C}$ ) for: 8 common benthic foraminifer species with varied habitat preferences, the sediment pore-water and the bottom water above the sites were measured. The geochemical data is compared to various sedimentary and micropalaeontological data. The later comprises abundances of the main benthic foraminifera species  $>212\mu\text{m}$ , checking for living position of the endo-fauna in Rose-Bengal stained samples and for the abundances of phytodetritus-loving species *E.exigua* in the  $>90\mu\text{m}$  for all the 0-1cm samples. The study of the planktonic foraminifer assemblages along a gradient stretching 170 km offshore confirms the major influence of the upwelling to the East. Except for the epi-benthic species *C.wuellerstorfi*, which records the bottom water  $\delta^{13}\text{C}$  at equilibrium, all other species failed to record the  $\delta^{13}\text{C}$  of the (pore) water at the depth of their living-position. We find that *G.affinis* could record the  $\delta^{13}\text{C}_{\text{DIC}}$  near equilibrium with the pore-water at a depth of c.-1cm; therefore above its living population peak. This could be explained by vertical migrations through the sediment column at sites where the supply of organic matter is pulsed. The later assumption seems supported by a reverse correlation between high relative abundances of *E.exigua* and that of the planktonic upwelling indicator species *G.bulloides* under productivity pulses corresponding to higher  $\Delta\delta^{13}\text{C}$ (epi-*G.affinis*).

The  $\Delta\delta^{13}\text{C}$  varies from 1.7 to 4.9‰ (n=6) across a decreasing but increasingly pulsed surface productivity gradient further away from the coast. Across this range, *G.affinis* is observed living at increasing depths in the sediment but always peaks in oxic sediments. The absence of *G.affinis* from water deeper than 3100 meters prevents  $\Delta\delta^{13}\text{C}$  estimates at deeper water depths. For 6 of the 11 sites where *G.affinis* was present *C.wuellerstorfi* occurred only twice. The  $\delta^{13}\text{C}$  for *H.elegans* and *C.mundulus* adjusted by -1.08 and +0.25‰ respectively (this study) were used instead for the shallower sites. Off the Iberian Margin the style of seasonally fluctuating food supply could be the main factor on  $\Delta\delta^{13}\text{C}$ . The implication on future and long-ranging IODP-based palaeoclimatic studies is that the  $\Delta\delta^{13}\text{C}$  could be used to estimate the type of productivity regime back in time. In the one hand the sites mostly influenced by the main upwelling cell exhibit  $\Delta\delta^{13}\text{C} <$

3‰ & correspond to less than 10% of the time spent in an oligotrophic setting below 0.2mg (chl<sub>a</sub>)/m<sup>3</sup>. In the other hand  $\Delta\delta^{13}\text{C} > 3\text{‰}$  trace offshore rare productive surface filaments in an environment otherwise corresponding to c.90% of the time under oligotrophic surface water. The absence *G.affinis* (for the range of depths studied) could indicate a record sitting outside either of these productive systems' influence.