## Glider observations of the Northwestern Iberian Margin during an exceptional summer upwelling season

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Figure 1: Copyright Callum Rollo. Also appears in a manuscript submitted to JGR:Oceans . (a) Location of the glider section offshore of Vigo, NW Spain. Grey dashed lines at 1/4 degree intervals. Black lines demarcate the 300 and 1000 m isobaths, the shelf break and maximum profiling depth of the glider respectively. Red line marks the glider's nominal section. Arrows are the detided dive average currents, averaged over the deployment. Cape Silleiro is marked with CS. The mouths of the two southern Rías Baixas estuaries are marked: the Ría de Pontevedra (RdP) and Ría de Vigo (RdV). (b) Limits of the Northwestern Iberian Margin, Cape Finesterre (CF) in the north and Cape Mondego (CM) in the south. Red box is area shown in (a). (c) Track of the glider during its 17 transects of the section, same scale as (a). Glider's nominal section in red. Green lines are transects 2-7. (d) Upwelling Index (UI) calculated with winds from the FNMOC model over yeardays 150-220 (30 April to 9 August) 2010. Shading shows the timing of the 17 numbered glider transects. Background shading indicates the direction of glider travel (grey: westward transects, white: eastward transects). Dive average currents show the enhanced equatorward current speed over the shelf.



Figure 2: Copyright Callum Rollo. Also appears in a manuscript submitted to JGR:Oceans . Conservative temperature (a-d) and meridional velocity (e & f). (a & b) Conservative temperature averaged over the uppermost 5 m, black ticks mark the surfacing of the glider during the transect for that column. (e & f) Meridional geostrophic velocity, negative velocity is equatorward. Density plotted with black lines. (b,c,e) Transect 2. (b,d,f) Transect 6. Note that the vertical scale changes at z = -200 m. Raised isopycnals over the shelf during upwelling favourable indicate vertical diplacement of 50 m



Figure 3: Copyright Callum Rollo. Also appears in a manuscript submitted to JGR:Oceans . (a) Conservative temperature at 10 m depth. Black dashed line demarcates glider track in time. Black lines are potential density anomalies in kg m<sup>-3</sup>. Cyan vectors are detided dive average currents. (c) Satellite observed SST with glider track overlaid. (b & d) Upwelling Index (UI) with glider transects shaded and numbered as in Figure 1. Near surface temperatures observed by teh glider show good visual correlation with satellite SST. Equatorward currents over the shelf are strongest during upwelling periods.



Figure 4: Copyright Callum Rollo. Also appears in a manuscript submitted to JGR:Oceans . As Figure 3 for Chlorophyll a concentration. Satellite chlorophyll a observations highlight short lived features missed by the glider over the shelf.



Figure 5: Mean vertical profiles of chlorophyll concentration for each transect of the deployment. The green line is the average of the water column over the slope, more than 5 km west of the shelf break. The red line is the average of the water column over the shelf, more than 5 km east of the shelfbreak. Uncertainty of 1 standard deviation is shaded around each profile. Transect number, yearday of the transect and UI during the transect are shown on each panel.



Figure 6: Copyright Callum Rollo. Also appears in a manuscript submitted to JGR:Oceans . As Figure 3a and 3b for  $\Delta(O_2)$ . 20 %  $\Delta(O_2)$  contour in solid black. The near surface maximum in  $\Delta(O_2)$  around yeardays 172-180 is observed 6 days later than the maximum in chlorophyll *a* concentration.