Abstract title

STUDYING THE PAST OF MEDITERRANEAN OUTFLOW BASED ON 230TH EXCESS INVENTORIES AND CONTOURITES

Authors

VEIGA-PIRES CRISTINA CARVALHO [1], GHALEB BASSAM [2], VOELKER ANTJE [3], ABRANTES FÁTIMA [3]

presenter's e-mail: cvpires@ualg.pt

1 - Universidade do Algarve - CIMA
2 - GEOTOP Research Center
3 - Instituto Geológica e Mineiro - IGM

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Abstract

The Mediterranean Outflow water (MOW) comes out from the Mediterranean Sea and then contours the northern slope of the Cadiz Gulf. Along its way to the southern Portuguese Margin, it divides itself into three levels flowing at different depths, 400 m, 800 m and 1200 m, respectively. These different pathways induce a series of contourites along the Cadiz slope as well as some sedimentary drifts, such as the Faro Drift. Based on the assumption that the sedimentologic characteristics of these contourites should give some light on the history of MOW velocity and intensity variability, two long sedimentary cores collected during the Marion Dufresnes 114/Images cruise in 1999 have been studied. The sampling sites of these two cores, MD99-2336 and MD99-2339, located in the Cadiz Gulf at 690 and 1177 m water column depths respectively, are thus, actually, below the first level and in the main core of the MOW third level. Along time, variations in these current levels, parallel to the slope, should then influence the existence and characteristics of contourites in both sedimentary records. For this purpose, thorium-230 (230Th) as well as granulometric and micropaleontologic analysis have been undergone at high resolution on the 4 uppermost meters spanning MIS1 to LGM times. The referred current prints can be detected by analysing surface and down core sediment for its 230Th content. This radioisotope is produced by the radioactive decay of uranium-234 which content in oceanic waters is known. Therefore, its production rate in the water column can be estimated as a linear function of the water depth (~ 2.6 dpm/cm2.ka for 1 km water depth). As 230Th is almost insoluble, it will sink to the oceanic floor together with the settling particles. This vertical flux to the underlying sediment is considered, in a first order approximation, equal to its production rate in the water column. On this basis, the 230Th excess in the sediment becomes a proxy for sedimentation versus erosion processes accordingly to the sign of the difference between the total and the vertical 230Th flux, i.e. if it is, respectively, positive or negative. With this method it is then possible to extrapolate on the location of the high velocity core area and whether its intensity changed or not looking at the inventory of excess 230Th in the contourite units. We acknowledge FEDER and OE that financed this study through the Portuguese Foundation for Science and Technology (PDCTM/PP/MAR/15297/1999).

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