Session: C4 Poster: TH183B

CLIVAR-SPAIN contributions: Air-sea CO2 fluxes in the north-eastern shelf of the Gulf of Cádiz (southwest Iberian Peninsula).

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An intra-annual investigation of the fugacity of CO2 (fCO2) has been conducted in surface waters of the north-eastern shelf of the Gulf of Cádiz (SW Iberian Peninsula) in four cruises made in 2006 and 2007. Intra-annual variability of fCO2 was assessed and is discussed in terms of mixing, temperature and biology. In the study area of the shelf, thermodynamic control over fCO2 predominates from early May to late November, and this is opposite and similar in magnitude to the net biological effect. However, biological control over fCO2 predominates during winter. The results suggest that surface waters in the coastal area are under-saturated with respect to atmospheric CO2 during most of the year; therefore they represent a sink for atmospheric CO2 between November and May (-1.0 mmol m-2 d-1), but a weak source in June (1.3 mmol m-2 d-1). In contrast, the coastal ecosystems studied (the lower estuary of Guadalquivir Estuary and Bay of Cádiz) acted as a weak sink for atmospheric CO2 during February (-1.3 mmol m-2 d-1) and as a source between May and November (2.6 mmol m-2 d-1). The resulting mean annual CO2 flux in the north-eastern shelf of the Gulf of Cádiz was -0.07 mol m-2 yr-1 (-0.2 mmol m-2 d-1), indicating that the area acts as a net sink on an annual basis.
Keywords: CLIVAR-SPAIN, CLIMATE VARIABILITY AND CHANGE, SOUTHWESTERN EUROPE