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SEASONAL VARIABILITY OF CO_2 SYSTEM AND AIR-SEA FLUXES ON THE EAST COAST OF GRAN CANARIA

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Abstract: This study describes the annual pattern, from March 2020 to April 2021, of different parameters of the CO_2 system and ocean acidification in the eastern coast of Gran Canaria Island (Gando Bay) via the monitoring of pH_T, total dissolved inorganic carbon (C_T), total alkalinity (A_T) and CO_2 fugacity (fCO_2), as well as other parameters such as sea surface salinity and temperature (SSS and SST), dissolved oxygen (O_2), chlorophyll (chl-*a*) and wind. In addition, the flux of CO_2 (FCO_2) between the atmosphere and the sea surface has been computed.

The results show a clear seasonal fCO_2 variation in seawater from 380 µatm (in winter) to 430 µatm (in summer), where the opposite behaviour was observed in pH_T with a range of variation of 8.072 to 8.032 and C_T between 2123.2 and 2101.5 µmol kg^{-1}. The thermal/non-thermal processes (ratio T/NT) affect the seasonal fCO_2 in seawater with a value of 1.38. The temperature mainly controls the variability of fCO_2 in the region, but the non-thermal factors have a higher contribution than other studies in the open ocean. Results indicate a higher role of the primary production in the area, which reduces C_T and the fCO_2. In addition, the rise of a water mass with low salinity (36.4) and temperature (22 ºC) due to the effect of high and constant Trade Winds (July and August), contribute to the physical and chemical seasonal variability in the Bay. This water mass had also higher concentrations of C_T due to the remineralization of organic matter that takes place at depth and out of the Bay.

The calculated flux of CO_2 at the buoy location was 0.27 ± 0.22 mmol m^{-2} d^{-1}, showing a mean behaviour as a slight source of CO_2. Assuming this value for all Gando Bay, it was found that the area emits 4.58 ± 3.68 Tons yr^{-1} of CO_2 each year.

This coastal time-series in the Canary Islands is contributing to improve our knowledge about the impacts of climate change in the CO_2 system and ocean acidification in coastal systems, also, incrementing the data set for the global carbon budget.

Key words: CO_2 system, CO_2 fluxes, coastal acidification, coastal time-series

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