The Mediterranean Sea sink for Greenhouse Gases

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The ocean has taken up about 28% of the CO_2 emitted by human activity over the last decade, representing the largest carbon reservoir on Earth. On the contrary, it behaves as a source of N_2O to the atmosphere, accounting for by 35% of the total natural sources of this gas (IPCC 2014). In addition, although minor, marine CH_4 emissions represent a net input that must be also accurately computed. Large oceanic areas have still little to no spatial GHGs data coverage, particularly for N_2O and CH_4, even though monitoring of these three radiatively active gases is crucial for global inventories and feedbacks with the climate system. Currently, CO_2, N_2O and CH_4 are being measured regularly only at a few marine time-series sites. One of such oceanic platforms is the Gibraltar Fixed Time Series (GIFT), where measurements started in 2005. It is located in the Strait that connects the Mediterranean Sea with the Atlantic Ocean, two different biogeochemical marine eco-regions. This work presents results of the GHGs monitoring program in the area, which have been used to compute the exchange of CO_2, N_2O and CH_4 between the two adjacent basins. Data show that the Mediterranean supplies N_2O to the North Atlantic and receives, in opposition, both Atlantic CH_4 and anthropogenic CO_2, which contributes to the process of ocean acidification in the Mediterranean, whose rate of pH decrease is also provided. Biogeochemical and physical processes behind gas exchange through the Strait are commented.