## Abstract title

Air-sea carbon flux at the Belgian Continental Shelf

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## Abstract text

Observing the balance of greenhouse gases is an important way to keep track of global change (Steinhoff et al., 2019). One important element in this balance is the atmosphere-water exchange of $CO_2$ in the ocean. The air-sea $CO_2$ flux provides insight in how much $CO_2$ is incorporated in the marine environment (i.e. the sea being a sink for atmospheric $CO_2$) or emitted by the marine environment (i.e. the sea being a source). As of 2013, as part of the European research infrastructure "Integrated Carbon Observation System" (ICOS), the Flanders Marine Institute (VLIZ) measures the $pCO_2$ in the surface layer of the water at the Belgian Continental Shelf. In this study, we used observations of $pCO_2$ collected at the Thornton buoy; a measuring buoy located at the Thorntonbank, a sandbank approximately 30 km seawards from the coast near Zeebrugge, from February until December 2018. We calculated the air-sea carbon fluxes according to the wind driven turbulence diffusivity model of Nightingale (2000). Our results show a clear seasonality of air-sea carbon flux at the Thornton buoy, with the sea being a carbon sink from February until June switching to a carbon source from July until December. This seasonality is also reported in Gypens et al. (2004 and 2011) and is hypothesized to be driven by temperature, biological processes and the impact of the freshwater plume of the Scheldt river (Gypens et al., 2011). We calculated that the sink was largest in April ($-0.95 \pm 0.90$ mmol C $m^{-2}$ $d^{-1}$), while in August, the source was at its maximum ($0.08 \pm 0.13$ mmol C $m^{-2}$ $d^{-1}$). Increasing the amount of $pCO_2$ observations with the RV Simon Stevin will allow us to further explore the spatial variability of the air-sea carbon flux at the Belgian Continental Shelf.

Keywords: Air-sea flux, Carbon dioxide, pCO2, North Sea, Belgian Continental Shelf

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## Session

Indicators definition for ocean health assessment in connection with SDG14 and GES assessment.