EGU22-11978
https://doi.org/10.5194/egusphere-egu22-11978
EGU General Assembly 2022


# North Atlantic CO2 sink variability revealed by the Go-Ship A25-OVIDE section

**Marta López Mozos**[1], Antón Velo[1], Marcos Fontela[2], Mercedes de la Paz[1], Lidia Carracedo[3], Noelia Fajar[1], Maria Isabel García-Ibáñez[4], Xose Antonio Padín[1], Damien Desbruyères[3], Herlé Mercier[5], Pascale Lherminier[3], and Fiz F Pérez[1]

[1]Instituto de Investigacións Mariñas, IIM - CSIC, Vigo, Spain
[2]Centro de Investigación Mariña, Universidade de Vigo, Departamento de Ecoloxía e Bioloxía Animal, Vigo, Spain
[3]Ifremer, University of Brest, CNRS, IRD, Laboratoire d'Océanographie Physique et Spatiale, IUEM, Ifremer centre de Bretagne, Plouzané, 29280, France.
[4]Institut de Ciències del Mar, ICM - CSIC, Barcelona, Spain
[5]University of Brest, CNRS, Ifremer, IRD, Laboratoire d'Océanographie Physique et Spatiale, IUEM, Centre Ifremer de Bretagne, Plouzané, 29280, France

About 30% of the carbon dioxide derived from human activities ($C_{ANTH}$) has been absorbed by the ocean (DeVries, 2014; Gruber et al., 2019; Friedlingstein et al., 2021), with the North Atlantic (NA) being one of the largest $C_{ANTH}$ sinks per unit area (Khatiwala et al., 2013; Sabine et al., 2004). In the NA, oceanic $C_{ANTH}$ uptake strongly relies on the meridional overturning circulation and the associated regional winter deep convection. In fact, the formation and deep spreading of Labrador Sea Water stands as a critical $C_{ANTH}$ gateway to intermediate and abyssal depths. The NA $C_{ANTH}$ uptake has fluctuated over the years according to changes in the North Atlantic Oscillation. Biennial observation of the marine carbonate system along the Go-Ship A25-OVIDE section has allowed us assessing the decadal and interannual variability of the $C_{ANTH}$ storage in the subpolar NA from 2002 to 2021. In this study, we investigate 1) the trend of $C_{ANTH}$ and 2) the relationship between the $C_{ANTH}$ saturation, the apparent oxygen utilization, and the ventilation of the water masses between the A25-OVIDE section and the Greenland-Iceland-Scotland sills during 2002-2021. We divided the A25-OVIDE section into three main basins (Irminger, Iceland, and Eastern NA). Our results show that the Irminger Basin presents a more homogenous $C_{ANTH}$ profile and higher $C_{ANTH}$ saturation values at depth than the other two basins, which is related to the pronounced convective activity in the Irminger Basin. In contrast, the Eastern NA Basin has higher $C_{ANTH}$ values at the surface due to its higher surface temperature, but its deep water masses show the lowest $C_{ANTH}$ values since they are the less ventilated in the section. Our analysis also reveals that, overall, the NA $C_{ANTH}$ storage has increased during 2002-2021, but varied according to the ventilation changes. While the Eastern NA water masses experienced a relatively constant, although shallower, average ventilation, the Irminger and Iceland Basins underwent a less steady $C_{ANTH}$ uptake pattern characterized by alternating periods of strong and weak $C_{ANTH}$ storage.