

Air-sea exchange of gases (including CO₂)

What is the issue?

Uptake of CO₂ by the ocean is a primary control on the level of greenhouse gases in the atmosphere, and hence a control on the climate.

What has happened and how confident?

The North Atlantic is the major store of dissolved CO₂ in the global ocean (Sabine *et al.*, 2004) which has taken up about one quarter of the anthropogenic emissions of CO₂ in the last 200 years.

Recent evidence suggests that the flux of atmospheric CO₂ into the surface of the North Atlantic reduced in 2002–05 compared with that measured in 1994–95 (Schuster and Watson, 2007).

What might happen?

Uptake of CO₂ in the future will be strongly affected by changes in water temperature and significant changes in circulation and stratification of the upper ocean.

Are there any OSPAR regional differences?

The exchange of CO₂ differs between the open ocean and the shelf seas and between cold and warm waters. Where sea ice exists this will also have an impact on the exchange.

↪ [Go to the full QSR assessment report on impacts of climate change \(publication number 463/2009\)](#)

References

- Sabine, C L., Feely, R.A., Gruber, N., Key, R.M., Lee, K., Bullister, J.L., Wanninkhof, R., Wong, C.S., Wallace, D.W.R., Tilbrook, B., Millero, F.J., Peng, T.H., Kozyr, A., Ono, T. & Rios, A.F., 2004. The oceanic sink for anthropogenic CO₂. *Science* 305, 367–371.
- Schuster, U., and Watson, A.J., 2007. A variable and decreasing sink for atmospheric CO₂ in the North Atlantic, *Geophys. J. Res.*, 112, C11006, doi:10.1029/2006JC003941