CO2 Response Functions to Ozone depletion

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Numerical set-up and experimental design is exactly as described in Ferreira et al, 2015

Antarctic Ocean and Sea Ice Response to Ozone Depletion: A Two-Time-Scale Problem
(Ferreira, D., Marshall, J., Bitz, C.M., Solomon, S., and A. Plumb),
Journal of Climate, vol. 28, pp. 1206–1226, 2015.

Fig.1

In response to an abrupt decrease in stratospheric ozone, the CO2 flux (Fig. 1, bottom) are perturbed with changes typically ~20% of the climatological mean (compare with Fig. 1, top).

The CO2 flux response (driven by a southward shift of the Southern Hemisphere jet stream) has a dipole pattern, with increased CO2 flux out of ocean on the poleward flank of the ACC (around 55 S) and increased flux into the ocean on the equatorward flank (45 S).

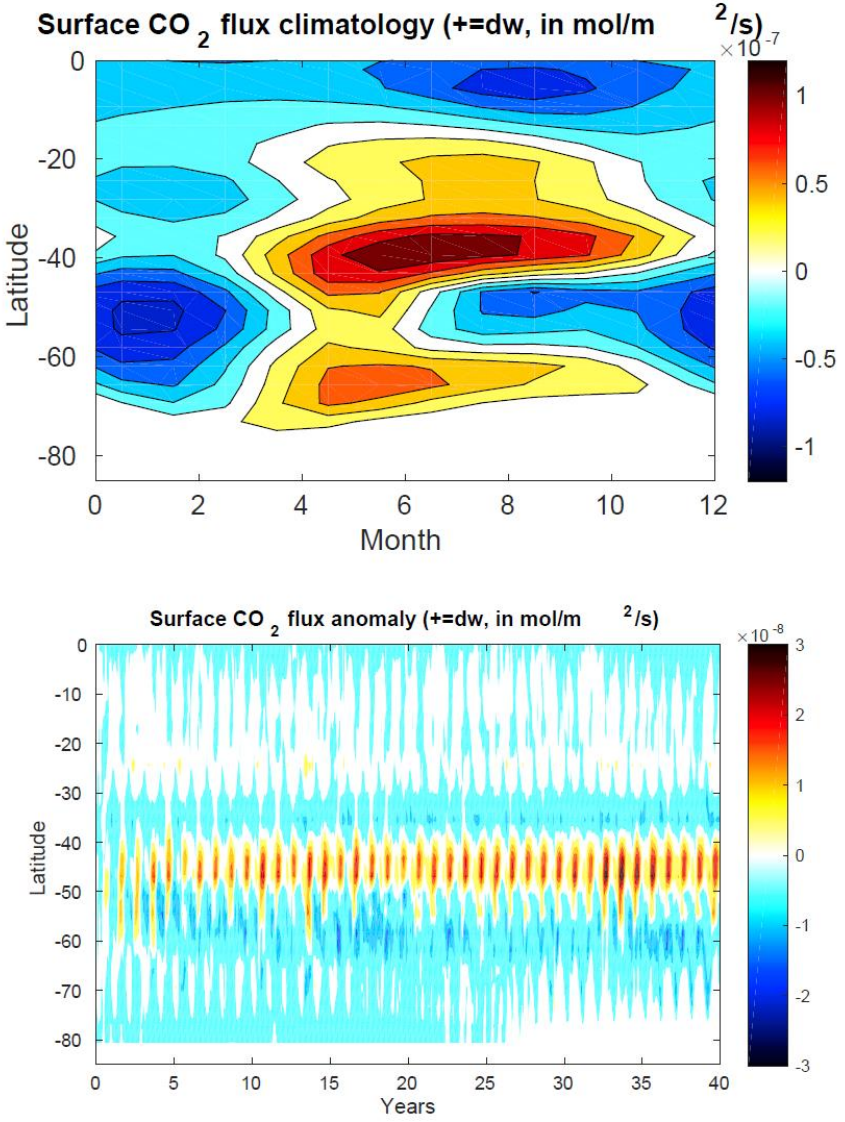
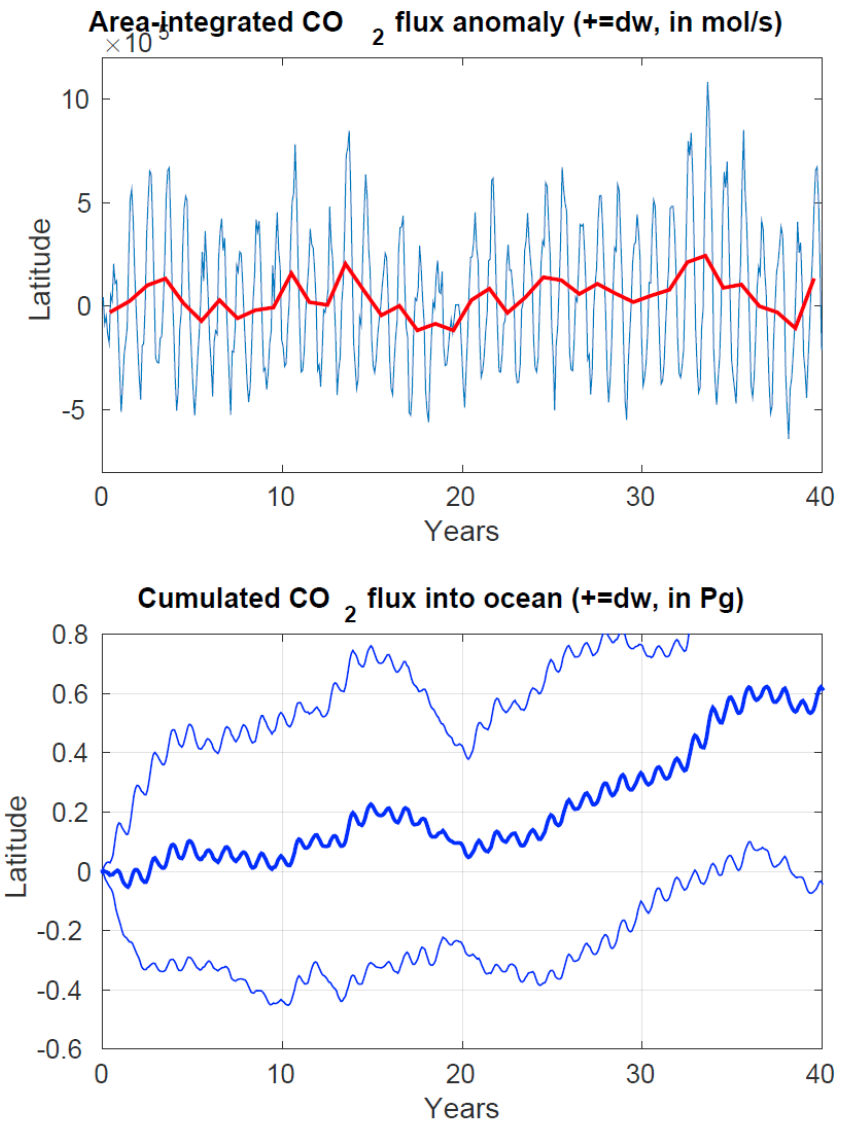


Fig.2



Because of the dipole pattern, the net globally integrated flux response is relatively small (Fig. 2, top; blue for the seasonal response and red for the annual mean). It is however slightly positive on annual mean (i.e. dominated by the increase CO2 intake on the equatorward flank on the ACC).

This results in a net increased storage of CO2 into the ocean in response to the ozone perturbation -- but note the small effect: less than a 1 Pg of carbon after 40 years (thick line), a small effect compared to the natural variability (thin lines, +/- one standard deviation from the 20-member ensemble).