

1           **Supplementary Information - Hypersensitivity of**  
 2           **Southern Ocean air-sea carbon fluxes to background**  
 3           **turbulent diapycnal mixing**

4           **Elizabeth Ellison<sup>1</sup>, Ali Mashayek<sup>2</sup>, Matthew Mazloff<sup>3</sup>**

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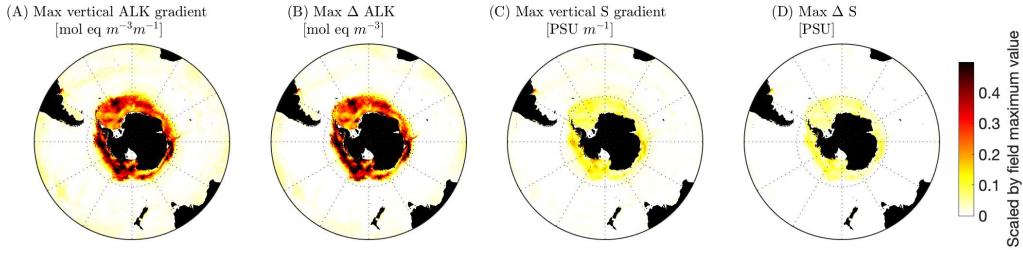


Figure 1: (A) Maximum vertical Alkalinity gradient in the water column for Ex1e-5, scaled by the maximum vertical Alkalinity gradient of the field. (B) Maximum change in Alkalinity between Ex1e-4 and Ex1e-5, scaled by the maximum difference in Alkalinity of the field. (C,D) Same as A and B but for Salinity. The maximum change in Alkalinity (Salinity) is defined as the greatest difference in Alkalinity (Salinity) concentration between the two experiments at any depth above 200 m at each latitude and longitude in the domain. Shown for December 2012, the first month of all experiments.

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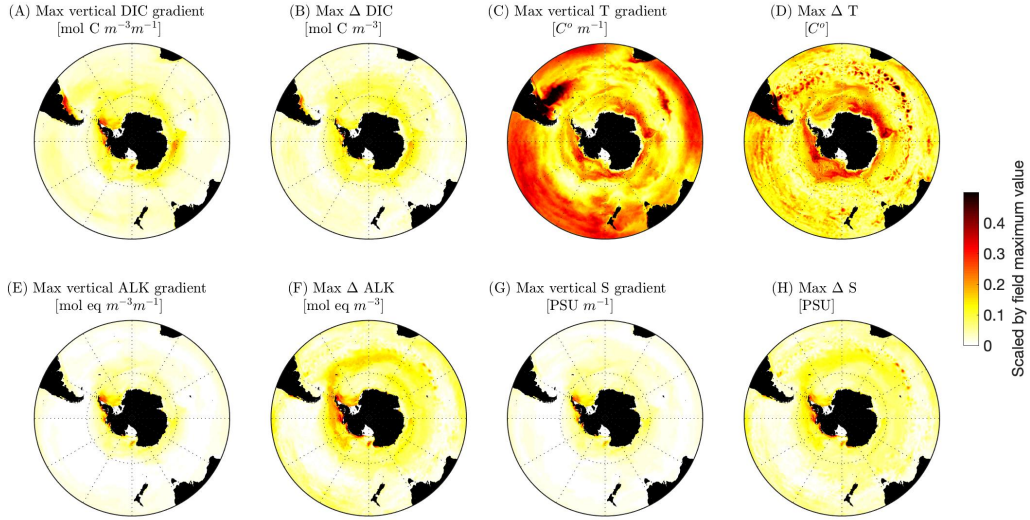


Figure 2: (A) Maximum vertical DIC gradient in the water column for Ex1e-5, scaled by the maximum vertical DIC gradient of the field. (B) The maximum change in DIC between Ex1e-4 and Ex1e-5, scaled by the maximum difference in DIC of the field (C,D) Same as A and B but for Temperature. (E,F) Same as A and B but for Alkalinity. (G,H) Same as A and B but for Salinity. The maximum change in each tracer is defined as the greatest difference in concentration between the two experiments at any depth above 200 m at each latitude and longitude in the domain. Shown as an average of January 2013 to December 2018.

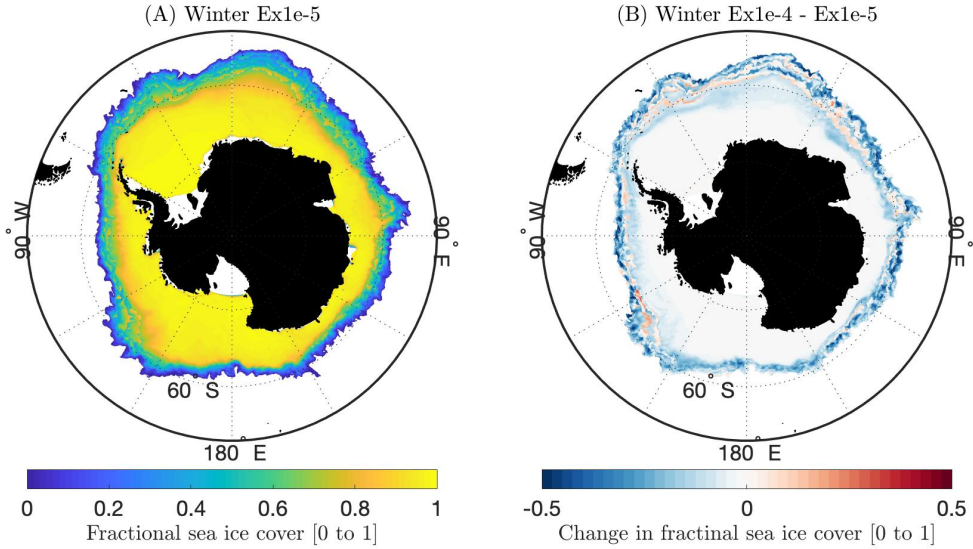


Figure 3: (A) Winter (June to August 2013 to 2018) sea ice extent, Ex1e-5. (B) Change in winter sea ice extent (Ex1e-4 - Ex1e-5).