Supporting Information for "Space and Time Variability of the Southern Ocean Carbon Budget"

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Introduction This supplementary material contains the figure discussed in sections 3.4.1 and 3.5. The analysis shows the spectral density of the dissolved inorganic carbon (DIC) budget, which identifies at which frequency the energy of each component of the budget is concentrated. Most of the energy is concentrated at the annual and semiannual periods. Some important features include:

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1. the most energetic term is associated with the divergence of DIC advection (ADV), with energy increasing with the time period;

2. for periods longer than 45 days, the tendency of DIC ($TEND$) shows a flat (i.e. white) spectra, while its energy drops for shorter periods;

3. freshwater fluxes ($DILUT$) has an almost white spectrum, meaning that the energy is similar for any temporal scale;

4. air–sea CO_2 fluxes have a white spectrum for periods shorter than 6 months, with energy increasing at longer periods;

5. diffusive transport ($DIFF$) and biological mechanisms (BIO) show a similar spectrum, with, as for ADV, higher energy at longer periods.

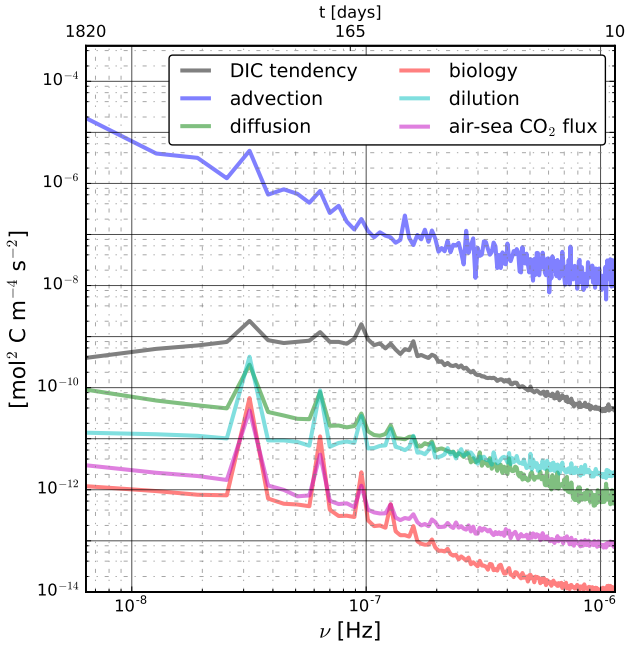

Figure S1. Zonal and meridional average of the frequency spectrum of the 0–650 m mean DIC budget terms (equation 7): the DIC tendency (black), divergence of advective DIC transport (blue), diffusive mechanisms (green), biological processes (red), surface air–sea CO_2 flux (magenta), and freshwater flux contribution (cyan).