Supplementary material for:

Examining Southern Ocean cloud controlling factors on daily timescales and their connections to midlatitude weather systems

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Submitted to Journal of Climate

December 2018

Revised

March 2019

May 2019

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FIG. S1. Composites of daily longwave CRE (LWCRE) anomalies (W m$^{-2}$) over the Southern Ocean (45°S–60°S) during austral summer (DJF), plotted as a function of the coinciding anomalies in EIS (y-axis, K) and $\omega_{500}$ (x-axis, Pa s$^{-1}$). The observed composite is shown in panel a, and the average of the composites from 10 CMIP5 models is shown in panel b. The dashed lines in each panel are placed at EIS' = 0 and $\omega_{500}' = 0$ to distinguish the four quadrants of the phase space.
FIG. S2. Composites of daily anomalies of cloud controlling factors around the centers of extratropical cyclones over the Southern Ocean (45°S–60°S) during DJF from the ERA-Interim reanalysis (2001–2016). The left column represents the structure of extratropical cyclones when using daily minima in oceanic sea level pressure to identify cyclone centers (as shown in the left column of Fig. 3 of the main manuscript). The right column depicts the structure of extratropical cyclones when using the Hodges (1994, 1995, 1999) feature tracking algorithm to identify cyclone centers. The cyclone tracking is performed following the procedure outlined in Grise et al. (2013). The top row (a, b) shows composites of $\omega_{500}$ anomalies (Pa s$^{-1}$), the middle row (c, d)
shows composites of EIS anomalies (K), and the bottom row (e, f) shows where the different
dynamical regimes (quadrants of Fig. 2 of the main manuscript) are located in the context of a
composite SH extratropical cyclone.
FIG. S3. Joint histogram of EIS and $\omega_{500}$ anomalies within the EIS-$\omega_{500}$ phase space in observations (a) and models (b) for oceanic grid points during austral summer (DJF) over the Southern Ocean (45°S-60°S). Shading represents the percentage of grid points that fall into each bin of the EIS-$\omega_{500}$ phase space.
As in the top two rows of Fig. 3, but for composites of daily anomalies in potential temperature at (top row) 700 hPa and (bottom row) the surface.
Fig. S5. Percent occurrences of the four dynamical regimes around the composite cyclone for observations (a-d) and models (e-h). (a) and (e) are for the occurrences of Q1 anomalies (blue), (b) and (f) for Q2 anomalies (green), (c) and (g) for Q3 anomalies (red), and (d) and (h) for Q4 anomalies (yellow). The shaded areas represent where the regimes occur on average (as shown in Figs. 3e and 3f), and the black contours represent the percentage of individual cyclones that possess the selected quadrant’s anomalies across the entire phase space.
References


