



Eddy response to variable atmospheric forcing in the Southern Ocean

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Satellite altimeter data of the Southern Ocean (SO) reveal an anomalous peak in eddy kinetic energy (EKE) in the Antarctic Circumpolar Current (ACC) in 2000-2002. This peak has been attributed to a delayed response to an earlier peak in the Southern Annular Mode (SAM) and its associated circumpolar eastward winds that occurred around 1998, where the delay is due to the formation and adjustment of the eddy field associated with the increased winds (Meredith & Hogg, 2006). A more recent analysis reveals that the EKE response varies regionally, with the strongest response in the Pacific, and it has been suggested that this variability is due to the additional influence of ENSO. The 2000-2002 peak in EKE is therefore attributed to the coincident peak in SAM and ENSO 2-3 years earlier, and that the EKE response was weaker in past years when modes were out of phase (Morrow & Pasquet, 2008).

We investigate this issue by applying SAM-like and ENSO-like wind forcings to Q-GCM, the eddy-resolving model used in Meredith & Hogg and configured for the Southern Ocean. We analyze the EKE response to each individual forcing as well as a simultaneous forcing of the two, both in and out of phase. From these results, we are able to quantify both the global and regional response to each forcing, and the degree to which each mode is responsible for the EKE strength and distribution across the ACC.