



## **Baroclinic anomalies associated with the Southern Hemisphere Annular Mode: the roles of synoptic and low-frequency eddies**

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Using the ERA40 reanalysis data, we study the baroclinic anomalies associated with SAM, in which the different roles of synoptic and low frequency eddies in sustaining the baroclinic anomalies are investigated. We find that the latitudinal displacement of the jet is followed by a low-frequency latitudinal shift of the low-level baroclinicity. The eddy effect on the low-level baroclinicity shift is examined by assessing the direct eddy thermal forcing and the indirect forcing through eddy-driven mean meridional circulation (MMC). The analysis shows that, in addition to the MMC induced by synoptic eddies, the direct eddy thermal forcing by low-frequency eddies plays an important role in driving the latitudinal shift of the low-level baroclinicity. These two processes, working together, prevail over the direct baroclinicity diffusion of synoptic eddies. The important roles of the synoptic eddy momentum and heat flux induced MMC in sustaining the baroclinicity anomalies are emphasized, with the former leading the shift and the latter enhancing the persistent shift. Our work further indicates that the different roles played by the synoptic and low-frequency eddies are related to their distinct latitudinal distributions of the low-level critical line and eddy heat flux relative to the midlatitude jet.