

## Seasonality of the subtropical high over the South Indian Ocean and its influence on the low-level clouds

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Over the South Indian Ocean, there is notable seasonality in the subtropical high. In summer the high resides over the eastern portion of the basin, while it strengthens in winter and shifts westward toward the seasonally-enhanced Agulhas storm-track core. As revealed from our analysis, low-level thermal contrast between the Australian Continent and southeastern Indian Ocean is important for the formation of the high in summer, while eddy-feedback forcing due to the enhanced Agulhas storm-track activity maintained by the strong SST gradient along the Agulhas Return Current is effective for the maintenance of the high in winter. In winter a Rossby wave activity flux is convergent into the upper-tropospheric high from lower and higher latitudes.

The present study also investigates how the seasonality of the high can influence the formation of low-level clouds, which are important for the Earth's radiation budget. The MODIS satellite data reveal that stratocumulus clouds are dominant in summer off the west coast of Australia, where near-surface cold advection and descending motion are enhanced in summer with the development of the subtropical high. In winter, low-level clouds form more extensively over the subtropical ocean than in summer. To the north of the subtropical SST frontal zone, however, cumulus clouds rather than stratocumulus clouds are prevalent, owing to enhanced latent heat flux from the warm ocean under the trade winds, which is likely to induce "decoupling". Our analysis highlights the importance of the combined effect among the subtropical high, SST and its gradient in determining the local properties of low-level clouds and their seasonality.

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