

Supplementary Information for

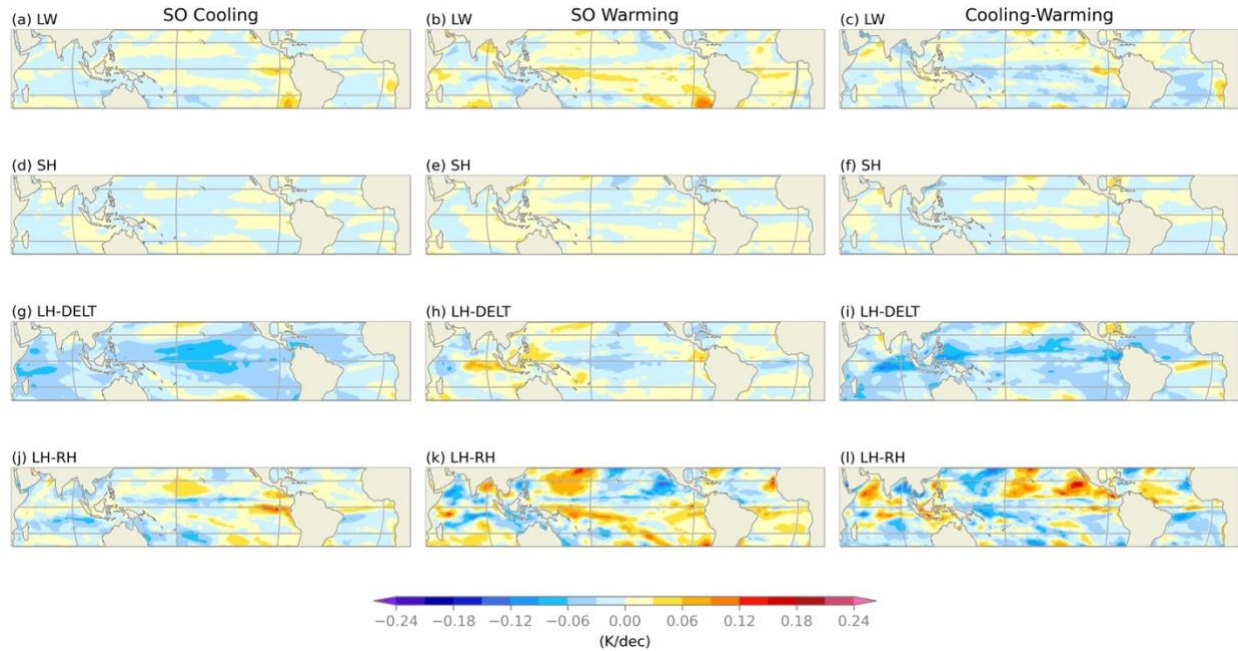
**Tropical and Antarctic sea ice impacts of observed Southern Ocean warming and cooling trends  
since 1949**

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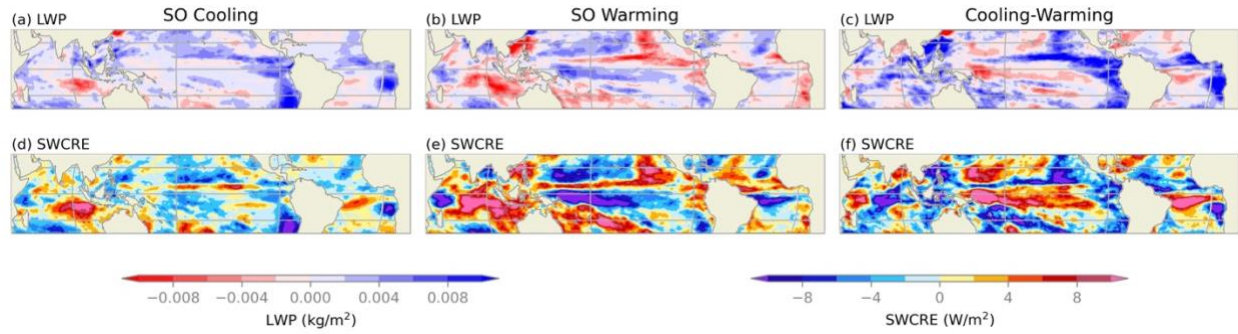
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**Figure S1. SO-driven SST contribution from less dominant terms.** (a–c) Surface net longwave flux, (d–f) sensible heat flux, (g–i) latent heat flux due to changes in air-sea temperature difference, and (j–l) latent heat flux due to changes in near-surface relative humidity for the SO cooling period (left column), SO warming period (middle column), and the SO cooling–warming difference (right column).



**Figure S2. SO-driven trends of cloud-related variables.** (a-c) Liquid water path and (d-f) surface shortwave cloud radiative effects for the SO cooling period (left column), SO warming period (middle column), and the SO cooling–warming difference (right column).