

ATS/CIRA Colloquium

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Enhanced CO₂ outgassing in the Southern Ocean from a positive phase of the Southern Annular Mode

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ATS room 101; Discussion will begin at 3:30pm

Refreshments will be served at 3:00pm in the coffee lounge

An ocean model is used to investigate the interannual variability in the flux of CO₂ between the atmosphere and the Southern Ocean, with particular emphasis on the role of the Southern Annular Mode (SAM). Approximately half of the air-sea CO₂ flux variability is coherent with the SAM. The positive phase of the SAM is found to be associated with anomalous outgassing of CO₂ nearly everywhere in the Southern Ocean. Budget analyses indicated that the primary cause of the outgassing is enhanced surface pCO₂, caused by elevated dissolved inorganic carbon (DIC) concentration. These anomalies in DIC are primarily a result of the circulation changes associated with the southward shift and strengthening of the zonal winds during positive phases of the SAM. If the current secular trend in the SAM persists, the CO₂ flux anomalies from the Southern Ocean could have a substantial positive feedback on the global carbon cycle.