

Wind-driven sea ice changes intensify warm water intrusion to the West Antarctica Ice Shelf

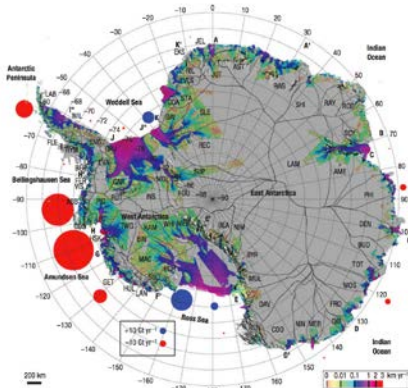
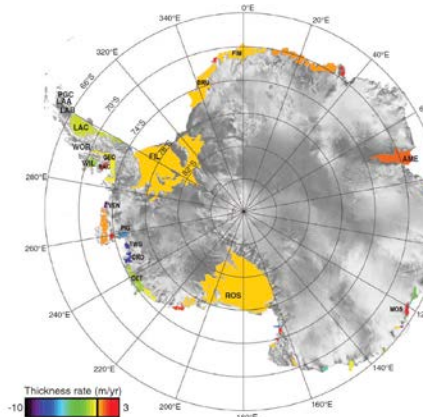
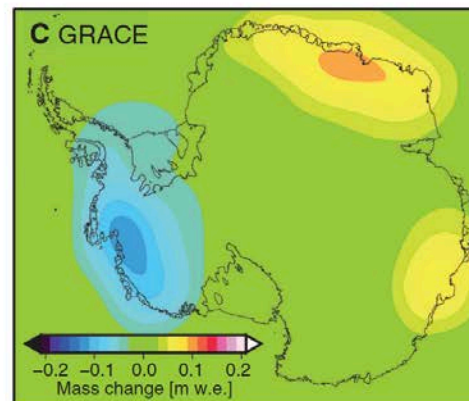
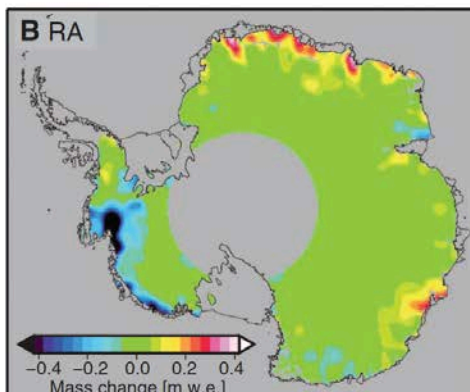
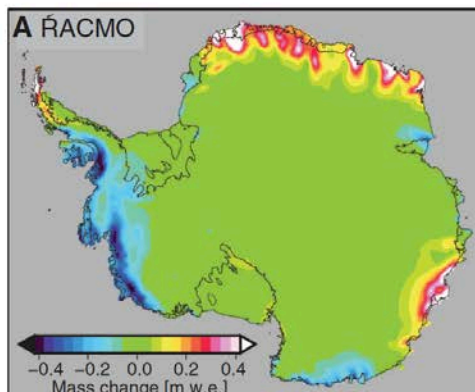
Xichen Li; Sarah Gille; Shang-Ping Xie; David Holland; Marika Holland

Take Home Points

- ▶ The Changes in Wind Forcing may Contribute to the Observed Ocean and Sea Ice Changes around West Antarctica
- ▶ The Sea Ice Changes may intensify the Brine Rejection
- ▶ The Stratification Changes make the Sub-surface Ocean Warmer and Saltier

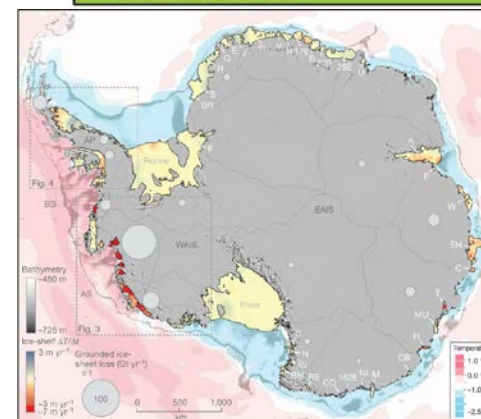
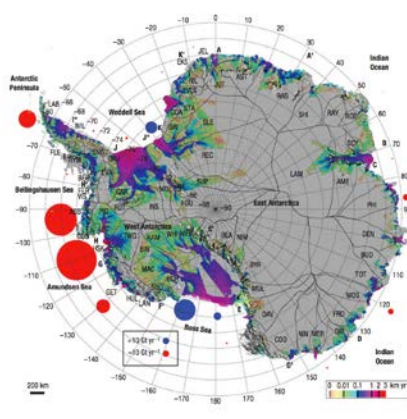
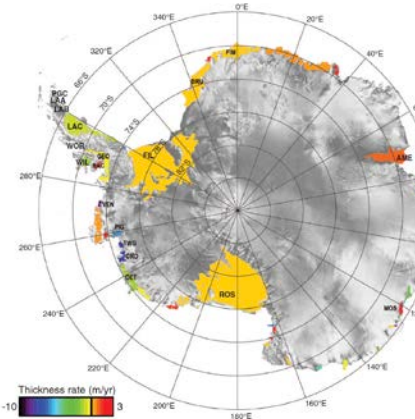
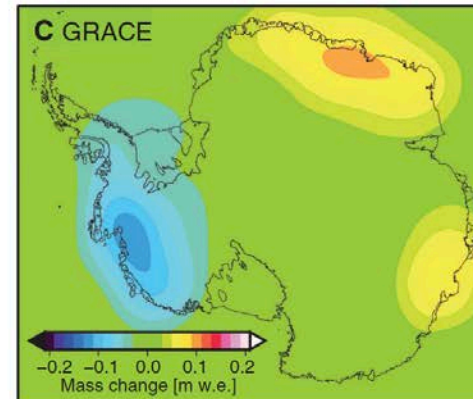
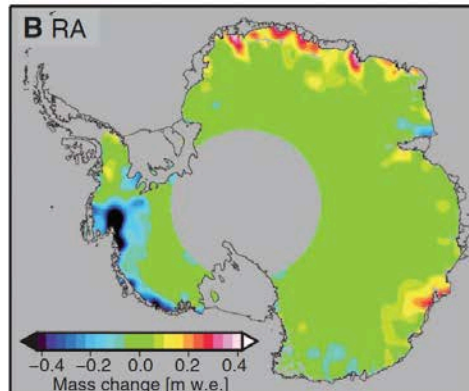
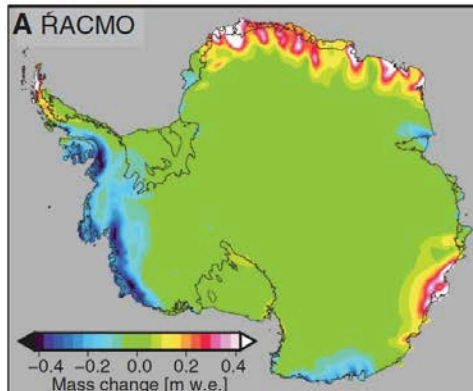


West Antarctic Land Ice Melting



- **Shepherd et al,** 2012
- **Rignot et al,** 2012
- **Joughin et al,** 2012

West Antarctic Land Ice Melting

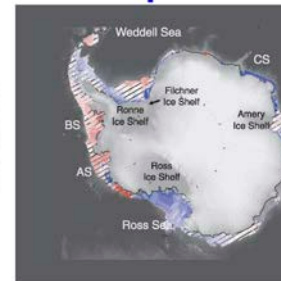


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- **Rignot et al,** 2012
- **Joughin et al,** 2012

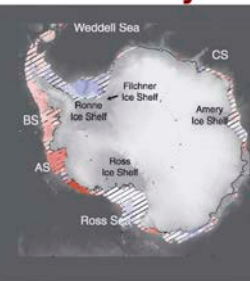
- **Pritchard et al,** 2009, 2012

Zonal Asymmetry In Antarctic Climate Changes

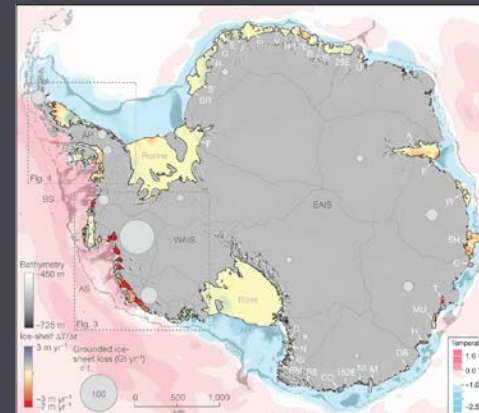
**Subsurface
Temperature**



**Subsurface
Salinity**

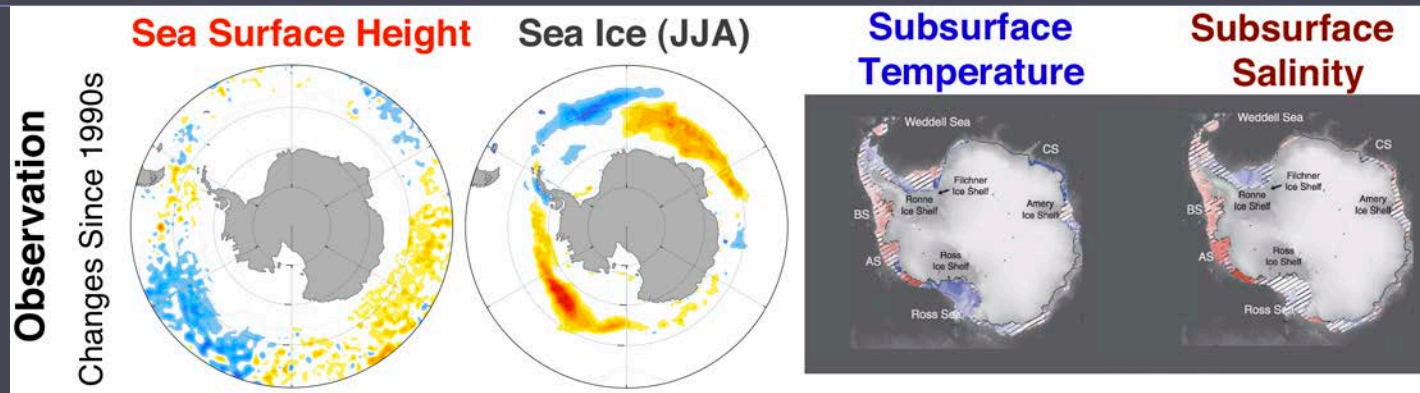


Land Ice Melting

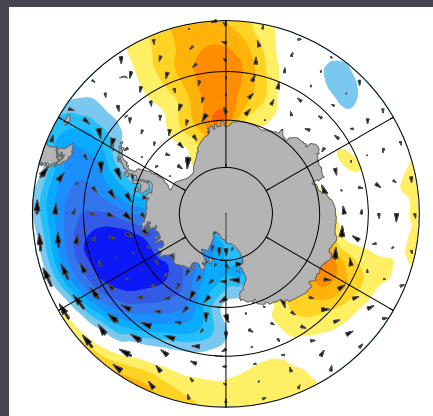


- **Pritchard et al,** 2009
- **Schmidtke et al,** 2014

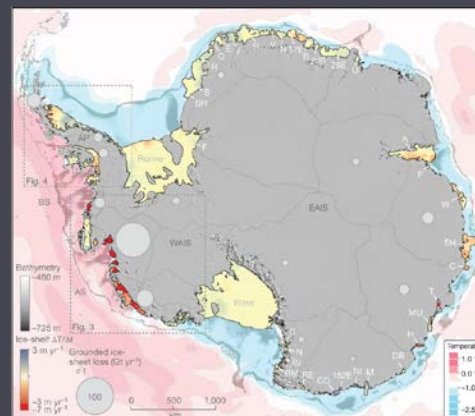
Zonally Asymmetric In Antarctic Climate Changes



Trend of Surface Circulation



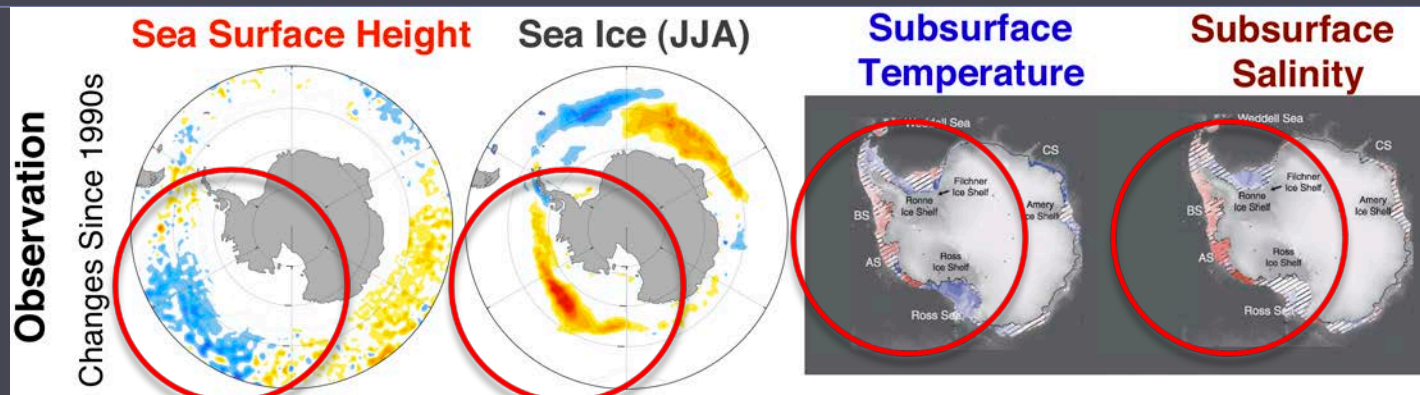
Land Ice Melting



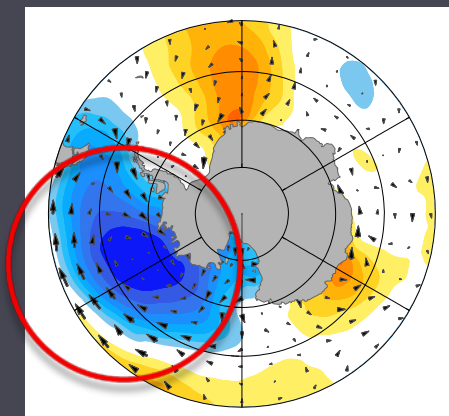
- **Holland and Kwok,** 2012
- **Yuan and Martinson,** 2000
- **Stammerjohn et al,** 2008

- **Pritchard et al,** 2009
- **Schmidtke et al,** 2014

Zonally Asymmetry In Antarctic Climate Changes



Trend of Surface Circulation



Land Ice Melting



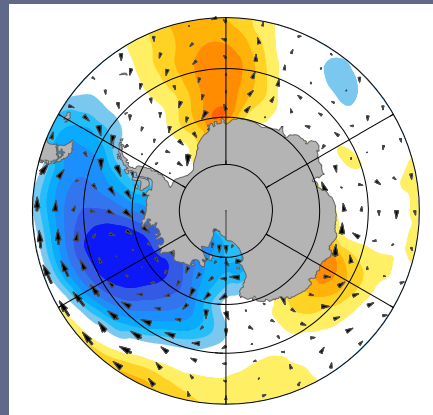
- **Holland and Kwok,** 2012
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Is there any relation between these zonal asymmetric patterns?

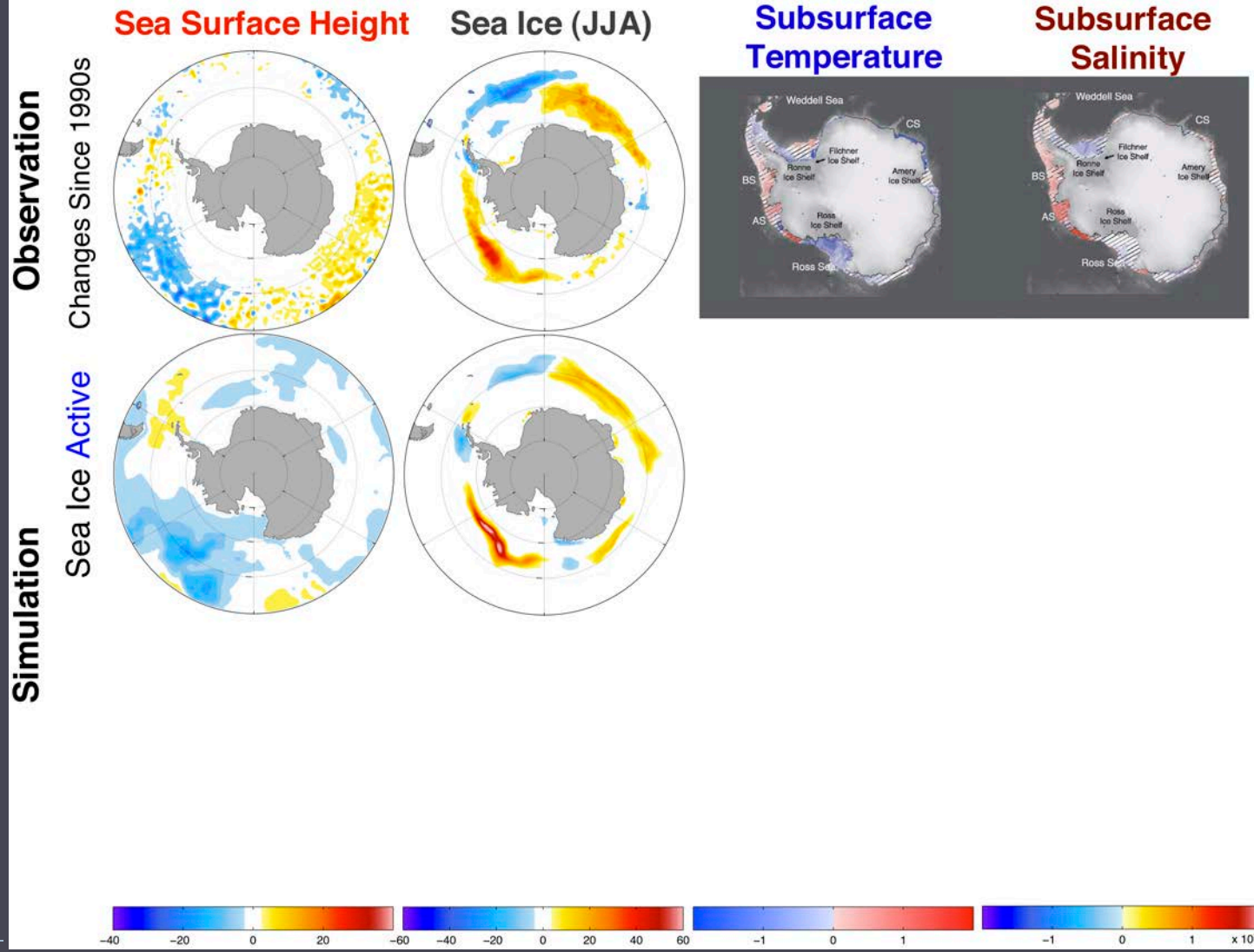
Wind Changes Force Ocean and Sea Ice

Atmospheric Changes as a Forcing

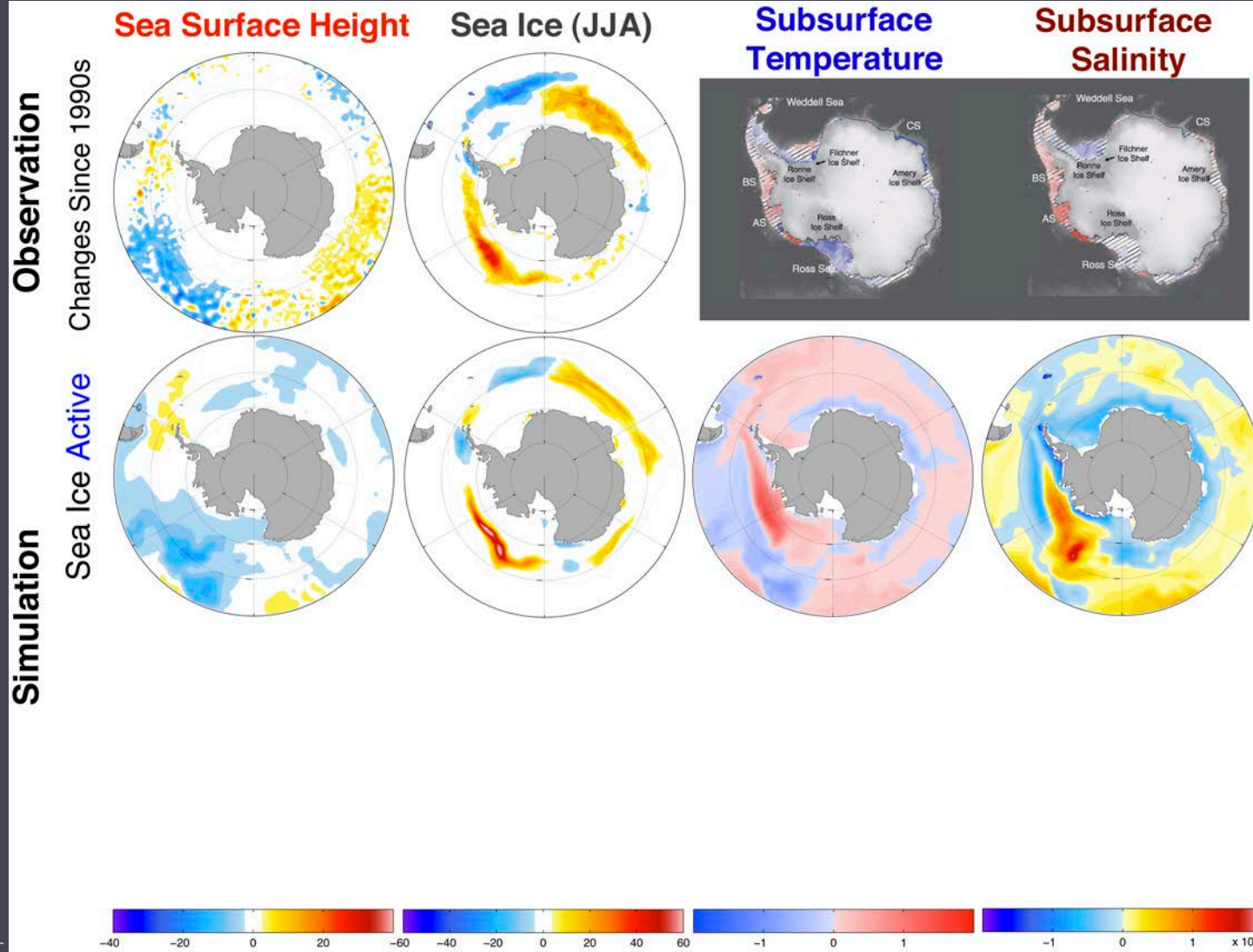


+ POP
CICE

Why We care about the Deepened Amundsen Sea Low?

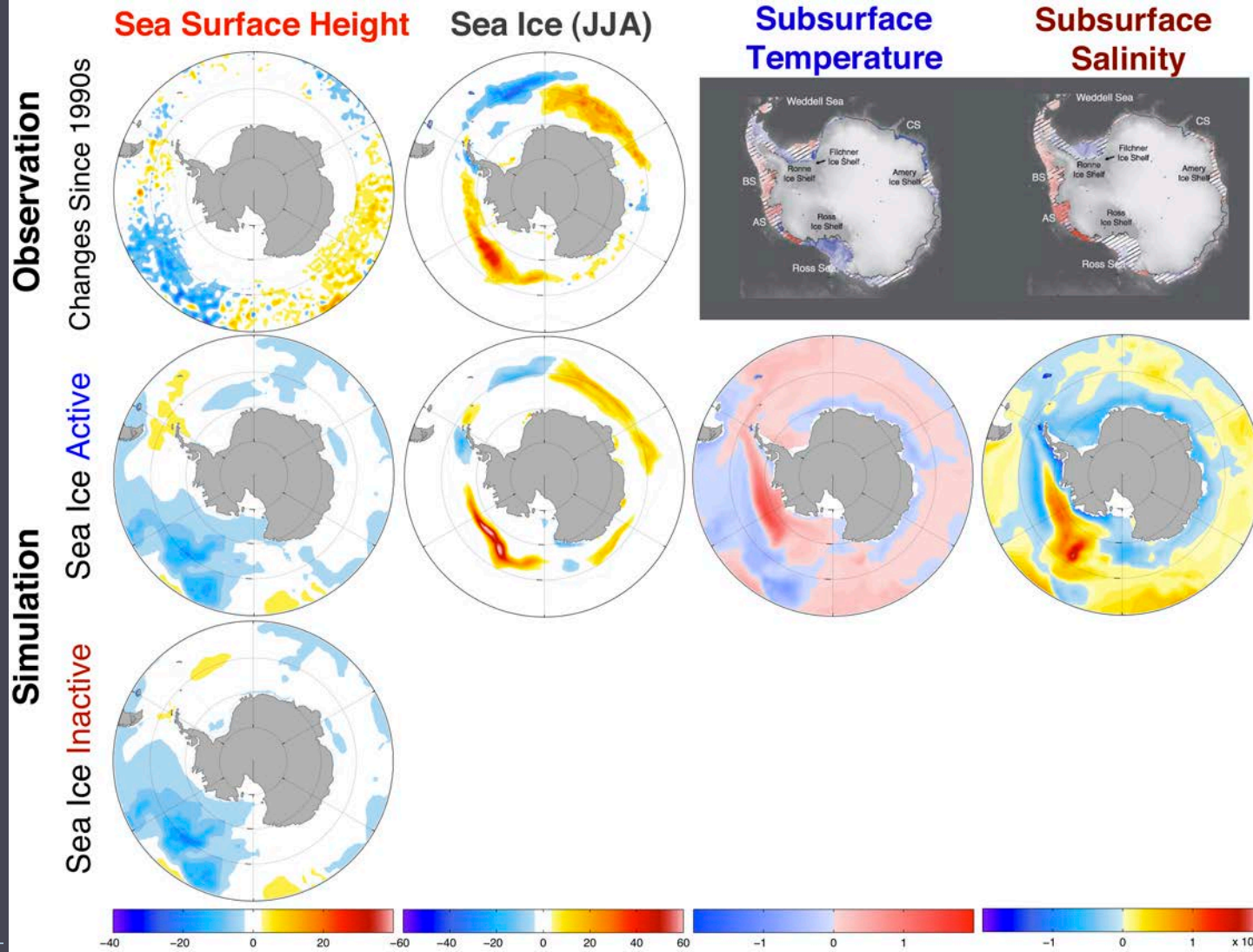


Why We care about the Deepened Amundsen Sea Low?

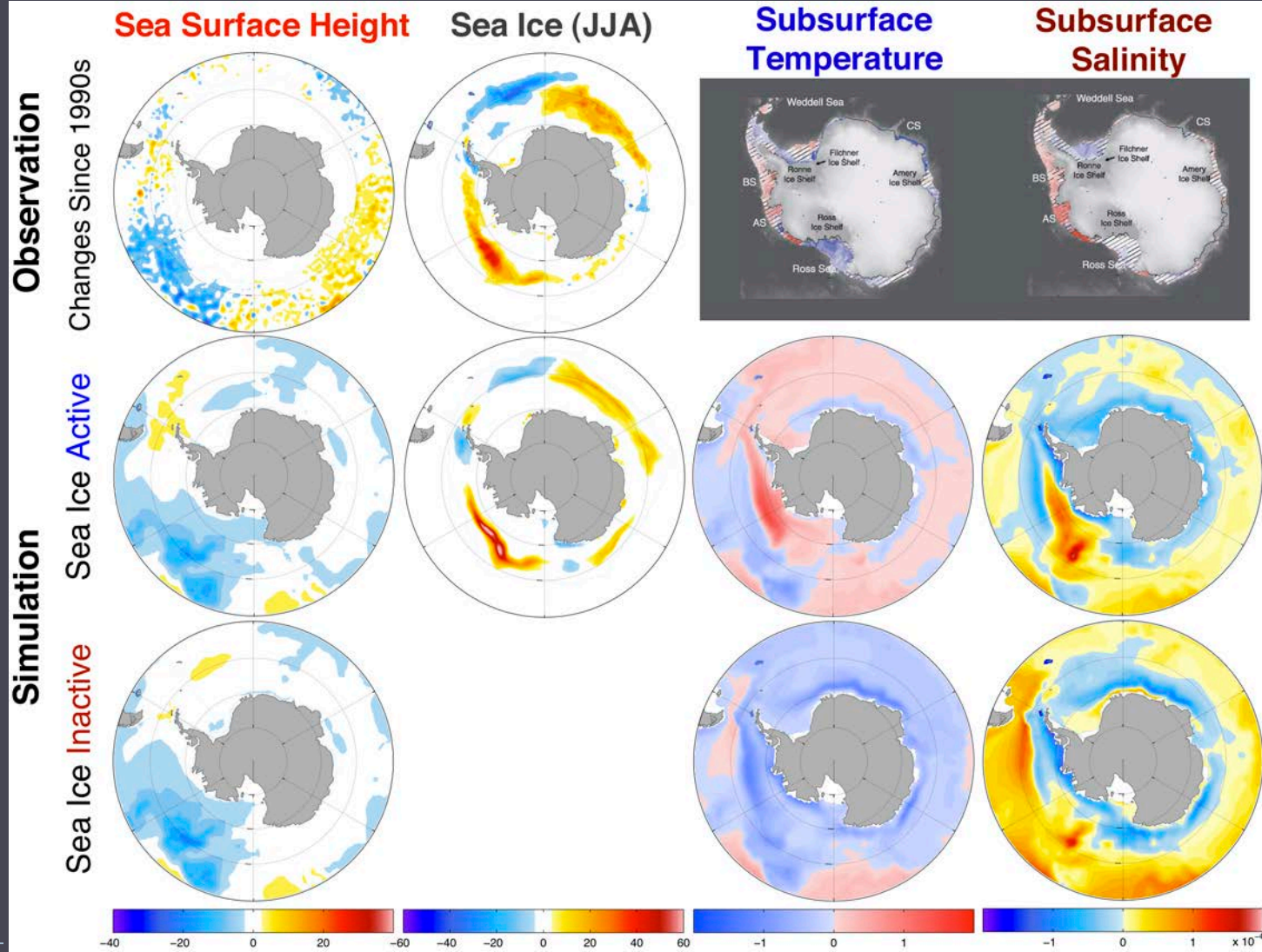


The Role of Sea Ice

Why We care about the Deepened Amundsen Sea Low?

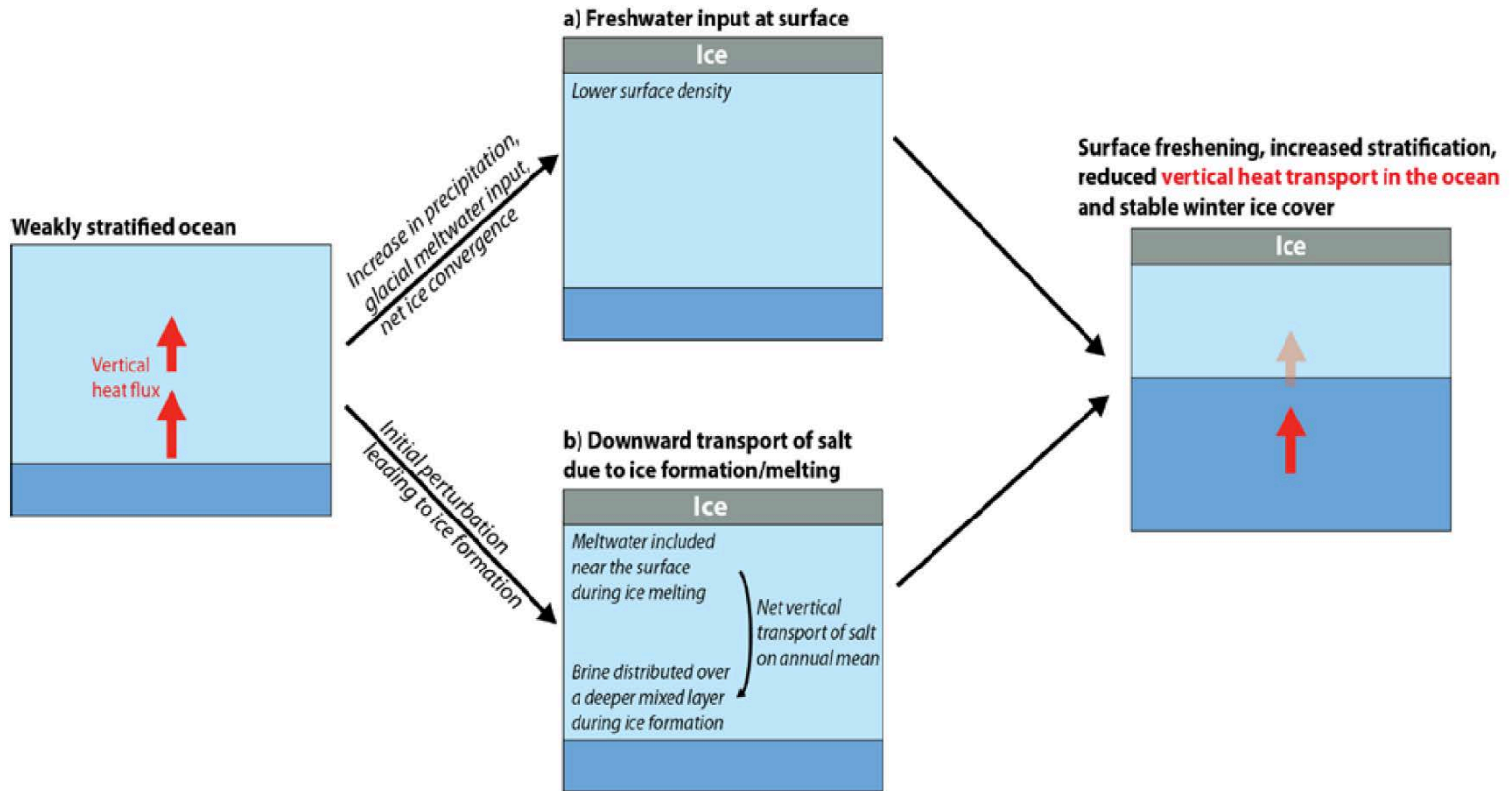


Why We care about the Deepened Amundsen Sea Low?



Mechanisms

Brine Rejection



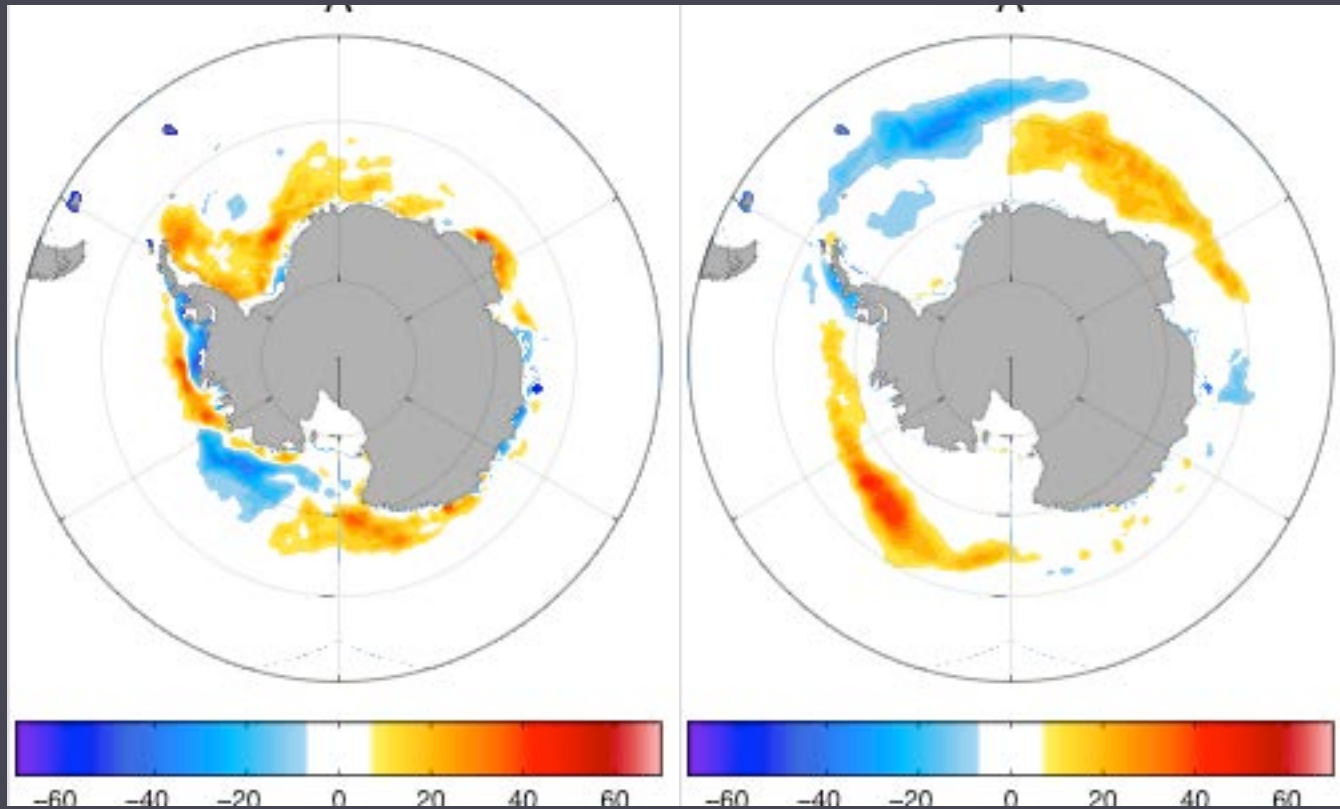
Goosse and Zunz,

2014

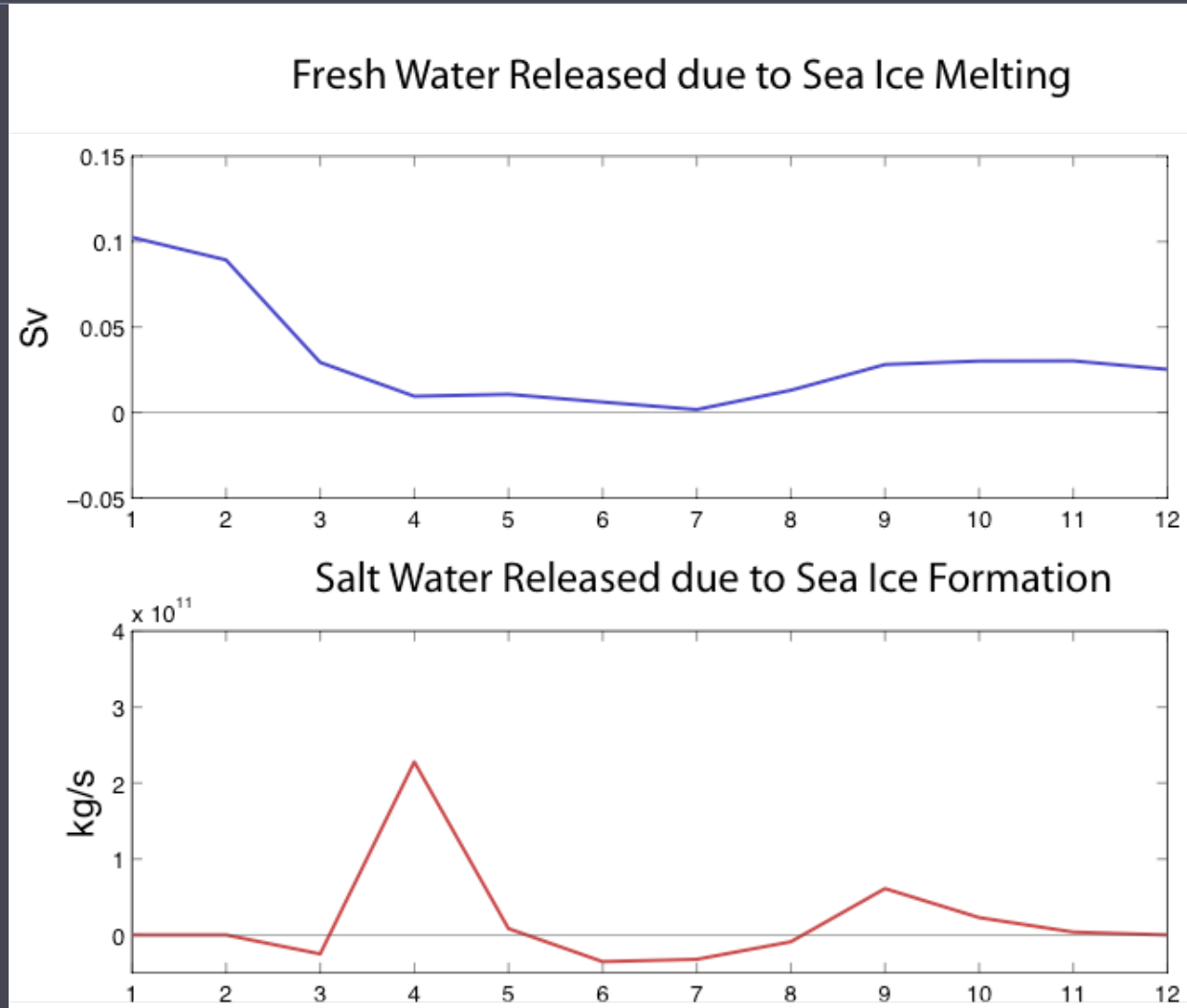
Sea Ice Trend

DJF

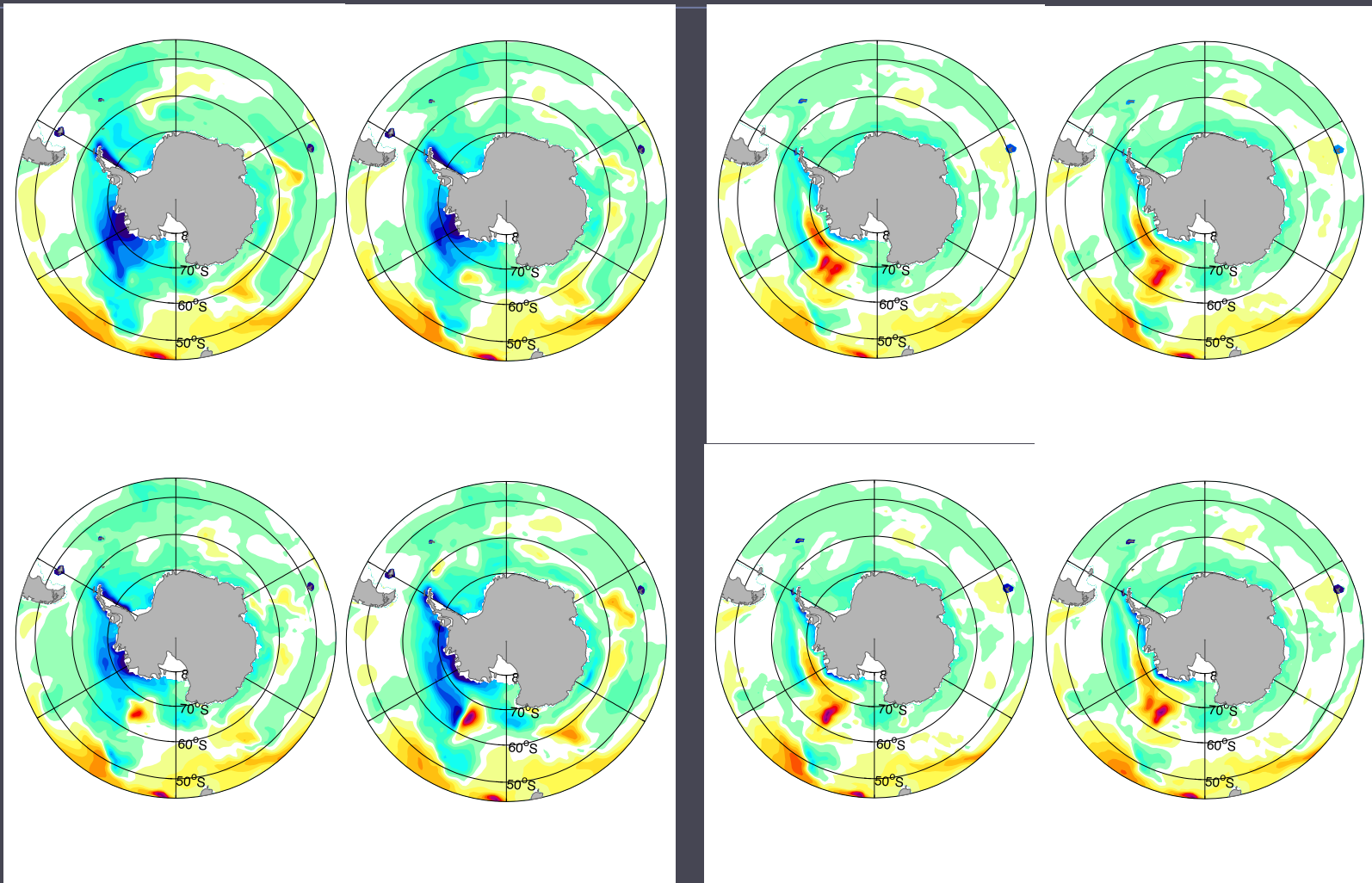
JJA



Seasonality of the fresh and salt water flux

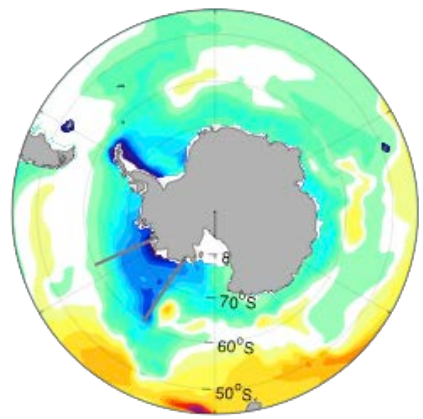


Regionality of the fresh and salt water flux

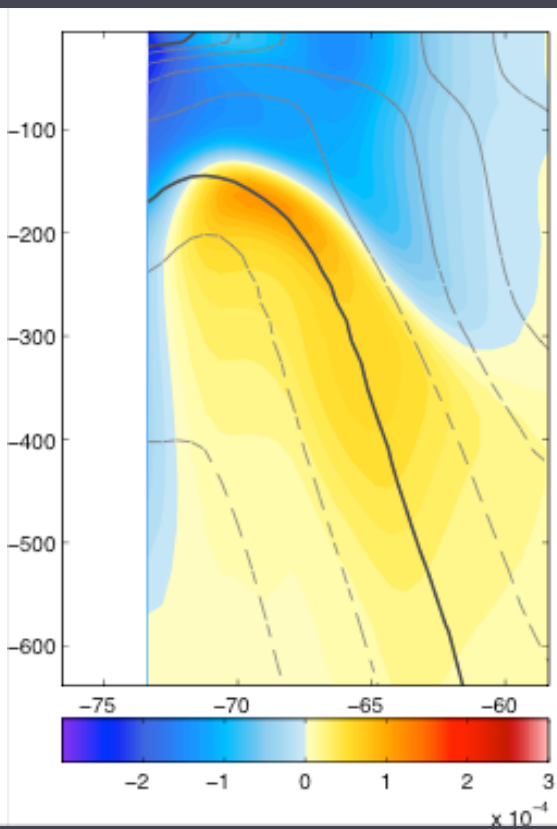
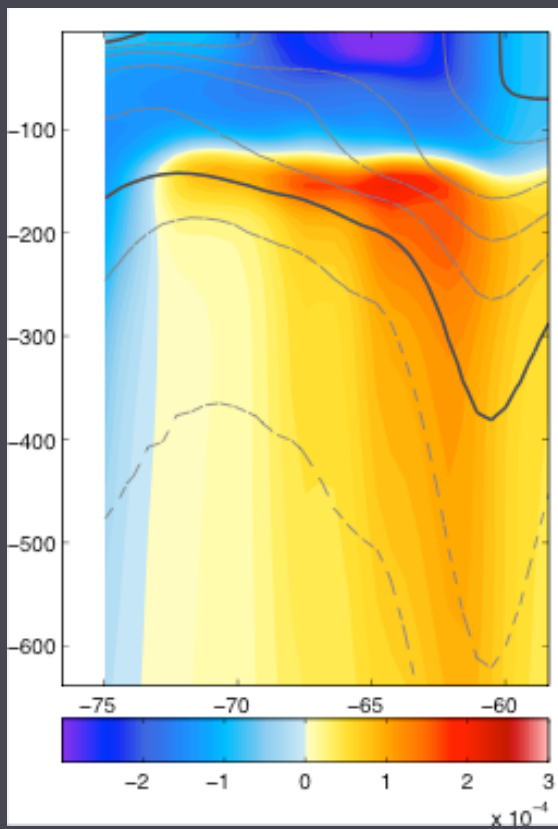
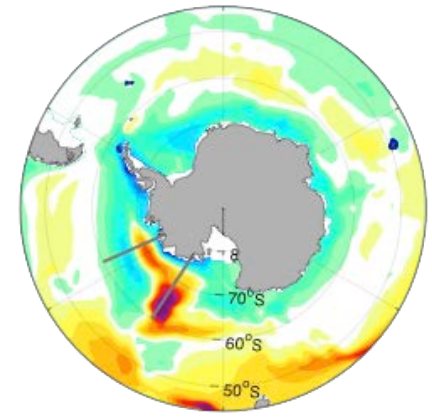


Vertical Salinity Profile

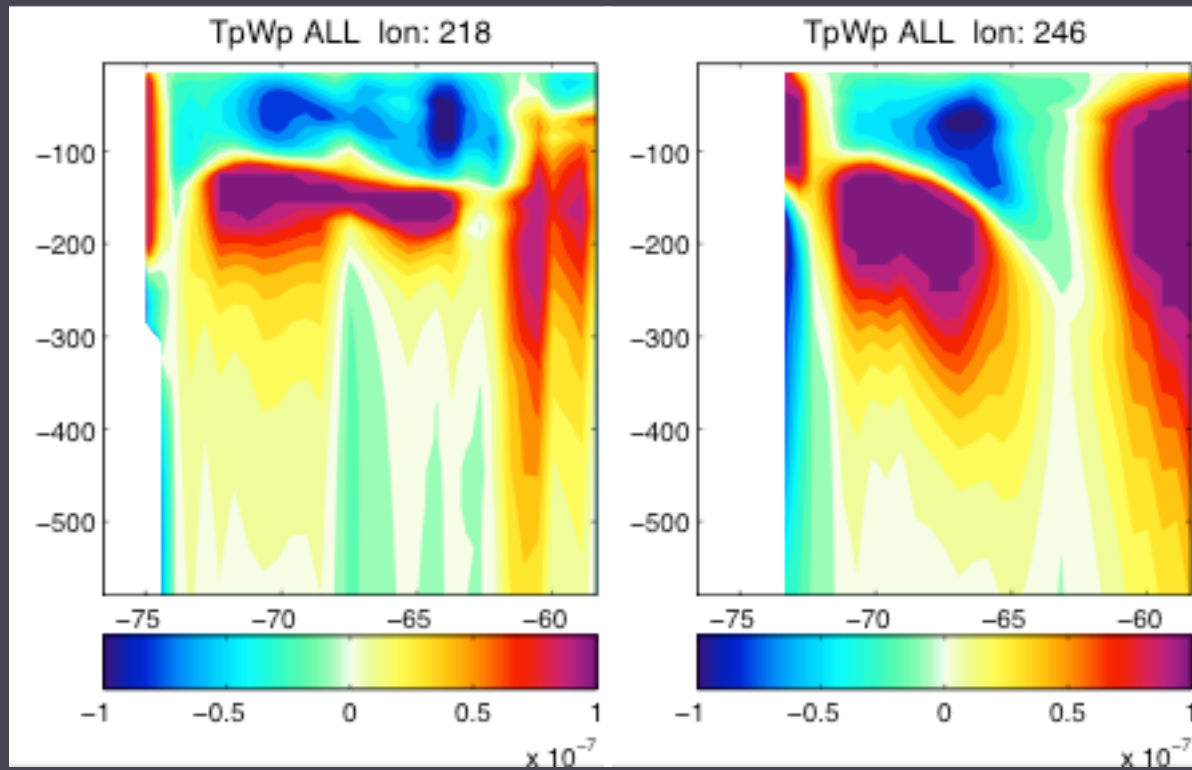
Salinity Changes at 100m



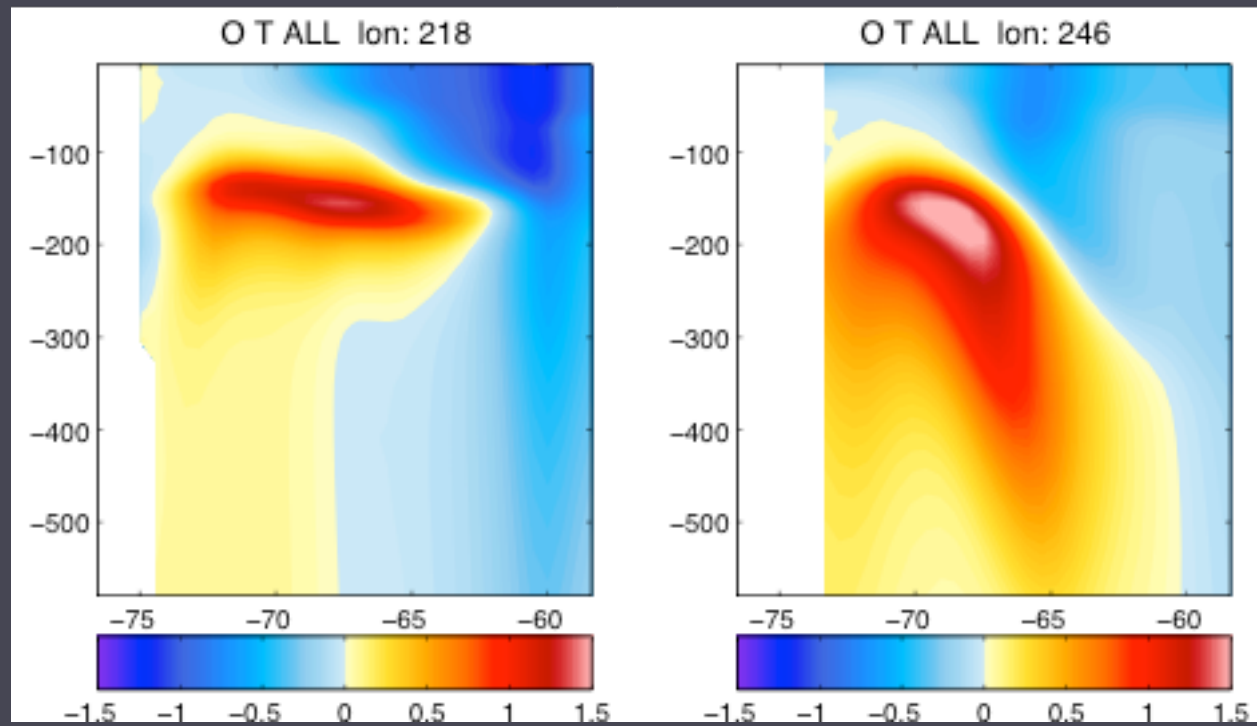
Salinity Changes at 150m



Vertical Heat Transport



Vertical Temperature Profile



Discussion

- ▶ The Wind Forcing Changes may Contribute to the Observed Ocean and Sea Ice Changes Around West Antarctica
- ▶ The Seasonality and Regionality of the Sea Ice Changes may intensify the Brine Rejection
- ▶ The Stratification Changes make the Sub-surface Ocean Warmer and Saltier

Thank you 😊