ENSO and SAM Influence on Regional Climate: Antarctic Peninsula vs. West Antarctica

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Overview

1. The Amundsen-Bellingshausen Seas Low (ABSL)

2. ENSO and SAM relationship with ABSL during austral spring (September – November; SON)

3. ENSO and SAM relationship with Antarctic Peninsula climate during SON

4. Significance of combined ENSO/SAM events on regional circulation

5. Varying circulation features associated with warm events across West Antarctica in SON
The Amundsen-Bellingshausen Seas Low (ABSL)

*The ABSL is important because:

1. It is the dominant atmospheric circulation feature along the coast of West Antarctica

2. Its position and intensity significantly influences temperature advection and sea ice across the Antarctic Peninsula and West Antarctica

High latitude South Pacific (55°-75°S), mainly across the Amundsen and Bellingshausen Seas (180°-60°W)
ENSO and SAM relationship with ABSL magnitude (minimum pressure) during SON
SOI, SAM, and ABSL MSLP
10-Year Running Correlations (SON)

From Clem and Fogt, *JGR*, in press
SOI, SAM, and ABSL MSLP
10-Year Running Correlations (SON)

From Clem and Fogt, JGR, in press
ABSL pressure anomaly composites:

An independent investigation on the atmospheric conditions driving ABSL pressure variations
ABSL Weak/Strong Events vs. Climatology (SON)

5 weakest ABSL events

5 strongest ABSL events
Ant. Peninsula Cold Events vs. Climatology (SON)

MSLP Anomalies

West Peninsula

Northeast Peninsula

Modified from Clem and Fogt, *JGR*, in press
Ant. Peninsula Warm Events vs. Climatology (SON)

MSLP Anomalies

West Peninsula

Northeast Peninsula

Modified from Clem and Fogt, *JGR*, in press
Significance of ENSO/SAM combinations:

Case study of 1988 SON La Niña/SAM-
1988 La Niña/SAM- Anomalies and Significance

Compared to SON La Niña

Compared to SON Climatology

Modified from Clem and Fogt, *JGR*, in press
West Antarctica temperature anomaly composites:

An independent investigation on the atmospheric conditions driving WAIS surface temperature variations
West Antarctica **Warm Events vs. Climatology (SON)**

Mean Sea Level Pressure (MSLP)

- **72°S-85.5°S, 75°W-156°W (ALL)**
- **115.5°W-156°W (Western)**
- **75°W-115.5°W (Eastern)**
West Antarctica **Warm Events** vs. Climatology (SON)

**Meridional Wind**

- **72°S-85.5°S, 75°W-156°W (ALL)**
- **115.5°W-156°W (Western)**
- **75°W-115.5°W (Eastern)**

Meridional Wind Anomalies and Significance
West Antarctica ERA-Int. Temperature Trends (SON)

1979-2012 Temperature & Slope ± 95% CI

72°S-85.5°S, 75°W-156°W (ALL)

115.5°W-156°W (Western)

75°W-115.5°W (Eastern)

Temperature & Slope ± 95% CI
Summary

1. The ENSO/SAM phase relationship in SON is related to the ENSO/ABSL magnitude relationship.

2. ENSO has a persistent relationship with W. Peninsula temperatures in SON.

3. SAM has a persistent relationship with N.E. Peninsula temperatures in SON.

4. More work is needed to determine the role of the tropics in the warmest SON events across West Antarctica.

5. The **location** of the regional circulation anomalies plays a greater role than their magnitude in driving SON temperature variations across West Antarctica.
Thank You!

Questions down the road? Email me at kc268406@ohio.edu
• **ABSL**: 55°S-75°S, 180°W-60°W  

• **W. Peninsula**: Faraday, Rothera  

• **N.E. Peninsula**: Esperanza, Marambio  

• **W. Ant (all)**: 72°S-85.5°S, 75°W-156°W  

• **W. Ant (west)**: 115.5°W-156°W  

• **W. Ant (east)**: 75°W-115.5°W  