IN SEARCH OF THE PERFECT WAVE:
VARIABILITY OF MARINE-TERMINATING GLACIER RESPONSE ALONG
THE WILKES LAND COAST TO DIVERSE OCEANOGRAPHIC CONDITIONS

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Changes at the margin of the Antarctic Ice Sheet

Vincennes Bay: Marine-Terminating Glacier Variability, 2007-2019

A changing ocean? Evidence of drawdown occurs near the grounding line/calving front, suggesting ocean influence

West Ice Shelf: Dynamic Collapse of Floating Ice and Polynya Effects

New rift detected after 20 years of stability

ICESat-2 views!

Basal melt rates & net thickness change between 1992-2019 (see poster #2058 by F. Paolo)

Oceanographic change

Ice surface velocities (Gardner et al., 2018) derived from repeat imagery by JPL auto-RIFT (autonomous Repeat Image Feature Tracking) using Landsat 4/5, 7, 8
• Changes since 2008 derived by differencing ~2008 InSAR (Rignot et al., 2011)

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West IS
Shackleton IS
Vincennes Bay
Totten/Moscow U
Porpoise Bay
George V Coast

VBS-LIVE project dh/dt since 1992

Depth (m)

Temperature (°C)

Estimated temperature profiles on shelf (left) using ECCO2 potential temperatures

Ocean heat content below 100 m; shows heat available to melt ice grounded at ~1 km. Ocean heat has been increasing on the continental shelf since 1992 (at a higher rate since 2008)

Correlation of monthly VB dry/drift to ocean temperatures above 500 m depth (3-month avg)

West IS is a contributor to Prydz Bay Current via the Barrier Bay Gyre and home to 2 penguin colonies

ICEsat-2 views!

Correlation of 200 m temperatures with ERA-interim-derived wind stress curl (negative = upwelling) Possible weakening of zonal wind (drives ACC) allows strengthening of westward Antarctic Coastal Current

West Ice Shelf calved a ~4700 km2 iceberg in 1992
• D15 grounded and became re-attached to WIS shortly
• Little to no rift or calving activity 1992-2013; split D15 in ~1 year
• Secondary rifts propagating from calving front
• Thickening occurring in western section of WIS; likely due to Barrier Bay polynya activity and grounding

Ice flow and calving rates

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Oceanographic change

Marine mammals Exploring the Ocean Pole-to-Pole (MEOP) e.g. Ross et al., 2015)
Averaged +/- 10 km radius sampling size

Region generally shows a decreasing trend in ocean heat content since 2009

Std. Anomaly of sea ice concentration; not significantly correlated to dh/dt