AGU 100 FALL MEETING
Washington, D.C. | 10–14 Dec 2018

DI31C-0025: Mantle transition zone beneath West Antarctica: Expanded mapping in previously unstudied region

Wednesday, 12 December 2018
08:00 - 12:20
Convention Ctr - Hall A-C (Poster Hall)

With the ongoing discussion of Earth structure under West Antarctica and how it relates to the extension and volcanism of the area, we explore the possibility of a hydrated or thermally perturbed mantle underneath the region. Using P-wave receiver functions, we focus on the Mantle Transition Zone (MTZ) and how its thickness fluctuates from the global average (240-260 km). Prior studies have explored the West Antarctic regions of Marie Byrd Land and the West Antarctic Rift, but we expand this to include ~3-5 years of recent, additional seismic data from the Amundsen Sea and Pine Island Bay regions. Several years of additional data from the Ronne-Fichtner Ice Shelf, Ellsworth Land, and Marie Byrd Land regions will help provide a more complete picture of the mantle transition zone. Data for this study was obtained from IRIS for earthquakes of a 5.5 magnitude or greater. We use an iterative, time domain deconvolution method, filtered with Gaussian widths of 0.5, 0.75, and 1.0. All events within their respective Gaussian filter have undergone quality check by removing waveforms that have lower than 85% fit and visually checking for clear outliers. We migrate the receiver functions to depth and stack, using both single station stacking and common conversion point (CCP) stacking. We migrate the CCP stacks assuming both 1D (AK-135) and 3D velocity models throughout the region. Preliminary results from single-station stacks beneath the Thurston Island and Amundsen Sea regions suggest that the MTZ thickness is similar to the global average and the depth to the transition zone appears to be depressed, with average transition zone boundaries appearing around 430 and 680 km. If the MTZ is thinner than the global average, it may be an indication for high temperature thermal anomalies or a plume under West Antarctica that may help explain the history of extension and uplift there. These results could be useful for glacial isostatic adjustment and/or geothermal heat flux models that attempt to understand ice sheet history and stability.

Authors

Alan Charles Horton
University of California Riverside

Erica Emry
Pennsylvania State University Main Campus

Samantha Elizabeth Hansen
University of Alabama

Jolante van Wijk
New Mexico Institute of Mining and Technology

John Paul O'Donnell
University of Leeds

Alex Brisbourne
NERC British Antarctic Survey

Graham William Stuart
University of Leeds

Sridhar Anandakrishnan
Pennsylvania State University Main Campus

Richard C Aster
Colorado State University

Audrey D Huerta
Central Washington University

Andrew Nyblade
Pennsylvania State University

Douglas Wiens
Washington University in St Louis

Jeremy Paul Winberry
Central Washington Univ

Terry J Wilson
Ohio State University

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