



HE14A-1916 - Kinematic Structure and Dynamics of the Denmark Strait Overflow

 Monday, 17 February 2020

 16:00 - 18:00

 SDCC - Poster Hall C-D

Abstract

The dense outflow through Denmark Strait is the largest contributor to the lower limb of the Atlantic Meridional Overturning Circulation. While its hydrographic structure is well documented, a full description of the velocity field across the strait remains incomplete. Here we analyze a set of 22 shipboard hydrographic and velocity sections occupied along the Látrabjarg transect at the Denmark Strait sill, obtained over the time period 1993-2018. The sections provide the first complete view of the kinematic components at the sill: the shelfbreak East Greenland Current (EGC), the combined flow of the Separated EGC and the North Icelandic Jet (NIJ), and the northward flowing North Icelandic Irminger Current (NIIC). We deconstruct the dense overflow in terms of water mass constituents and flow components, demonstrating that the combined EGC branches and NIJ transport comparable amounts. A strong cyclonic structure was present in two-thirds of the occupations, which is thought to be due to the combined effect of eddies and wind. Strong negative wind stress curl north of the strait intensifies the separated EGC, while the enhanced northerly winds under these conditions strengthen the NIIC and cause it to shift the west. Both the cyclonic and non-cyclonic flow states can be super-critical in different parts of the strait, leading to symmetric instability and enhanced mixing. A proxy is used to assess this condition in a larger set of shipboard crossings with hydrography only, elucidating the degree to which mesoscale features drive such mixing.

Authors

Peigen Lin

Woods Hole Oceanographic Institution

Robert S Pickart

Woods Hole Oceanographic Institution

Kerstin Jochumsen

Federal Maritime and Hydrographic Agency (BSH)

Martin Moritz

Federal Maritime and Hydrographic Agency (BSH)

Kent Moore

University of Toronto

[Hedinn Valdimarsson](#)
Marine Research Institute

[Tim Fristedt](#)
Swedish Defence Research Agency (FOI)

View Related

[NEUMAN, A. G., N. GRIVAUULT, C. XIANMIN HU, AND P. G. MYERS](#) | [THE NATURE AND ORIGIN OF MONTHLY TO SEASONAL HYDROGRAPHIC SIGNALS IN THE DENMARK STRAIT OVERFLOW](#)



CONTACT US

2000 Florida Ave. NW,
Washington, DC 20009
Phone: +1 202 462 6900
Toll Free: 800 966 2481
(North America only)

© 2019. American Geophysical Union | All rights reserved | [Privacy Policy](#)

[The nature and origin of monthly to seasonal hydrographic signals in the Denmark Strait Overflow](#)

Jacob Opher^{1,2}, *J. Alexander Brearley*³, *Stephen Dye*⁴, *Ian Renfrew*⁵, *Robert S Pickart*⁶, *Michael Paul Meredith*¹ and *Benjamin Harden*⁷, (1)NERC British Antarctic Survey, Cambridge, United Kingdom, (2)University of East Anglia, Norwich, United Kingdom, (3)NERC British Antarctic Survey, Polar Oceans, Cambridge, United Kingdom, (4)University of East Anglia, Centre for Ocean and Atmospheric Sciences, Norwich, United Kingdom, (5)University of East Anglia, School of Environmental Sciences, Norwich, United Kingdom, (6)Woods Hole Oceanographic Institution, Woods Hole, MA, United States, (7)Sea Education Institute, Woods Hole, MA, United States

[Formation and Evolution of High-transport Denmark Strait Overflow Events](#)

Mattia Almansi¹, *Thomas W N Haine*² and *Renske Gelderloos*¹, (1)Johns Hopkins University, Baltimore, MD, United States, (2)Johns Hopkins Univ, Baltimore, MD, United States

[The North Icelandic Jet is fed by transformation of Atlantic Waters on the Icelandic shelf](#)

*Yarisbel Garcia Quintana*¹, *Nathan Grivault*², *Xianmin Hu*² and **Paul G. Myers**^{1,3}, (1)University of Alberta, Earth and Atmospheric Sciences, Edmonton, AB, Canada, (2)University of Alberta, Edmonton, AB, Canada, (3)University of Alberta, Department of Earth and Atmospheric Sciences, Edmonton, AB, Canada