



## **Iceland Scotland Overflow Water flow through the Bight Fracture Zone in June-July 2015**

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ISOW (Iceland Scotland Overflow Water) is the densest water in the northern Iceland Basin and a main constituent of the lower limb of the meridional overturning circulation (MOC). ISOW is the product of mixing of dense water originating from the Nordic Seas with Atlantic Water and Labrador Sea Water during its crossing of the Iceland-Faroe-Scotland Ridge and downstream acceleration. In the northern Iceland Basin, ISOW is characterized by potential density  $\sigma_0 > 27.8$  and salinity  $> 34.94$ . Downstream of the Iceland-Scotland Ridge, ISOW flows southwestward in a Deep Western Boundary Current along the eastern flank of the Reykjanes Ridge. Models and float trajectories previously suggested that part of the ISOW flow could cross the Reykjanes Ridge through the Bight Fracture Zone. However, no direct observations of the ISOW flow through the Bight Fracture Zone are available that would allow us to quantify its transport and water mass transformation. This lack of direct observations also prevents understanding the dynamics of the throughflow.

In this study, we analyzed a set of CTDO<sub>2</sub> and LADCP stations acquired in June-July 2015 during the Reykjanes Ridge Experiment cruise and provide new insights on the ISOW flow through the Bight Fracture Zone. The evolution of the properties as well as the velocity measurements confirm an ISOW flow from the Iceland Basin to the Irminger Sea. A main constrain to the throughflow is the presence of two sills of about 2150 m depth and two narrows. With potential densities between 27.8–27.87 kg m<sup>-3</sup> and near bottom potential temperature of 3.02°C and salinity of 34.98, only the lightest variety of ISOW is found at the entrance of the BFZ east of the sills. In the central part of the Bight Fracture Zone, the evolution of ISOW is characterized by a decrease of  $\sim 0.015$  kg m<sup>-3</sup> in the near bottom density, ascribed to the blocking of the densest ISOW variety by the sills and/or diapycnal mixing. To the West, at the exit of the BFZ, ISOW overlays denser waters originating from the Irminger Basin. ISOW transport was estimated from LADCP measurements at two locations and it ranges from 0.4 to 1 x 10<sup>6</sup> m<sup>3</sup> s<sup>-1</sup>.