



## **Formation and evolution of the East Reykjanes Ridge Current and Irminger Current**

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The circulation of the North-Atlantic Subpolar Gyre (NASPG) is strongly influenced by the Reykjanes Ridge as it flows to the Irminger Sea from the Iceland Basin. Along the Reykjanes Ridge, two main along-ridge currents compose the NASPG: the southwestward East Reykjanes Ridge Current (ERRC) in the Iceland Basin and the northeastward Irminger Current (IC) in the Irminger Sea. To study their interconnection through the ridge as well as their connections with the interior of each basin, velocity and hydrological measurements were carried out along and perpendicular to the crest of the Reykjanes Ridge in June-July 2015 within the framework of the RREX project. This new dataset highlights that the hydrological properties, structures and transports of the ERRC and IC consistently evolve as they flow along the Reykjanes Ridge. We show that these latitudinal evolutions are due to flows connecting the ERRC and IC at specific locations through the complex bathymetry of the ridge, but also to significant connections between these currents and the interiors of the basins. North of about  $59.5^{\circ}\text{N}$ , the surface layers of the ERRC directly cross the ridge and feed the IC. The deep layers of the ERRC, blocked by the bathymetry, continue southwestward and are joined by inflows from the interior of the Iceland Basin. This strong inflow causes an increase of the ERRC transport by 9.4 Sv. Between about  $59.5$  and  $56^{\circ}\text{N}$ , the ERRC transport decreases as 7.6 Sv join the Irminger Sea. The IC is composed of two baroclinic branches. At about  $56^{\circ}\text{N}$ , the eastern branch is mainly fed by waters from the Iceland Basin while the western branch is mainly fed by the subpolar branch of the North-Atlantic Current that joins the Irminger Sea without entering in the Iceland Basin. Between about  $56$  and  $59.5^{\circ}\text{N}$ , the IC incorporates waters from the Iceland Basin as well as subpolar waters from the Irminger Gyre, such as its transport increases by 13.7 Sv. Finally between about  $59.5$  and  $63^{\circ}\text{N}$ , the IC is largely detained toward the Irminger Gyre and its transport decreases by 7.8 Sv.