Supplementary Information for Sustained Rockall Trough Transport observations using gliders

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S1 Data loss and gap filling

The data return of the moored hydrographic and velocity instruments are generally very high. However, a few data gaps occurred due to battery failure or instrument loss and the different gap filling methods are described below.

At EB1, a data gap in the hydrographic observations (Figure 2 c,e) due to battery failure and fishing damage of the upper two MicroCATs between March and May 2017 is filled using linear regressions with the time series at WB1 (Houpert et al., 2020).

No velocity observations are available between April 2016 and beginning of July 2016 due to the wrong type of battery installed on the deployed current meters (Figure 2a,b). Due to the high correlation between adjacent instruments at one mooring, the longest velocity record of each mooring is used to extent the records of the other instruments before the data is gridded on a regular depth grid. Therefore, we normalise the longest velocity record by its mean and standard deviation and then scale the normalised time series to have the same mean and standard deviation as the instrument record at the target depth for that deployment period. The instrument records are consecutively filled starting with the instruments closest to the one with the longest record. A 3 months data gap remains where no velocity data is available. For the Rockall Trough transport calculation, the 3 month gap in the gridded velocity data is filled by temporal linear interpolation (Houpert et al., 2020; Fraser et al., 2022).

At the end of the 2016-2017 mooring deployment the upper two current meters at EB1 malfunctioned and suspicious data are removed between end of March and beginning of May 2017 (Figure 2a). Similar to the previous deployment, we normalise velocities observed from the next closest instrument at 500 m depth and fill the data gaps in the upper two instrument records by scaling the normalised time series of the 500 m instrument with the mean and standard deviation of the instruments at the target depth for the same deployment period.

During the deployment period from October 2020 to July 2022 the deepest current meter at EB1 was flooded with seawater hence no velocity data is available at 1780 m (Figure 2a). To reconstruct the time series of the deepest instrument we normalise the velocity observations from the nearest instrument at 1350 m by the mean and standard deviation including the previous deployment period (July 2018 to July 2022) and scaled the normalised time series with the mean and standard deviation derived from the instrument at 1780 m using the previous deployment period (July 2018 to October 2020).

Supplementary Figures

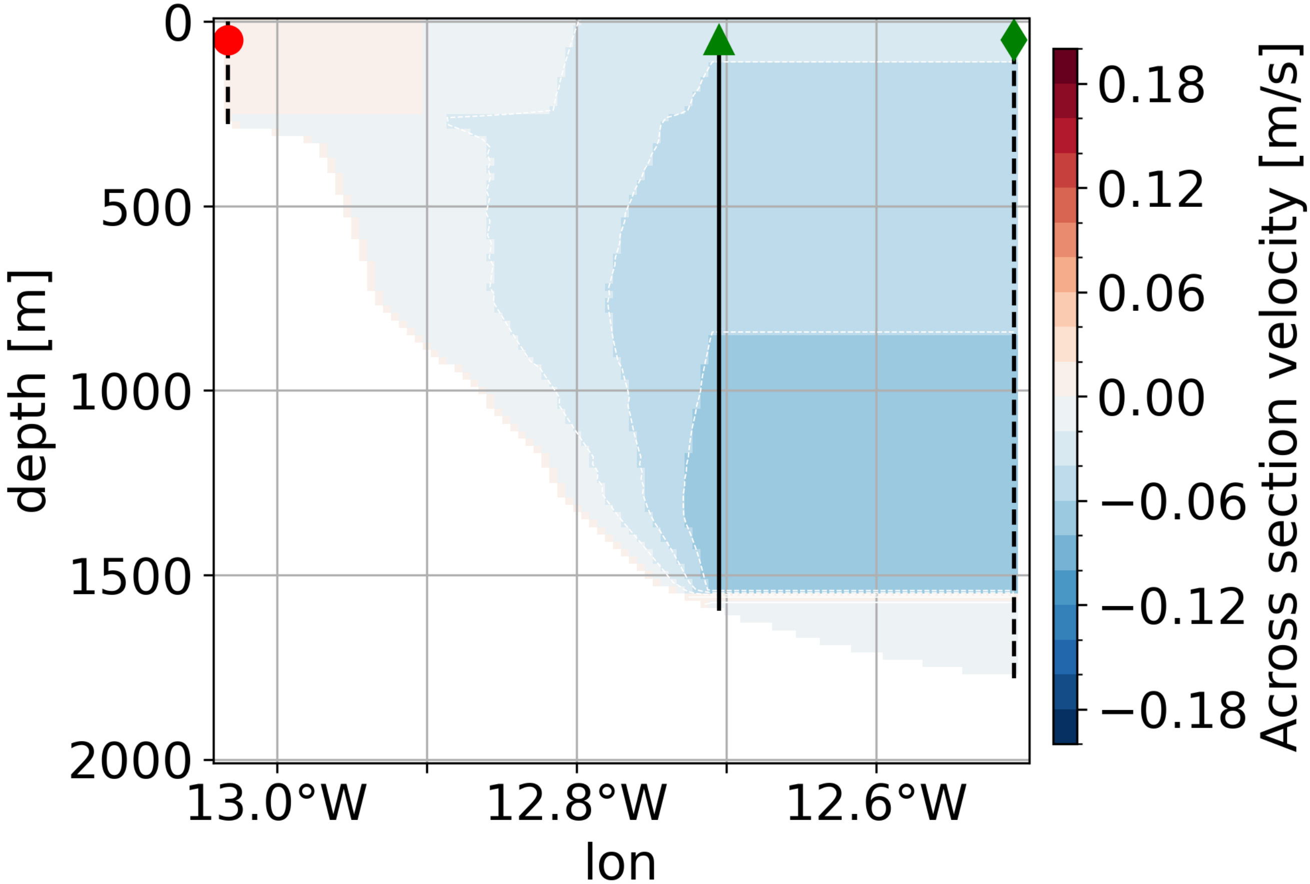

Figure S1. Averaged across section velocity for the western wedge. Dashed black line with red dot marks the western limit of the section, black line with green triangle marks mooring WB1 and dashed black line with green diamond marks WB1/2, the mid-point between the moorings WB1 and WB2 which is also the eastern limit of the section.

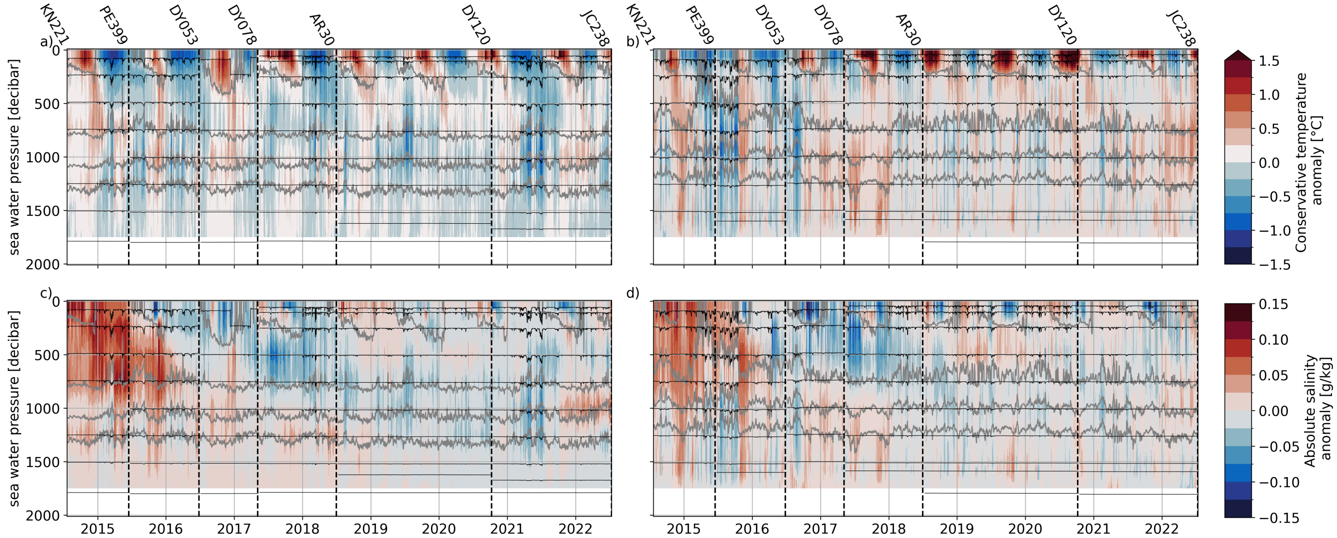

Figure S2. Temporal temperature (a,b) and salinity (c,d) anomalies, relative to the long term mean from the EB1 (a,c) and WB1/2 (b,d) moorings. Black lines mark the pressure time series for the single CTD sensors. Grey contour lines show potential density values at 27.2, 27.4, 27.6 and 27.7 $\mathrm{kg\,m^{-3}}$ (top to bottom). Vertical dashed black line indicate the individual servicing cruises for the moorings.

References

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