Supplementary Material
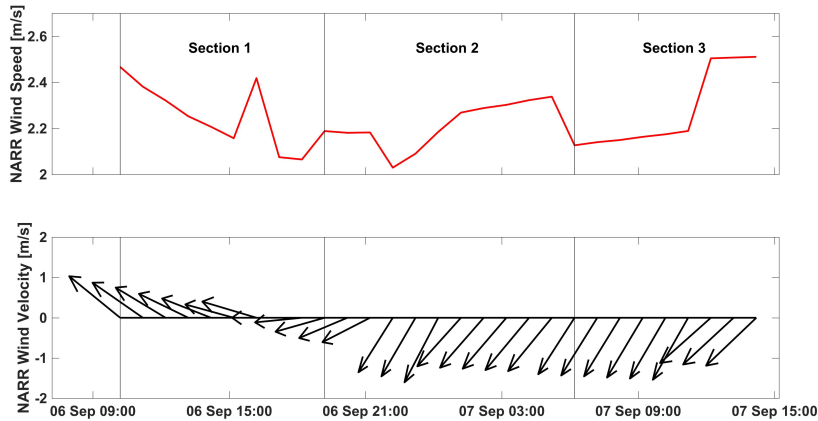
Figure S1: Time series of winds over Herald Canyon during the 2008 ISSS-08 hydrographic survey. (a) Wind speed. (b) Feather plot of wind speed and direction. The length of the arrows indicates wind speed and their direction its cardinal direction. The daily 10 m wind data used is from the NCEP North American Regional Reanalysis (NARR, Mesinger et al. 2006) and was interpolated onto the positions and times of the ISSS08 stations.
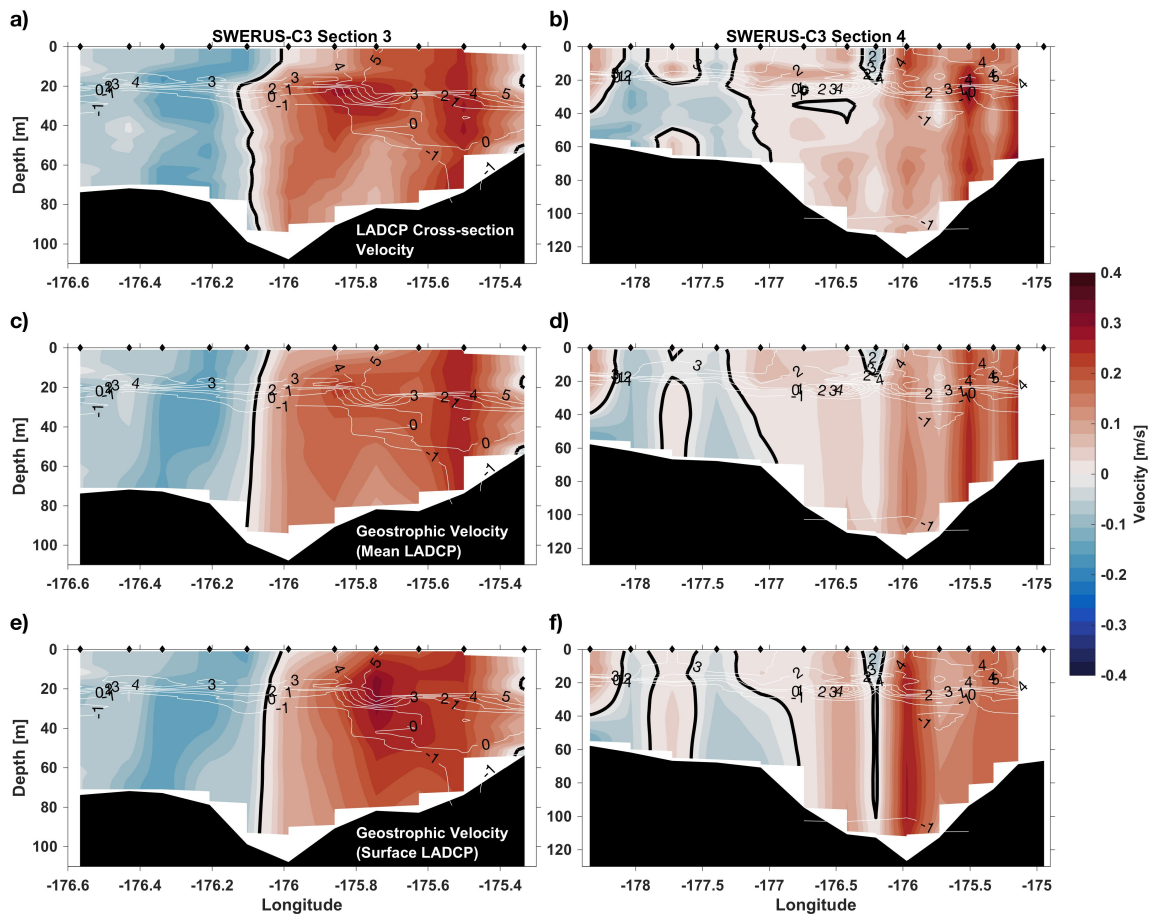
Figure S2: Cross-section velocities for 2014 SWERUS-C3 sections 3 (a, c, e) and 4 (b, d, f). a and b show the cross-section LADCP velocities, c and d geostrophic shear referenced to the vertical mean LADCP velocities, and e and f geostrophic shear referenced to the surface LADCP velocities. Positive velocities are northward. The white contours show temperature [° C]..
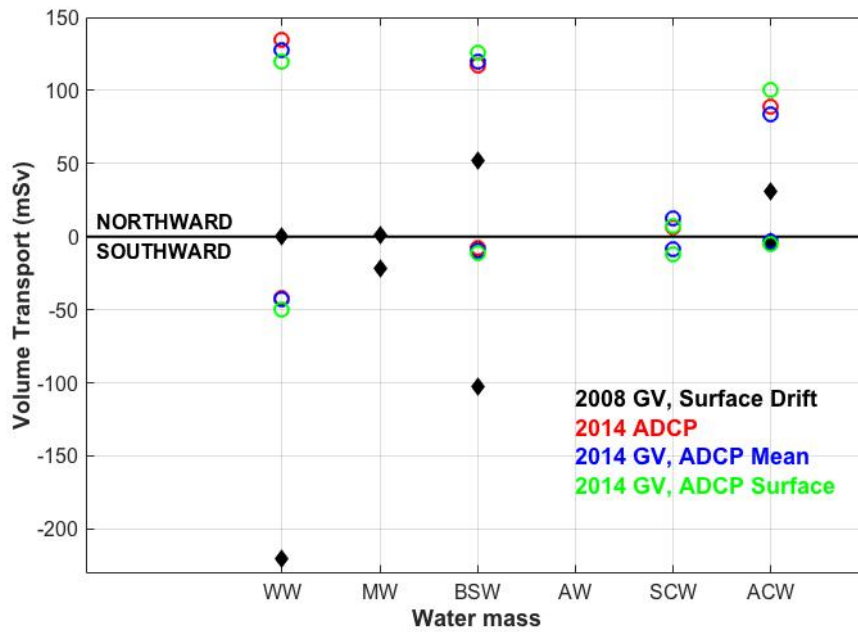
Figure S3: Comparison of volume transports for different water masses across Section 3 Transports are split into northward (positive) and southward (negative) components. Black diamonds denote geostrophic shear referenced to surface drift for the 2008 ISSS-08 section. Coloured circles are used to compare volume transports computed from different velocity fields for the 2014 SWERUS-C3 section: LADCP cross-section velocities (red), geostrophic shear referenced to the vertical mean LADCP cross-section velocities (blue), and geostrophic shear referenced to the surface LADCP cross-section velocities (green). Water masses are defined as shown in Fig. 3: WW = Winter Water, MW = melt water, BSW = Bering Summer Water, AW = Atlantic Water, SCW = Siberian Coastal Water, ACW = Alaska Coastal Water.
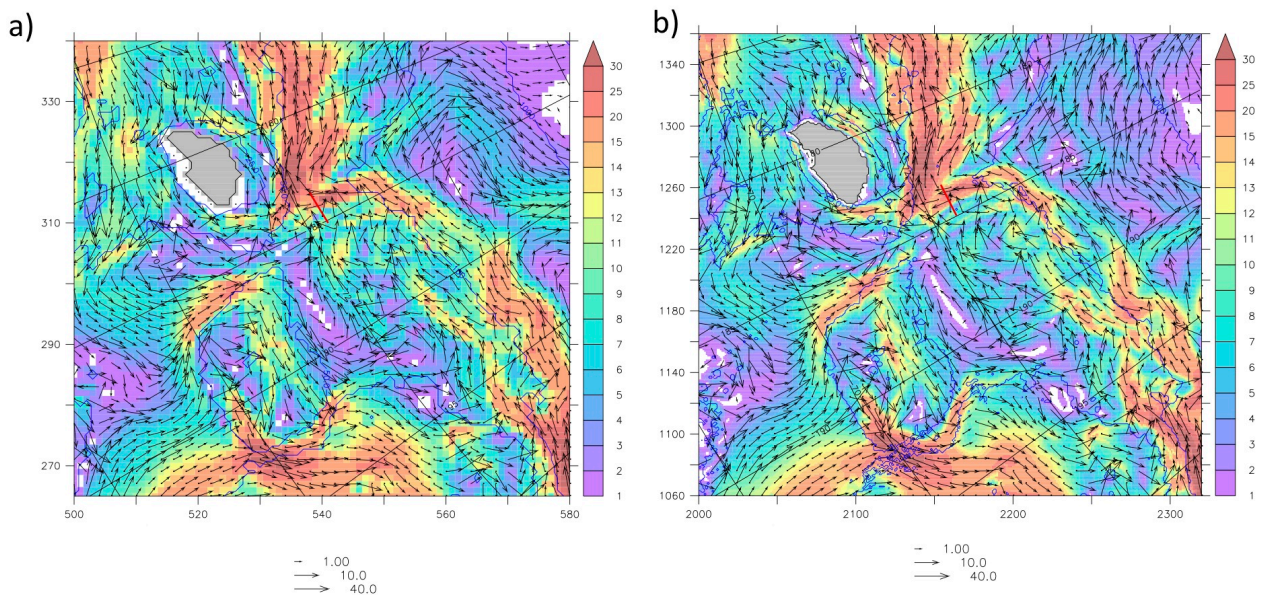
Figure S4. Upper 100m averaged speed (shading) and velocity vectors (cm/s) from model output during November, 2017. (a) is from the 9km model results and the right column (b) is from the 2km model results. Every 2nd vector for the 9km and every 8th vector for the 2km is shown. The red line indicates the location of section 3 discussed elsewhere.