Figure S1. A typical velocity (towards 304°) profile at site FB. The interface at each instant is defined to be at the height where the velocity has decreased to 50 % of the core velocity (V_{max}).
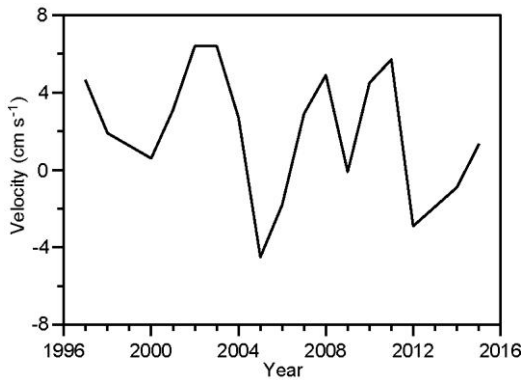
Figure S2. Average along-channel velocity at bin 16 (appr. 420 m above the bottom) for each ADCP deployment at site FB, lasting 11 months or more.
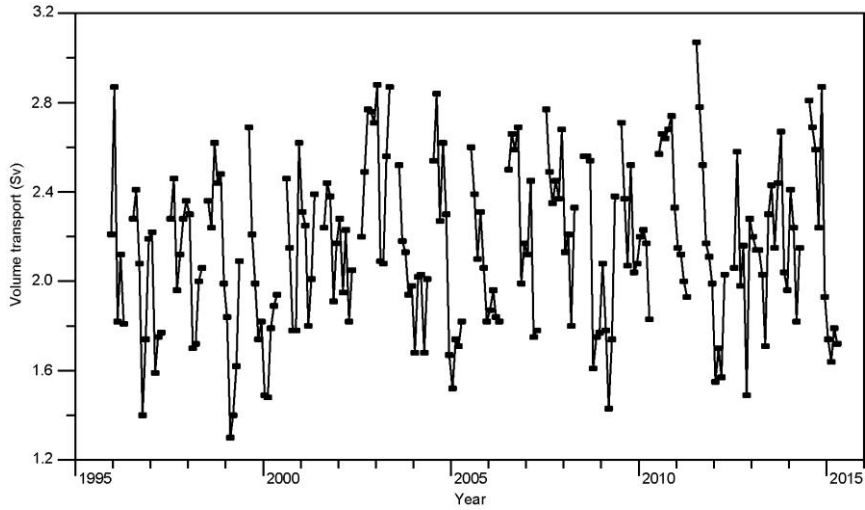
Figure S3. Monthly averaged kinematic overflow through the FBC for months with at least 28 days of observations at site FB.
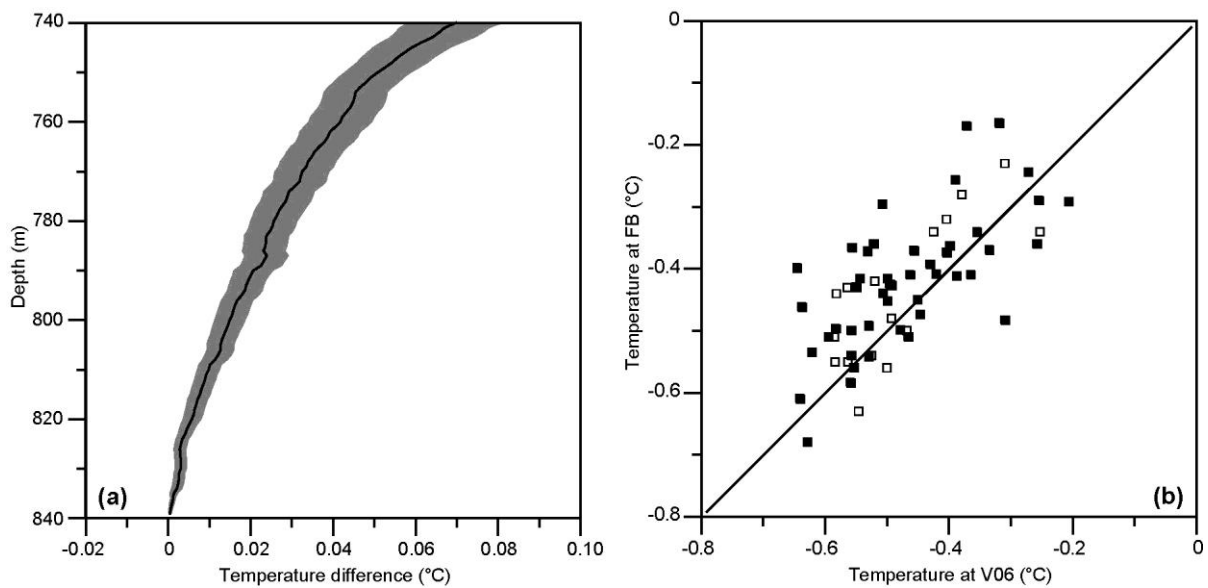
Figure S4. (a) Vertical temperature variation at CTD station V06 close to the sill depth. The black line shows the average difference between temperature at a given depth and simultaneous temperature at 840 m depth. Shaded area indicates ± 1 standard error. Based on 68 CTD profiles at V06. **(b)** The bottom temperature at FB plotted against simultaneous temperature at 810 m depth at V06. Open squares are from the period before the use of Microcats at FB in 2001. The diagonal line indicates equality.
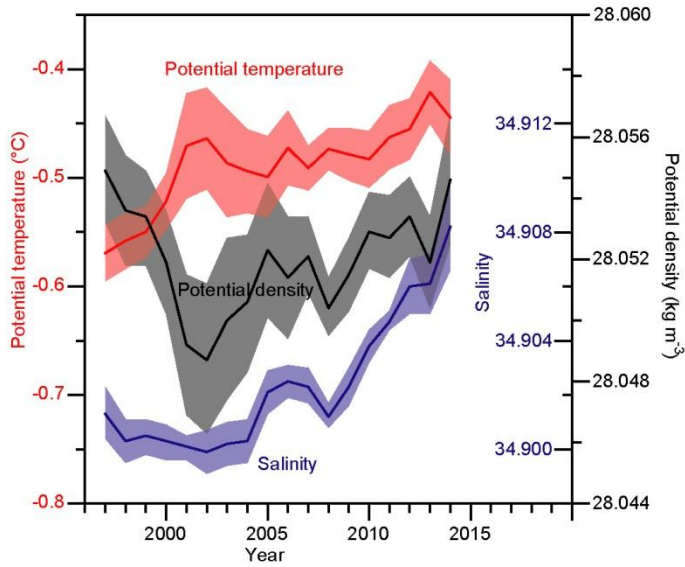
Figure S5. Temporal variations of potential temperature (red), salinity (blue), and potential density (black) at 800 m depth at station S08, which is the deepest station on section S. Each parameter is shown by a curve following the 3-year running mean surrounded by a shaded area in the same colour representing ± 1 standard error.
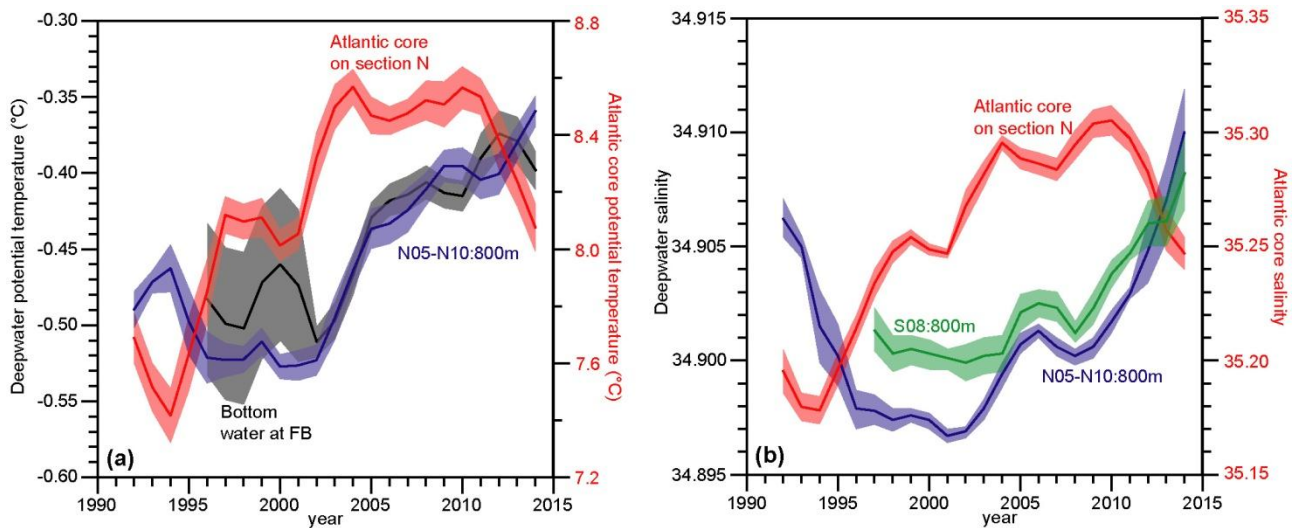
Figure S6. (a) Potential temperature close to the bottom at site FB (black, left axis), at 800 m on section N (blue, left axis), and of the Atlantic water core on section N (red, right axis). **(b)** Salinity at 800 m on section N (blue, left axis), at 800 m at S08 (green, left axis), and of the Atlantic core on section N (red, right axis). Each parameter is shown by a curve following the 3-year running mean surrounded by a shaded area in the same colour representing ± 1 standard error (over 3 years). For the potential bottom temperature at FB, the shaded area includes the instrumental uncertainty. Potential temperature and salinity at 800 m on section N are calculated as the average of six stations (N05 to N10) on 91 cruises from 1991 to 2015 (blue).
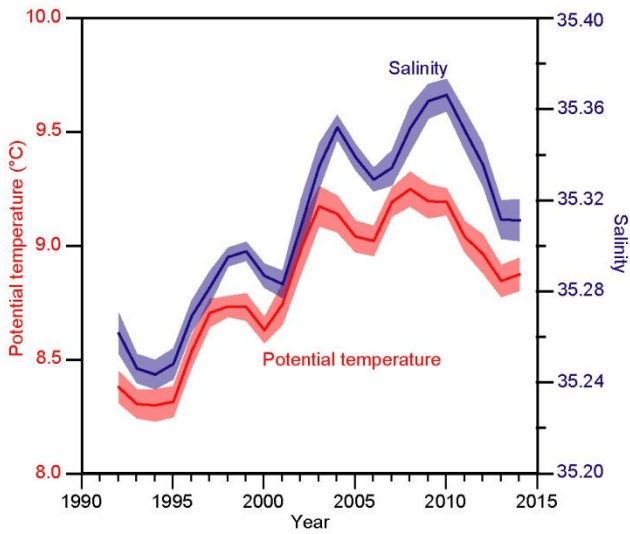
Figure S7. Potential temperature (red) and salinity (blue) of the Atlantic water core on section V. Each parameter is shown by a curve following the 3-year running mean surrounded by a shaded area in the same colour representing ± 1 standard error.
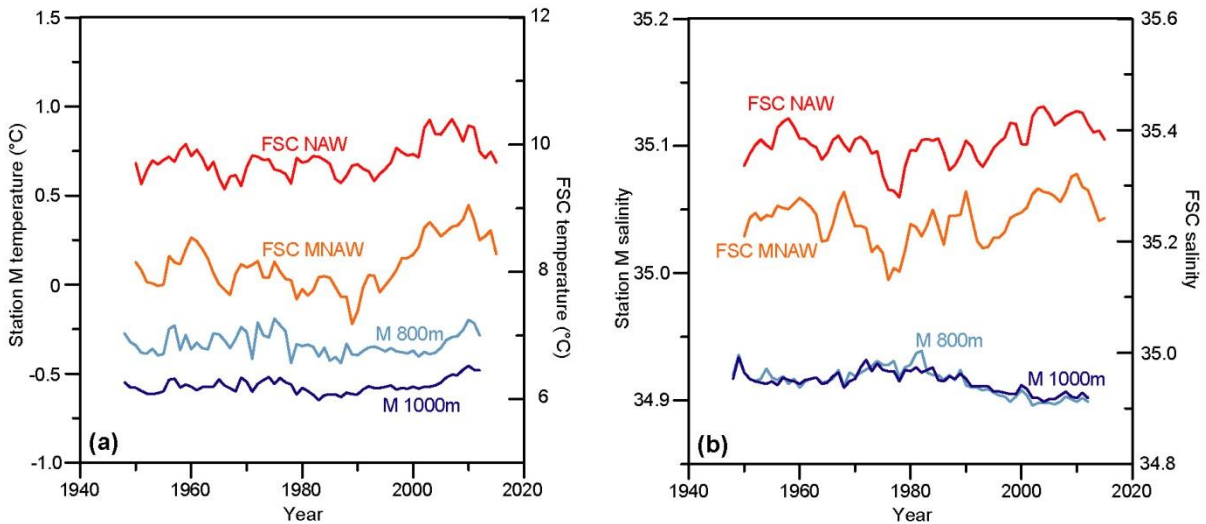
Figure S8. Comparison of long time series for Atlantic water properties in the FSC and deep water properties at station M. Temperature (a) and salinity (b) of NAW and MNAW in the FSC and at two depths at station M. Data from the FSC have been downloaded from www.ices.dk. Data from station M are available at the Norwegian Marine Data Centre (www.nmdc.no).