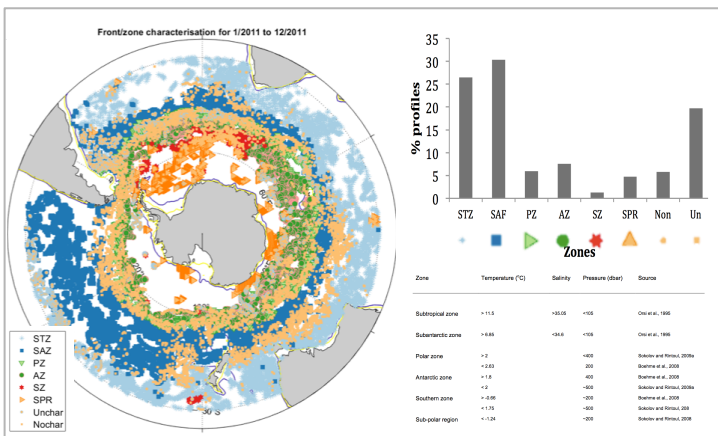


A new method for characterising the ACC fronts using Argo float temperature and salinity profiles

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We have created a publicly available code that characterises physical features of the Antarctic Circumpolar Current using Argo float profiles, using minimal software, and without the need to access high-performance computers

The code successfully characterizes profiles into zones. However some zones are underrepresented and many profiles fail to fit into one zone. We therefore suggest both a need for greater Argo resolution in these regions and a re-assessment of the traditional 'global' definition of ACC fronts. The code captures both seasonal and annual trends that show fair alignment with results from high powered models.

We hope the code will help to inform both future deployment of Southern Ocean floats and data quality control of the Argo array.

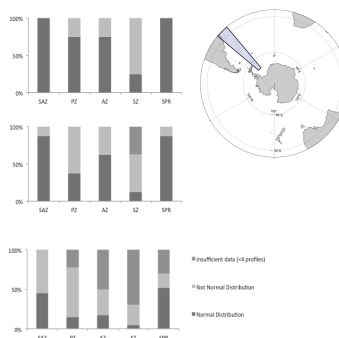


Figure 1 (above) - Stereographic map projection from 2011 using classification definitions in shown table – graph shows the percentage classification in each zone. Note the low SZ and high unclassified representation

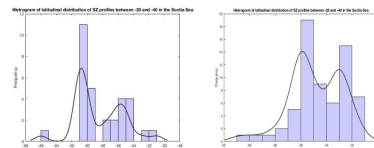


Figure 2 – Anderson-Darling test results testing for normal latitudinal distribution in 10, 5 and 1 degree longitudinal bins from Scotia Sea

Figure 3 – Latitudinal distribution of SZ profiles from 10 degree bin in Scotia Sea from (a) 2011 (b) 2012. Bi-modal distribution = meandering

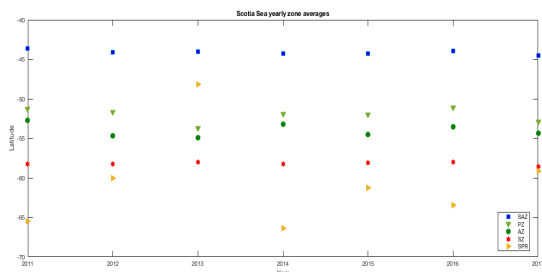


Figure 4 – Time series of mean latitude of ACC zones within a 10 degree longitudinal bin from 2011 to 2017 in the Scotia Sea -50 to -40. There is a southward trend in all zones, with greatest movement of 0.98 degrees per decade in the SAZ

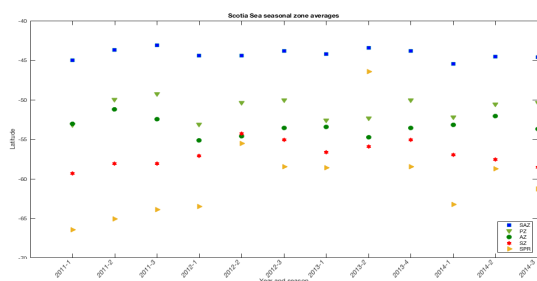


Figure 5 – Seasonal time-series of mean latitude of ACC zones within a 10 degree longitudinal bin from 2011 to 2014 in 4-month periods (JFMA, MJA, SOND) in the Scotia Sea -50 to -40. There is a cyclical cycle attributed to seasonal sea-ice and wind variations