



Thirty years of heat and salinity variability in the Newfoundland Basin

D. Aleynik (2), V. Ivchenko (1) and N. Wells (1)

(1) National Oceanography Centre, Southampton, U.K. (ncw@noc.soton.ac.uk) (2) Plymouth University, U.K.

The analyses of hydrophysical data, collected in the area 35-55 deg N and 35-55 deg W between the years 1975 and 2000 are presented in this study. About 64,000 CTD

and bottle profiles were obtained from the WOD-2001 database. Around 5860 ARGO floats profiles of temperature and salinity up to 2 km depth extended the time series for a further 6 years. The quality control procedures include the elimination of the outliers, which were over 4.5 s.d. when compared with the climatology (WOA-2001).

This procedure reduces the number of stations by ~ 11 %. Heat and salt contents were evaluated on 10x10 degree region in the Newfoundland Basin with a one month time step and 25 m vertical resolution up to 2000 m depth. Irregular station positions and spatial and temporal gaps in data coverage were resolved with a regional monthly climatology (WOA-2001). 4D fields were calculated by an optimal interpolation technique, based on Gandin (1964) and Bretherton (1976). The region has a high variability of water characteristics which is the result of interaction of between the sub arctic waters of the Labrador Sea and subtropical waters of North-Atlantic current. Furthermore the strong thermal contrast across this region has direct influence on the climate of the North Atlantic and Europe. Comparison of monthly anomalies of Heat and Salt Contents (AHC and ASC) based on historical data set and Argo profiles demonstrate a very close variation in amplitude. A seasonal signal in AHC and ASC is found in the upper 50-75 meters. Cooling and freshening was very characteristic for the upper hundred meters during 1975-1986. Warming of the upper layers occurred in the late 1980's and in the last 5-6 years. Since 2000 the warming has spread down to 300-400 m. In the 1990's the upper layers were cold, while waters between 400 and 1000 m were warmer and more saline, than in previous period and in the last 10 years. The

positive trend in salt content anomaly was observed for the whole upper 500 m layer during 1995-2005. The negative trend of ACS was observed at the same time at waters below 1000 m. In the intermediate layers (500-1000 m) cold periods were observed in 1970's and since the second part of 1990s. This cooling continues after 2000. The coldest layer in 1995-2000 was at 550 m depth, now it is slightly reduced in amplitude and has moved deeper to 700-800 m depth. A clear negative signal in heat content was observed in waters below 1000m since the second half of 1990s.