



Heat and salinity content in the North Atlantic from 1999 to 2007

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

1. National Oceanography Centre, Southampton, U.K.
2. Plymouth University, Plymouth, U.K.

(ncw@noc.soton.ac.uk)

The Argo temperature and salinity profiles were used as our data for the calculations of anomaly of heat content (AHC) and anomaly of salinity content (ASC). For the analysis we used the data between January 1999 and December 2006 for the area between 10 deg. N and 70 deg. N. The temperature and salinity anomalies fields were calculated with an objective analysis scheme, based on Gandin [1965] and Bretherton et al. [1976]. The AHC and ASC demonstrate positive trends in the upper 2000m of the North Atlantic over the last 8 years. The decisive contribution to the trend comes from the northern part of the basin (i.e. between 50 deg. N and 70 deg. N), whilst there is no obvious trend for both AHC and ASC in the southern and central basin. The strongest interannual variability occurs in the central North Atlantic. We should also add a caveat about the salinity data for the southernmost and northernmost sub regions between the end of 1999 and the beginning of 2000 where the paucity of data is an issue. The averaged values of the AHC and ASC for the whole period of time for the upper 2000m are negative for AHC and positive of ASC. The negative values of the AHC are unexpected, because in a number of studies a warming of the ocean was observed. The most plausible explanation lies in the climatology, which is based on a combination of data sets from different instruments (e.g. CTD, XBT), and can result in a possible bias (Gouretski et al., 2007). Gouretski et al. [2007] have shown that the XBT data has a positive bias in the temperature field when compared to CTD data. For the basin-averaged values the Argo data provides a rather stable base for the estimation

of the AHC, and to some extent for ASC. Removing 50% and even 75% of the data leads to AHC and ASC values not too different to those values from the total data set. In most parts of the upper 2000m the time averaged AHC is statistically significant, as well as the time dependent series of the depth averaged AHC. There are clear signs for a negative AHC in the upper 1000m in most parts of the southern and mid-North Atlantic. There is also evidence for a positive sign of the AHC in the northern part of the North Atlantic. The number of salinity data in the first three years (i.e. 1999-2001) does not allow a decisive estimation of the ASC in the Northern Atlantic, especially in the southern and northern parts. The time-averaged ASC as a function of depth does not provide statistically significant values for estimation in most parts of the North Atlantic. However, at some places and some depths significant values are obtained, for example in the upper 200-300m in the south western North Atlantic, and in the layer between 900-2000m of the western North Atlantic between 50 deg. N and 60 deg. N. For this latter belt in the eastern North Atlantic a significant positive ASC is evident in the upper 900m.