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Anthropogenic carbon uptake by North Atlantic Deep Water

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The uptake and storage of anthropogenic carbon (Cant) by North Atlantic Deep Water (NADW) is to a great part related to the formation of the different NADW components. The calculation of Cant is based on a 15 year time series of CFC data over the period 1994 - 2009 from the subpolar North Atlantic. A decrease of the Cant inventory is found within the density range of Labrador Sea Water (LSW), whereas the lighter Upper LSW (ULSW) showed an increasing trend of Cant uptake. Over the whole NADW column, a decrease of the Cant inventory has been observed between 1997 and 2005. Afterwards, the Cant storage of NADW could keep pace with the increasing atmospheric CO_2 content. This is mainly due to the deep convection event in early 2008, which was accompanied by an additional storage of at least 0.2 Pg C both in ULSW and LSW, i.e. 10% of the annual global oceanic carbon uptake. The contributions of the overflow water masses to the variability of the Cant reservoir in the subpolar North Atlantic is small compared to ULSW and LSW.