



Transit Time Distributions of North Atlantic Deep Water

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Transit time distributions (TTDs) describing the spreading from the subpolar to the tropical Atlantic are calculated for Upper Labrador Sea Water (ULSW), Labrador Sea Water (LSW), Gibbs Fracture Zone Water (GFZW) and Denmark Strait Overflow Water (DSOW). The analysis starts in the Labrador Sea, where TTDs for the newly ventilated NADW are computed. For LSW, the TTDs are different for periods of weak and strong convection. CFC concentrations in the Labrador Sea for the period prior to 1990, where almost no observations exist, are calculated from the TTDs. Repeated hydrographic sections from the subpolar to the tropical Atlantic indicate the southward propagation of CFC signals and salinity anomalies. This information is then used to infer the parameters of the TTDs. Two different types of TTDs are assumed: One type does contain only the young fraction of NADW, including an explicit dilution, the other type extends also over the older fraction of the water without dilution. In order to infer anthropogenic CO₂ from TTDs, a knowledge of the transit time distribution of the older portion of the water is necessary. It is discussed, in how far it is possible to derive this old part of the TTDs from CFC data.