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A comparison of two inverse mixing analysis methods for the determination of anthropogenic carbon

Aneurin G. Henry-Edwards, Johannes Karstensen, Birgit Schneider

Leibniz-Institut für Meereswissenschaften, Kiel, Germany

(ahenry-edwards@ifm-geomar.de / phone +49-431600-4140)

Two inverse mixing analysis methods are used to determine the anthropogenic carbon uptake from the output of a general ocean circulation model. One method (OMP) is based on an overdetermined system of linear mixing equations, the other method (TROMP) is based on a weakly non-linear under-determined system of mixing equations. Both methods successfully reproduce the known anthropogenic carbon signal. TROMP is able to reproduce the individual uptake in different water mass source regions while OMP gives an integrated uptake only. A caveat of both methods is that their application requires the knowledge of pre-industrial source water concentrations in carbon. Under the assumption of a constant pCO_2 disequilibrium the mixed layer pCO_2 concentration in the source water region may be used as a substitute for a static DIC definition.