Abstract View

Volume 27, Issue 8 (August 1997)

Journal of Physical Oceanography
Article: pp. 1635–1653 | Full Text | PDF (324K)

A Comparison of Methods to Determine Mass Transports from Hydrographic Measurements

J. C. de Munck

Department of Physical Oceanography, The Netherlands Institute for Sea Research, Den Burg, the Netherlands

(Manuscript received June 13, 1994, in final form December 23, 1996)

DOI: 10.1175/1520-0485(1997)027<1635:ACOMTD>2.0.CO;2

ABSTRACT

The purpose of this paper is to discuss the possibility of determining mass transports in a relatively small ocean region, using a hydrographic dataset and some general physical principles. A new hydrographic dataset of the Iceland Basin is used as an example. The physical principles imply geostrophy for the baroclinic component of the velocity field, whereas the barotropic component is determined in the first instance by assuming a uniform level of no motion.

It is attempted to eliminate the subjectivity inherent in this method by using inverse modeling techniques, which describe the physical principles (conservation of tracers) in a mathematical form. In this paper it is shown that some of this subjectivity is misleading, by presenting in detail which choices are to be made and how they influence the results. These choices include weighting parameters, omission of planned measurements, and smoothing parameters.

From a simulation study on the Levitus dataset it is concluded that the stability of the inverse methods can be improved by choosing an alternative way of sampling.