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The Use of Data Assimilation in Coupled Hydrodynamic, Ecological and Bio-geo-chemical Models of the Ocean. Selected papers from the 33rd International Liege Colloquium on Ocean Dynamics, held in Liege, Belgium on 7-11 May 2001.

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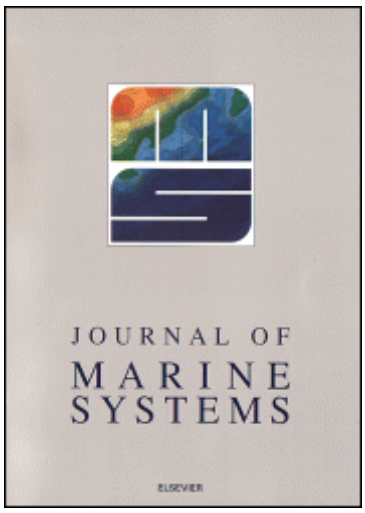

The objective of the 2001 Colloquium was to evaluate the progress of data assimilation methods in marine science and, in particular, in coupled hydrodynamic, ecological and bio-geo-chemical models of the ocean.

The presentations given during the Colloquium lead to discussions on a series of topics organized within the following sections: (1) Interdisciplinary research progress and issues: data, models, data assimilation criteria. (2) Observations for interdisciplinary data assimilation. (3) Advanced fields estimation for interdisciplinary systems. (4) Estimation of interdisciplinary parameters and model structures. (5) Assimilation methodologies for physical and interdisciplinary systems. (6) Toward operational interdisciplinary oceanography and data assimilation. A subset of these presentations is reported in the present Special Issue.

As was pointed out during the Colloquium, coupled biological–physical data assimilation is in its infancy and much can be accomplished now by the immediate application of existing methods. Data assimilation intimately links dynamical models and observations, and it can play a critical role in the important area of fundamental biological oceanographic dynamical model development and validation over a hierarchy of complexities. Since coupled assimilation for coupled processes is challenging and can be complicated, care must be exercised in understanding, modeling and controlling errors and in performing sensitivity analyses to establish the robustness of results. Compatible interdisciplinary data sets are essential and data assimilation should iteratively define data impact and data requirements.

Based on the results presented during the Colloquium, data assimilation is expected to enable future marine technologies and naval operations otherwise impossible or not feasible. Interdisciplinary predictability research, multiscale in both space and time, is required. State and parameter estimation via data assimilation is central to the successful establishment of advanced interdisciplinary ocean observing and prediction systems which, functioning in real time, will contribute to novel and efficient capabilities to manage, and to operate in our oceans.