Inverse Ocean Modeling System (IOM)

BOON S. CHUA

College of Oceanic and Atmospheric Sciences, Oregon State University, U.S.A

The IOM is a modular data assimilation system which is being developed using Information Technology, including modern software engineering concepts [1]. The IOM implements weak-constraint, four-dimensional variational assimilation [2]. The "W4DVAR" algorithm is very intricate, and largely model independent. The user supplies the model dependent components of the algorithm (the forward and adjoint codes, and the intrinsic interpolation scheme associated with the numerical model). The ocean observer supplies, through the modeler, the parameters which characterize the observing systems producing the data to be assimilated. Advanced code generation techniques are implemented to build customize code for the many critical components of the algorithm not supplied by the modeler. The customizing of these codes enables their use with each individual models, and, furthermore, the automatic code generation minimizes the very high likelihood of user mistakes when building such a complex algorithm. A Graphical User Interface (GUI) is provided to facilitate the assembly of numerical experiments.

One of the major goals of the program is to minimize the number of protocols and constraints imposed on the user so that the IOM can be used with a wide variety of models and data structures. Present IOM applications include a wide range of coastal, basin-scale and global ocean models and we foresee its use in operational weather forecasting and ocean forecasting, in ocean biogeochemistry, in groundwater hydrology and in solid-earth geophysics.

References

[1] http://iom.asu.edu
[2] Chua, B.S., and A.F. Bennett, 2001: An inverse ocean modeling system. Ocean Modelling, 3, 137-165.