"A Physically Consistent Practical Ocean Data Assimilation System"

I. Fukumori, B. Tang, D. Menemenlis, and T. Lee

Filters commonly used in assimilation, including the Kalman filter, are instantaneous inversions of observations that, on the one hand, result in physically inconsistent temporal evolutions of the estimated states. Smoothers on the other hand invert such estimates dynamically into consistent results. A practical ocean data assimilation system is being established so as to monitor global ocean circulation and to better understand processes underlying its seasonal-to-interannual changes. The system consists of an approximate Kalman filter and smoother based on partitioning the model uncertainties into a series of reduced rank systems. The partitioning approximation renders data assimilation with extremely large models computationally feasible. The system will be described using examples of data assimilated ocean circulation estimates with particular emphasis on issues of state approximation and the physical consistency of the model evolution.