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Incremental analysis update implementation into an intermittent data assimilation system for ocean general circulation models.

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A major drawback of sequential data assimilation methods is the discontinuity between the model forecast and the data assimilation process estimates due to the suboptimal treatment of the intermittent approach. The data assimilation step, named the analysis, is known to induce shocks in the model restart phase, causing spurious high frequency oscillations and data rejection. A method called Incremental Analysis Update (IAU) is now recognised to efficiently tackle these problems.

In the first part of this study, an IAU scheme is chosen and implemented to an intermittent data assimilation system using a reduced rank Kalman filter (SEEK), in the case of an Ocean General Circulation Model (OGCM) OPA set for ocean state prediction in the North Atlantic basin (NATL3, 1/3˚ grid resolution, rigid lid). Assessments have been conducted with this particular configuration, in order to check new features brought up by the IAU implementation. Improvements such as the damping of analysis-induced high frequency signals while preserving model internal fluctuations and the time continuity of the solution are shown. An overall assessment of the impact of this new scheme on the assimilated runs is discussed .

The second part of this work stands in the IAU implementation to a free surface OGCM. A set of experiments using the ORCA configuration (global 2x2˚ low resolution, free surface) with altimetric data assimilation (SEEK filter) are conducted in order to evaluate the IAU impact on a free surface model. Satisfying results are shown, illustrating the IAU behaviour in such a configuration. Aside with the ORCA configuration outcomes, prior results obtained with NATL3 will be used to conduct another set of experiments using the NATL4 configuration (1/4˚ grid resolution, free surface).

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