Advanced Data Assimilation for the Development of Operational Oceanography.

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The general objective of this study is to assess a variety of multi-satellite assimilation systems for the North Atlantic, with the goal to further improve the ocean circulation in high resolution ocean models. The approach taken for this work is based on the use of a sequential SEEK filter, which interacts with a high-resolution, isopycnic coordinate model of the Gulf Stream using real-time satellite altimetry, sea-surface temperature and ocean colour data.

**Figures and Tables**

- **Figure 1**: Tracks for one, two and three satellite configurations. Examples of track patterns for 5 days of observation.
- **Figure 2**: U, V, SSH fields for a) true state, b) initial state, c) filtered state.
- **Figure 3**: Anomalies of sea-surface temperature from the filtered state (c) minus the initial state (b). A special effort is currently dedicated to the development of tools that allow for the assimilation of altimeter data into the ocean circulation model.

**Conclusions**

- New methodological developments, such as local error covariances, local gain, and adaptive mechanisms have been undertaken to address specific assimilation problems.
- The capacity of the assimilation scheme to predict realistic and objectively consistent error bars on the field estimates has been examined and improved by “re-guessing” the residual innovation data.
- A special effort is currently dedicated to the validation of the assimilation system with independent assimilation approaches, in particular for non-linear processes.
- The assimilation system has been validated in the North Atlantic using real-time data from the TAO array and the TOPAZ project.

**References**