DRAKKAR: Enhancing synergies between satellite, in-situ, and numerical oceanography

The DRAKKAR ocean modelling consortium is led by scientists from France, Germany, and the UK, with several collaborations in the operational and research oceanographic communities. This group continuously develops, upgrades, and integrates a hierarchy of global and regional ocean/sea-ice models over the period 1960-present, making continuous use of available observed datasets (forcing, validation, OSSEs).

Improve the surface forcing for global ocean models: blending satellite observations (SST, air-sea fluxes, scatterometer data) with reanalyses.

Part of our OST/ST project aims at improving and continuously extending bulk formulation-based atmospheric forcing functions, and then, reanalyses. Building consistent surface forcing fields for long global ocean hindcasts requires assessment of atmospheric drivers, consistent blending between them, and their assimilation. Building on Southern wind speeds, the NCEP reanalysis exhibits for long global ocean hindcasts requires assessments of extending bulk formulae-based atmospheric forcing functions, and then, reanalysis.

DRAKKAR’s general objective within the OST/ST is to further develop synergies between ocean observations, theories, and models. This poster summarizes along 4 axes some results obtained these last years (with collaborations within the OST/ST community) and presents our objectives for the next years.

1. satellite observations

Standard deviations over 1995-2004 of Reynolds satellite-derived SSTs land-pass filtered between 3 and 18 months (left), and their counterpart standardized to the 1° DRAKKAR model (without assimilation) after oceanic simulations. The seasonal cycle of SST appears very realistic in most areas, except discrepancies around Antarctica. Diagnostics are underway over SST contours, and about to be published concerning near-surface anomalies (Penduff, 2006, 2007).

2. hydrographic observations

Example: Monthly mean of mixed layer temperature tendency after assimilating the outputs of three DRAKKAR global runs into ARGO profiles (1998-2006).

3. perspectives

Developments are needed to simulate extreme events in more datasets (e.g. SST, currents, geostrophics, ARGO displacements).

Extend the multivariate, quantitative, systematic assessment of DRAKKAR simulations with respect to, and after time/space collocation with:

- NEMO ocean/sea-ice/C/CFCs 3-level code
- Global 2°, Global 1°, Global 0°, Global ½°
- Stand-alone configurations
- Nested configurations
- Period of interest: 1958-present
- Both global and regional studies
- Water masses, dynamics, scale interactions, ...
- Strong links with ocean observations & theories
- 106+ users collaborating on scientific studies

Distribute DRAKKAR simulations to the OST/ST community and beyond, to further develop model/observations/theories complementarities, promote collaborations with OST/ST contributors. This includes e.g. full model outputs, post-processed fields, model equivalents of satellite maps (SSH, SST, SSS, etc) or in-situ T/S profiles collocated in time & space.

Example 1: DRAKKAR + ARGO - Atlantic

Regional patterns of 1995-2004 sea-surface temperature (SST) from observations and numerical simulations: CLIPPER heritage and DRAKKAR perspectives.

Example 2: DRAKKAR + ARGO - Antarctic

The combined study of CLIPPER simulations and Argo data allowed Levitus et al. (2001) to answer the question of whether the current warming trend in the Southern Ocean is caused by warming of the ocean interior, or by changes in the surface conditions.

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References


