**Adjustment of atmospheric forcing parameters by Sea Surface Temperature data assimilation for multi-year simulations of the global ocean circulation.**

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**CONTEXT**

Sea surface temperature (SST) is more precisely observed from space than near-surface atmospheric variables and air-sea fluxes. But ocean general circulation models used for simulations of the recent ocean variability use, as surface boundary conditions, bulk formulae which do not use the observed SST. In brief, models do not use directly in their forcing one of the best observed ocean surface variable, except when specifically assimilated.

The objective of this research is develop new approaches based on ensemble data assimilation methods that use SST satellite observations (and when available SMOS or AQUARIUS satellite sea surface salinity data) to constrain (within observation-based air-sea flux uncertainties) the surface forcing function (surface atmospheric input variables) of long-term ocean circulation simulations. The problem of the correction of atmospheric fluxes by data assimilation has already been approached in other studies and projects (Sakchok et al., 2009, Skandran et al., 2009). The main goal of this work is to adapt the methodology to a different experimental context.

**CONCEPT**

Correct the forcing function by SST data assimilation

**METHOD**

We use a sequential method based on the SEEK filter, with an ensemble experiment of 200 members to evaluate parameter uncertainties. To better isolate forcing errors, we have to minimize the other sources of error such as parameters over the whole ERAinterim period. The control vector is extended to correct forcing parameters (air temperature, air humidity, longwave and shortwave downward radiations, precipitation, wind velocity). The assimilation step is realized « off-line », that is to say that we don’t correct the model state. We obtain atmospheric parameters corrections that we can apply to the model in free runs.

**RESULTS AND CONCLUSIONS**

- Forcing the model with corrected parameters (estimated for each month of 1989-2007) : reduced warm bias in the intertropical band with respect to observations.
- Diagnostic of the net heat flux computed with observed SST : sensible reduction as expected to correct ERAinterim forcing set, correction of the negative trend observed in ERAinterim dataset, better heat balance over the 1989-2007 period.

**REFERENCES**


M. Meinvielle et al., 2011 : Optimally improving the atmospheric forcing of long term global ocean simulations with sea surface temperature observations, Mercator Quarterly Newsletter, 42, 24-32.