PREFACE Milestone Report

Milestone#: MS25

Milestone name: Basic set of bias-correction experiments

WP#: WP07

Lead beneficiary: CERFACS

Achievement date from annex I: 31.12.2016

Actual achievement date: 06.02.2017

Milestone achieved: YES

Comments:

Anomaly coupling (AC) experiments have been performed with 3 different coupled models (NorESM, UCLA CNRM-CM5), led by Noel Keenlyside and Shunya Koseki (UiB), Emilia Sanchez-Gomez (CERFACS), Aurore Voldoire (MF-CNRM), Thomas Toniazzo (UniRes) and Teresa Losada (UCM). The description and results from these experiments have been detailed in Deliverable 7.2. The main goal in WP7 is to investigate if improved model climatologies (SST and wind-stress) lead to benefits in simulated tropical Atlantic (TA) variability at interannual timescales. The anomaly coupling protocol consists of replacing the climatological part of the fields exchanged in the model components by those of observations, while leaving free the anomalous parts without modifications. The coupling information is modified every coupling timestep. At each coupling time, the OGCM SST (Fig. 1, dashed red box) is modified by subtracting the OGCM SST climatology ((SST)OGCM control) and adding the observed climatology ((SST)obs), the resultant SST (blue box) is passed to the AGCM. In the same way, the surface fluxes (wind-stress in our case) passed from the AGCM (dashed blue box) to the OGCM (red box) are modified by subtracting the AGCM mean fluxes ((surface fluxes) AGCM control) and adding back the observed climatology of fluxes ((surface fluxes) obs).

Koseki and Toniazzo (2017, under revision) have developed an alternative way of AC in which the model climatology is updated as the simulation proceeds. A running time-average provides an estimate of the bias of the actual, corrected coupled model climatology with respect to observations, and the coupling fields are modified accordingly. A fundamental aspect of this technique is that the correction is refined iteratively and thereby converges to the desired climatology. In this study, AC is applied for the other 2 coupled models (UCLA and CNRM-CM5) and assesses the inter-annual variability over the tropical Atlantic Ocean among different three models with AC.

The partners involved in this work are UiB (lead), UCM and CERFACS/MF-CNRM. A coordinated baseline experiments has been defined amongst the partners: a common observed climatology has been defined for SST and for wind stress for the period 1981-2000. HadISST and ERAI datasets have been selected to compute the respective SST and wind-stress climatologies. Unfortunately the implementation of the anomaly coupling technique is not exactly the same for all the models, since each model has its particularities in the coupling set-up. Hence, some differences exist (described below) in the anomaly coupling experimental design. A control experiment (free model run) has been also performed in order to assess the impact of the anomaly coupling on the model mean state and variability. All the experiments have been run for at least 100 years to take into account the model adjustment. Data have been shared for the analysis and a set of relevant variables is available in the NORSTORE server.

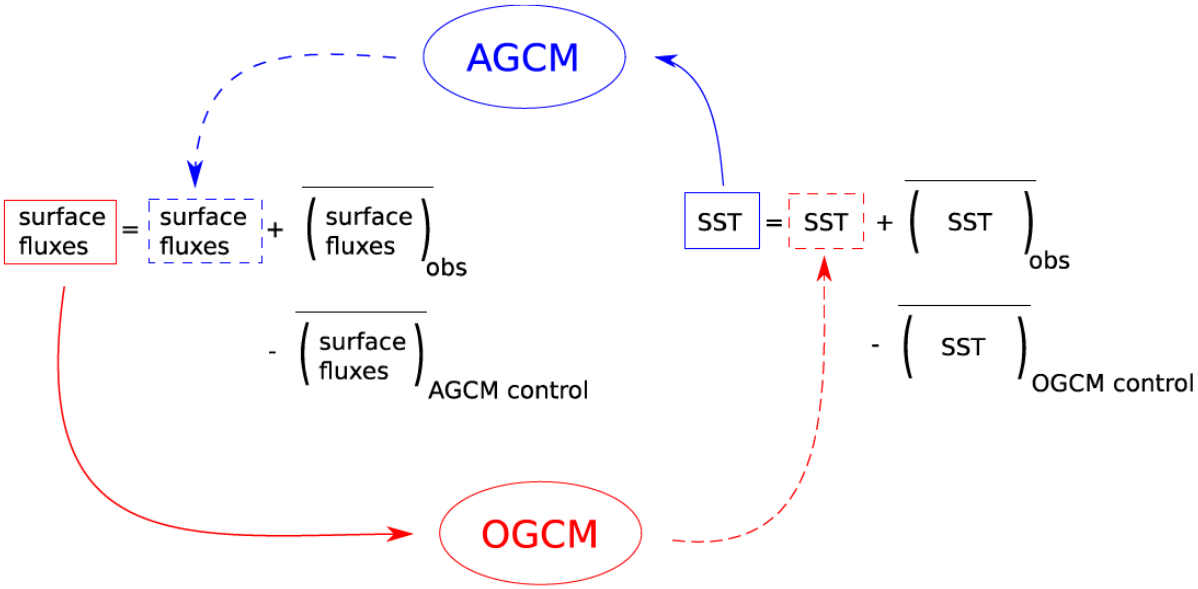

Figure 1: Schematic illustration of the anomaly-coupling strategy (see text for details) implemented in PREFACE.