MISSION REPORT

Climate Forecasting Unit

To: CFU

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From: Chloé Prodhomme

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Subject: PREFACE General Assembly (Cape Town, South Africa, 24-28/08/2015)

Meeting summary

Ocean climate variability has important socio-economic consequences on continental climate (droughts and floods) and fluctuations in marine ecosystems and fisheries. Our understanding of ocean climate variability in the Tropical Atlantic (TA) and its impacts is limited, and our ability to simulate and predict it is poor. Recognising this, the European Union's Seventh Framework Programme (EU FP7) PREFACE "Enhancing Prediction of Tropical Atlantic Climate and its Impacts", PIRATA "Prediction and Research Moored Array in the Tropical Atlantic" and the CLIVAR Atlantic communities jointly organised the "2015 Conference on Ocean, Climate and Ecosystem" in Cape Town (South Africa) from Monday 24 to Friday 28th August 2015. Additional internal CLIVAR Atlantic panel, PREFACE and PIRATA meetings and workshops were held that week.

The meeting was organised by Mathieu Rouault, Emlyn Balarin and Sharon Bosman from the Nansen Tutu Centre for Marine Environmental Research and the MA-Re Institute of University of Cape Town and Mahaut de Vareilles, Mandy Kong and Noel Keenlyside from University of Bergen, Norway. There were 90 delegates from 25 countries that attended the Conference. This was a COP21 side event and co-sponsorship was secured by IRD and the SCAMPI NRF bilateral project between Norway and South Africa. More info and presentations are available on the conference and PREFACE web sites.

PREFACE is a climate project with 28 partners across 18 countries in Europe and Africa, and 3 associate partners directly involved in the sustainable management of the three Eastern boundary large marine ecosystems of the Tropical Atlantic.

PIRATA "Prediction and Research Moored Array in the Tropical Atlantic" is a program designed to study ocean-atmosphere interactions in the tropical Atlantic that affect regional climate variability on seasonal, interannual and longer time scales. The array was originally developed in the mid-1990s and has undergone extensions and enhancements since 2005 to improve its utility for describing, understanding, and predicting societally relevant climate fluctuations. PIRATA has been implemented through multi-national cooperation in support of CLIVAR, GOOS, GCOS, and GEOSS. Financial, technical and logistic support is provided by France (IRD in collaboration with Meteo-France, CNRS and IFREMER), Brazil (INPE and DHN) and the USA (NOAA). Data are freely available for research and operational applications via the World Wide Web and the Global Telecommunications System.

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CLIVAR "Climate and Ocean: Variability, Predictability and Change" is one of the four core projects of the World Climate Research Programme (WCRP). CLIVAR's mission is to understand the dynamics, the interaction, and the predictability of the coupled ocean-atmosphere system. To this end it facilitates observations, analysis and predictions of changes in the Earth's climate system, enabling better understanding of climate variability and dynamics, predictability, and change, to the benefit of society and the environment in which we live.

The conference web site is http://mathieurouault6.wix.com/pirataprefaceconf.

Summary of relevant talks for Climate Forecasting Unit (CFU) and Climate Services (CS)

Economy and fisheries

Fisheries represent at the global scale approximately 260 million jobs. However, during recent decades the increase of fishing effort is not associated to a catch increase, which is very worrying in terms of economic for numerous countries.

Moreover, taking into account the crucial role of fisheries in the economy it is crucial to predict where the fish will move in the future. Will this displacement occur towards the coast or offshore, making fishing either easier or harder (also cheaper or more expensive)? Moreover, any movement of a fish population from one area, country, village, to another might be the direct cause of conflict and/or economic migrations.

Studies are also suggesting an impact of climate change on the fish size.

Bias development

The different talks presented by the CT2 part of PREFACE were focused on understanding the oceanic processes in the Benguela upwelling region using regional oceanic forced simulations. Most of the talks conclude that the resolution is important and also the choice of the wind product. QuickScat showed generally better results, especially to represent the double core structure of the upwelling. However, the simulations used had much higher resolution than the ones we are using, making the comparison difficult.

MPI also presented interesting results of tuning of clouds in the MPI coupled model. With a tuned cloud parametrization they showed massive improvements in the Tropical Atlantic SST mean state. However, this makes the clouds in the model completely unrealistic.

CNRM presented on interesting methodology to study use of the fast development of biases in the atmosphere: Transpose AMIP (TAMIP), which are experiments with atmospheric only simulations initialized.

Variability in the Tropical Atlantic

The analysis of CMIP5 model wind stress in the TA presented by Ingo Richter (invited) shows that all the models had a one month delay for the peak of variability with respect to the observations. He also shows that this variability was present also in AMIP forced experiments with climatological SST, but that the response varies a lot across the different models.

An intra-seasonal oscillation with a period of 14 days is present in the TA and influences the African monsoon. At this timescale the African monsoon is also affected by the Madden-Julian Oscillation. Interestingly, the relation between these two modes of variability is not well known.

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Finally, the skill of the African monsoon at decadal time scales improves strongly in initialized decadal hindcasts compared to historical simulations. Moreover, the response of African monsoon to climate change strongly varies across the CMIP5 models.

Work Package P11 work plan (CFU and CS)

Partners plan (CFU)

As we are the Work Package (WP) leader on this task, it is relevant for us to know what the different partners are planning in the framework of this WP:

- Bergen University is setting up now a seasonal forecast system, which might be ready during fall 2015. Recent findings of WP6 suggests that the best correction to be applied in the forecast system to try to improve the skill is to perform a flux anomaly correction, which is slightly different to the plan to run flux corrected or wind corrected experiment as it was planned in the project description.

- In the framework of WP6, CNRM-CM and University of Wageningen with the help of IC3 had realized coordinated experiments in which the wind stress is corrected in different regions of the TA. Once this experiment will be finished, the change of skill induced by the wind modification will be assessed by the two partners.

- Elsa Mohino (UCM) confirmed that she will help in the analysis of the African monsoon skill in decadal (and eventually seasonal) hindcasts.

Data sharing with CT5 (CFU and CS)

One of our tasks in the WP11 is to share with the fisheries communities our seasonal and decadal hindcasts (CFU and CS).

The input needed to run the economic model or biological model are very different between each other. Economists are mainly interested in climate projections and they might be able to work with index instead of using directly dynamical variables. Some biological model could also be interested in some index instead of global variables (drift index, averaged temperature). But other models would need precise 3D daily data.

The three communities are not used to the vocabulary, methods, models, or kind of data used by climate predictors, which make difficult the formalization of a definitive work plan at the stage. However, we decided to focus mainly on small pelagic, which is more influenced by climate and is crucial for local economies.

In order to define a clear work plan and discuss the needs of different communities, a workshop we might organize at BSC following these objectives:

☐ Better understanding of the need in terms of input for economical and biological models and evaluate the associated need for downscaling and bias correction.

☐ Explain to the biological and economical community the climate jargon (projection vs prediction, skill, reliability, bias correction....).

☐ Define a work plan for data exchange.

Following these ideas, Patrice Brehmer (patrice.brehmer@ird.fr) invited IC3 to join for a conference on fisheries in Dakkar mid-November.

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