SPECIAL PROJECT PROGRESS REPORT

Progress Reports should be 2 to 10 pages in length, depending on importance of the project. All the following mandatory information needs to be provided.

Reporting year ……2014………………………………………

Project Title: Interactions between the Atlantic Ocean, African monsoon, the Indian and Pacific Oceans using the EC-Earth and IFS modelling systems …………………

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Computer Project Account: ………SPITDIPO…………………………………

Principal Investigator(s): ………………Fred Kucharski…………………………

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Affiliation: Abdus Salam International Centre for Theoretical Physics (ICTP)…………………………………………………….

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Name of ECMWF scientist(s) collaborating to the project
(if applicable)
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Start date of the project: ……30.04.2013……………………………………

Expected end date: ……30.12.2015……………………………………

Computer resources allocated/used for the current year and the previous one
(if applicable)
Please answer for all project resources

		Previous year		Current year	
		Allocated	Used	Allocated	Used
High Performance Computing Facility	(units)	300	?	300	
Data storage capacity	(Gbytes)	1000	?	1000	

This template is available at:
http://www.ecmwf.int/about/computer_access_registration/forms/

Summary of project objectives
(10 lines max)

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Previous work has shown the possibility that the tropical Atlantic has an unexpectedly strong
Influence on the Indian Ocean, Indian Monsoon and Pacific Ocean.
Since most of these studies are based only on observational data and intermediate complexity model
simulations, the aim of this project is to use the latest state-of-the-art modelling systems EC-Earth
and/or the IFS to confirm and refine the various hypothesises that have been made previously.
Relatively high-resolution and complex physics simulations are essential to increase confidence in the
hypothesis that the tropical Atlantic may have a much stronger impact on the surrounding ocean and
land masses than previously thought. However, also simulations with the intermediate complexity
ICTPAGCM coupled to OPA/NEMO will be performed, because the efficiency of this model enables
to assess and validate new techniques quickly.

Summary of problems encountered (if any)
(20 lines max)

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Summary of results of the current year (from July of previous year to June of current year)

This section should comprise 1 to 8 pages and can be replaced by a short summary plus an existing
scientific report on the project

In 2014 it is planned to further investigate to what extend the Atlantic forcing may have been responsible for the recently observed climate shift in the Pacific region. Also the general impact of the Atlantic on the Pacific interannual variability is investigated.

For this purpose the at the ICTP the ICTPAGCM has been coupled to the OPA ocean and LIM ice model (NEMO), via the OASIS3 coupler. The model has been successfully tuned and tested in a 300 year long control simulation and Atlantic Pacemaker experiments of the whole 20th century have been performed. Fig. 1 shows the interannual standard deviation of the 300-year control simulation compared to observations. As can be seen, given the complexity of the model, the CGCM is reproducing the observed maxima of standard deviations in the equatorial and extra-tropical regions reasonable well compared to observational data (here HadISST and ERSST).
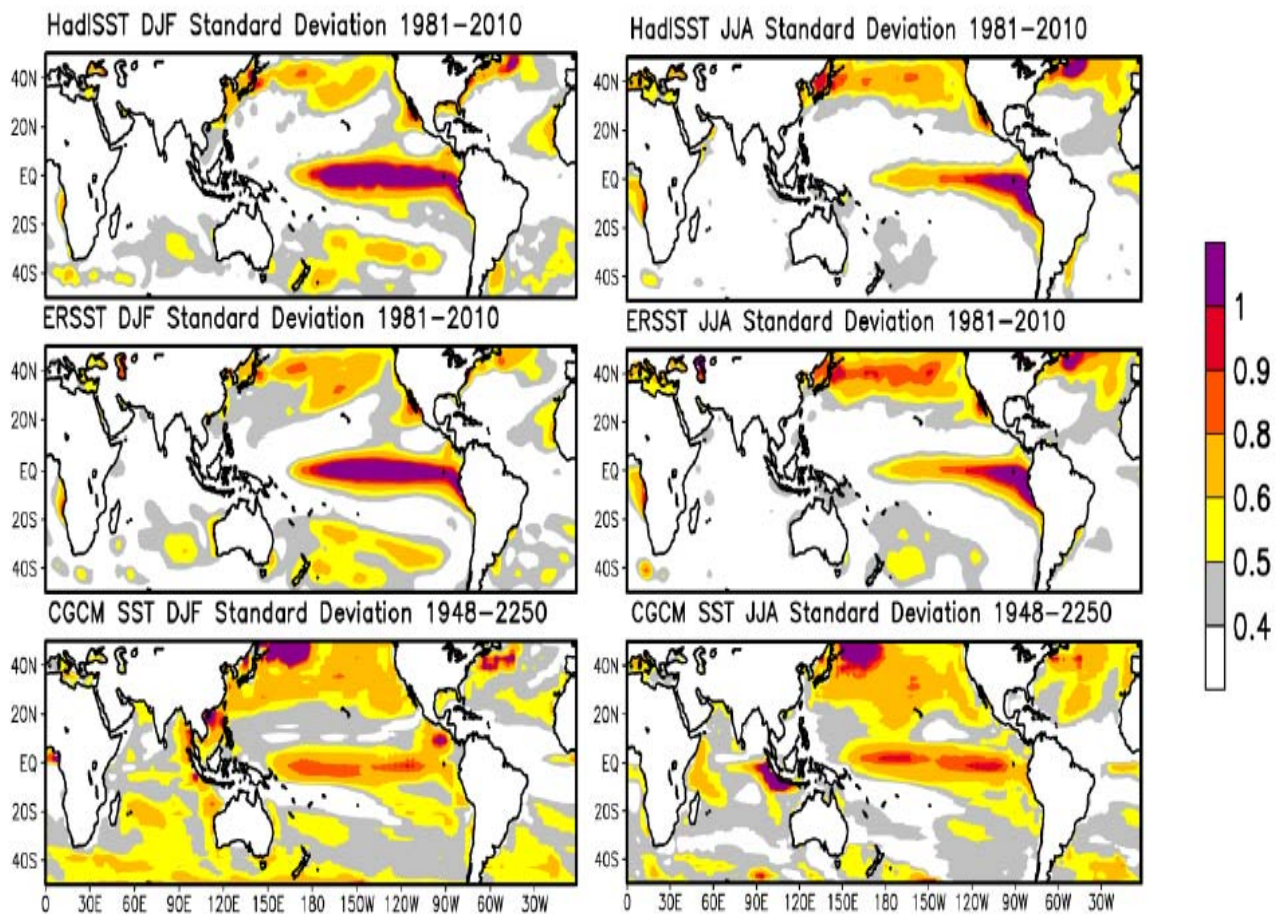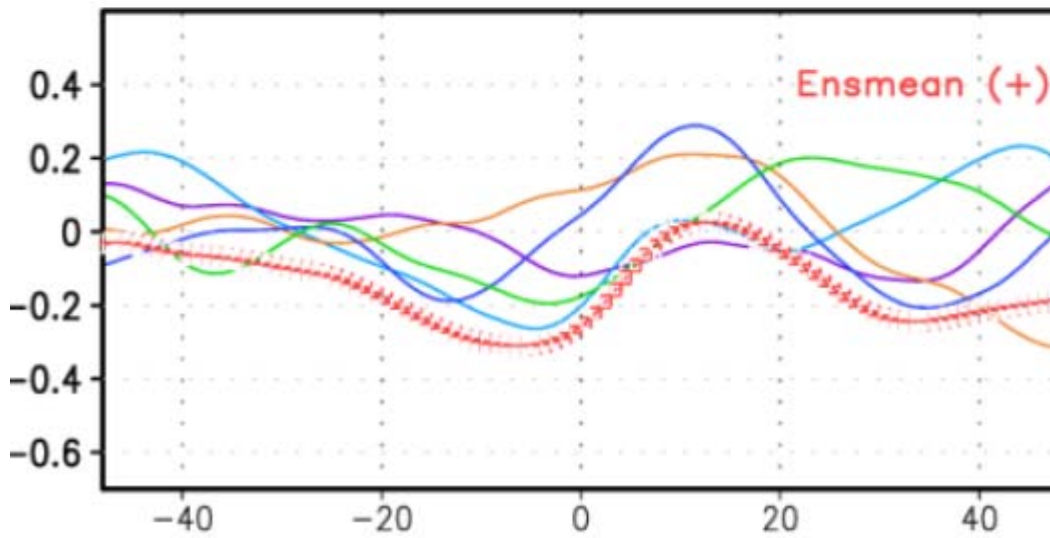

In Figure 2, the observed (HadISST and ERSST) lead-lag correlations between ATL3 and Nino3.4 indexes are compared with the ones from a 5-member Atlantic Pacemaker experiment. In the ensemble mean the model is able to reproduce the ATL3 influence on Nino3.4, but with reduced magnitude and with smaller time-lag.

Observed

HadISST
ERSST

EXP−A

Ensmean (+)

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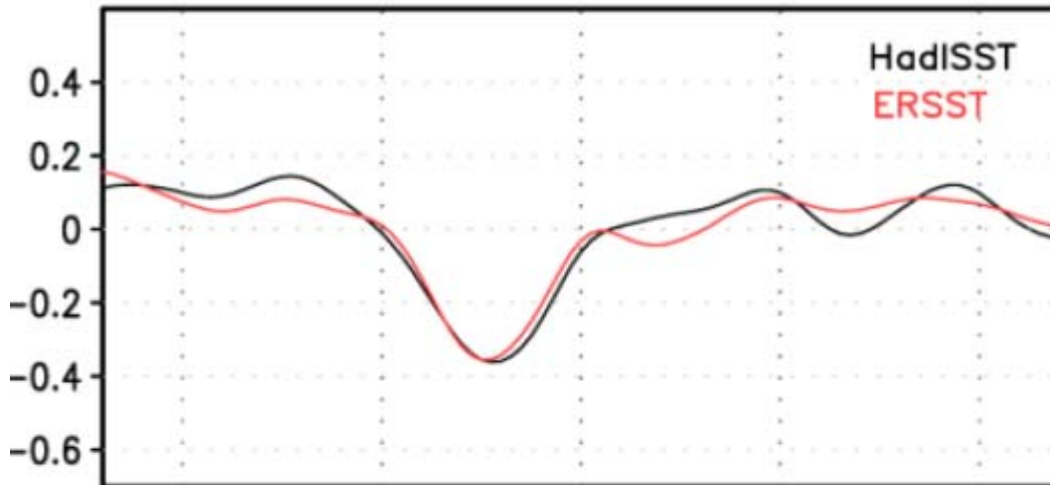
List of publications/reports from the project with complete references

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Farah Ikram, Analysis of climatology and variability of a Coupled General Circulation Model, ICTP diploma thesis (Supervisor: Fred Kucharski), 2014

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Summary of plans for the continuation of the project
(10 lines max)

…………The Pacemaker experiments should be continued, including other forcings such as greenhouse gases, and then further analysed with the aim to write a research paper on the Altantic influence on the Pacific, including climate shifts, to be submitted to a high impact scientific journal.

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In the long-term, we plan to confirm the intermediate complexity model results with idealized EC-EARTH simulations.

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