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 2010

Project Title: Use and value of ECMWF short-range and seasonal forecast products for developing countries in terms of end-user impact variables

Computer Project Account: SPITP4DC

Principal Investigator(s): Adrian Tompkins

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Affiliation: Abdus Salam International Institute for Theoretical Physics (ICTP)

Name of ECMWF scientist(s) collaborating to the project (if applicable) ……

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Start date of the project: 1 January 2010

Expected end date: 31 December 2013

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)	n/a	n/a	100,000	18854 (18%)
Data storage capacity	(Gbytes)	n/a	n/a	100 Gb	

Summary of project objectives

(10 lines max)

The purpose of this product is to end ECMWF products to drive impacts models in distinct pilot projects focussing on developing countries in Africa, namely Ghana, Senegal, Ethiopia, Malawi, Rwanda, Uganda, Tanzania and Kenya. The science in each project focuses on the coupling of the ECMWF systems to end-user dynamical models for water resources, crop production and vector borne disease, and then test the predictability of these coupled system in tropical regions. The project will test CDF and EOF-based bias correction techniques developed at ICTP under the EU-FP WATCH project to join the medium range, monthly and seasonal models seamlessly to drive the end-user impacts models. A limited allocation of computing resources is requested to allow a small set of sensitivity experiments to be conducted for each subproject to investigate the predictability of the region concerned with sensitivity integrations conducted with the IFS or possibly also the EC_Earth system.

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

The first six months of the project have developed in two main areas (1) the validation of the seasonal forecast system and the EC-EARTH model in seasonal forecast mode over the tropical areas of interest and (2) the initial testing of the impacts models using a mixture of observations and reanalysis data over the area of interest, which will then be forced using the validated and bias corrected forecast data.

Validation of forecast models.

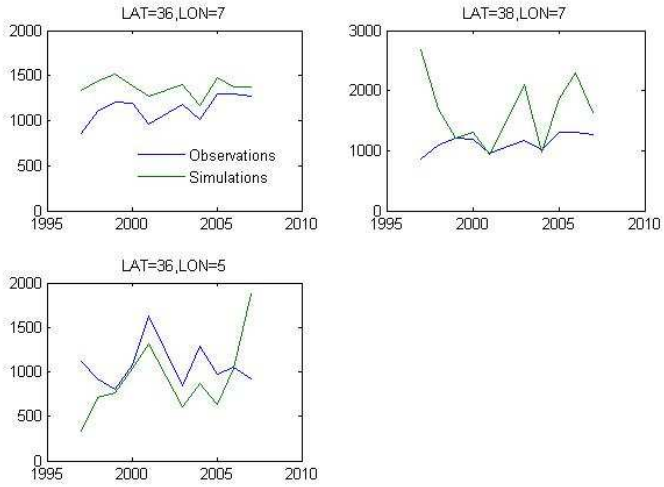
This part of the project follows on from groundwork conducted with the PA account, which examined both bias and skill of the seasonal forecast system as well as aspects of its variability. The work has led to a publication by Tompkins and Feudale in Weather and Climate 2010, which will also be converted into an ECMWF tech memo.

Part of the problem with predictability on monthly timescales is the continuing poor representation on the Madden Julian Oscillation in the monthly and seasonal forecast system, despite improvements in recent cycles. The project account was then used to conduct a series of sensitivity tests with the model, which have identified changes that lead to a much improved MJO. This work is currently being written up in collaboration with ECMWF staff members, with the intension of devising a "computationally cheap" version of the operational system with the improved MJO with which to drive the impact models.

Additionally, the SPITP4DC account was used to conduct a seasonal forecast integration starting from initial conditions from Aug 2000 which was then evaluated using a modified version of the Climplot package. These integrations were then compared with similar existing integrations with recent model cycles in addition to the SYS3 seasonal forecast model. The results were presented at the ECEARTH meeting in Barcelona, and show that the present EC-EARTH version has specific problems in the tropics, with a cold SST tongue over the equatorial Pacific developing quickly and an associated dry atmosphere. The presentation of this work is submitted as an attachment to this report. Based on these results, the decision has been taken that the SPITP4DC project will use SYS3 products on the seasonal timescale, and future sensitivity studies will be conducted with this system.

(2)Impact model studies

The initial impact model work has concentrated on the crop modelling aspect, although recourse to the operational products for health impact studies will be made soon for the project QWECI. The work has so far attempted to validate the crop model in Ethiopia, Ghana and China. An example integration is given in the figure below which shows crop yield predictions for three locations in Ethiopia made using observed rainfall (GPCP) and ERA-interim reanalysis products for temperature and radiation. The integrations show the problems of impacts research in that the impacts data is limited in length and often questionable in quality. Multiple cell distributed integrations will be used in a novel way to infer data quality before application to monthly and seasonal forecasting.



List of publications/reports from the project with complete references

Adrian M. Tompkins and Laura Feudale
Seasonal Ensemble Predictions of West African Monsoon Precipitation in the ECMWF System 3 with a Focus on the AMMA Special Observing Period in 2006
Weather and Forecasting 2010; 25: 768-788

Summary of plans for the continuation of the project

(10 lines max)

The monthly forecasts will be evaluated in a systematic manner similar to determine the skill improvement on the 3-4 week timescale.

The seasonal and monthly forecasts will be bias corrected and then used to drive the crop model in the target regions, possibly using the enhanced MJO version of the IFS currently being written up in Tompkins, Vitart and Jung.

The Vector borne disease model of Trieste VECTRI will be completed and undergo evaluation in Africa using observations.

Sensitivity tests will be conducted with SYS3 to see what impact the crop surface attributes characteristics have on the local circulation.