REQUEST FOR A SPECIAL PROJECT 2013–2015

MEMBER STATE: … ITALY ……

Principal Investigator[1]**:** … Dr. Adrian Tompkins ……

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Other researchers: External Organisations are specified below. These organisations will access processed forecast fields for analysis and validation but will not require access to ECMWF computing facilities. The task of conducting sensitivity experiments and data access on MARS will be solely conducted by ICTP.

Project Title: Use and value of ECMWF short-range and seasonal forecast products for health impacts in developing countries

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Computer resources required for:	**2013**	**2014**	**2015**
High Performance Computing Facility (units)	300,000	300,000	300000

[1] The Principal Investigator will act as contact person for this Special Project and, in particular, will be asked to register the project, provide an annual progress report of the project's activities, etc.

Data storage capacity (total archive volume) (gigabytes)	100	100	100

Is this a continuation of an existing project?	YES X	NO
If YES, please state the computer project account assigned previously	SPITP4DC (cpa, cpg)	
Would you accept support for 1 year only, if necessary?	YES ☒	NO ☐

*An electronic copy of this form **must be sent** via e-mail to: special_projects@ecmwf.int*

Electronic copy of the form sent on (please specify date): ……XX/04/2012……

Continue overleaf

Extended abstract

(It is expected that Special Projects requesting large amount of computer resources should provide a more detailed abstract/project description including a scientific plan and a justification of the computer resources requested)

This project is an application for a follow-up project to "*Use and value of ECMWF short-range and seasonal forecast products for developing countries in terms of end-user impact variable*" which ran from 2010 to 2012. The original project aimed to set the ground-work for examining the potential use of medium range to seasonal products for impacts sector applications of hydrology and crop forecasting in developing countries. The project has led to a number of publications of the research work, examining the skill and climate of the system 3 seasonal forecasts over West Africa as well as conducting sensitivity tests to determine the reasons for systematic errors (Tompkins and Feudale, Weather and Forecasting, 2010), applied ECMWF systems to drive crop models (Li and Tompkins 2011/2012 two articles in review) and looked at ways of applying bias correction to the monthly to seasonal systems for use in impacts modelling (Feudale and Tompkins, GRL, 2011, Digiuseppe, Molteni and Tompkins, 2012 in review).

As in all such flexible research projects, especially when relying on research interactions involving institutes in developing countries, some aspects fail to come to fruition while other opportunities may arise in the course of the project. In this case, failure to acquire follow-up from the project partners in Vietnam meant that the hydrological component of the original proposal was not carried out. On the other hand, the lead PI successfully participated in two EU proposal examining climate and health interactions in developing countries, (one co-authored by the PI Tompkins which involved ECMWF as partners) which has led to a number of new

developments. In particular, a new dynamical disease model for malaria (VECTRI) has been developed at ICTP (Tompkins and Ermert, manuscript in preparation) which is in the process of being coupled to the ECMWF monthly and seasonal forecast systems to test the potential of a prototype malaria forecasting system. This proposal therefore is for a special project to specifically focus on the development and testing of this coupled disease modelling system.

The special project would focus on the following aims

a) Complete testing of the existing ERA-interim/Satellite rainfall coupled disease modelling system for the period 2000-2012.
b) To complete the coupling of the VECTRI model to the monthly EPS system, which climate anomalies relaxed to climate in the 2-4 month reange.
c) To couple the VECTRI model to the seasonal system
d) To couple the VECTRI model to the monthly/seasonal system in a seamless way.
e) To examine the improvement of implementating the Di Giuseppe et al. Bias correction technique
f) Validate the above four alternative coupled systems for the project focus areas of Eastern Africa, Malawi, West Africa (particularly Ghana and Senegal).
g) Examine the potential gain by introducing further developments of the VECTRI model v2 currently under development, and quantify these gains relative to improvements in prediction of T2m and precipitation in revised ECMWF model versions (i.e. newer versions of the EPS system, which always have a 18 year hindcast period, or examining SYS4 versus SYS3 differences)

In the above studies, extensive use of datasets from the partner countries will be used to validate the coupled system output for a hindcast period covering 2000-2012, which is the period for which both daily satellite data is available from two reliable sources of FEWS and TRMM (Tompkins and Adeyemi, Using CloudSat data to differentiate satellite precipitation products over Africa, 2012 accepted subject to revisions, JHM), and also for which reliable malaria survey data is available for the target countries (e.g. Malawi 2004-, Uganda, 1999-, Senegal 2007-). It should be emphasized that this is a research project focussing on the hindcast period and is in direct collaboration with ECMWF members Francesca Di Giuseppe and Franco Molteni. We have requested a limited amount of supercomputing units to be able to conduct ECMWF sensitivity tests where deemed necessary, and also to permit a limited investigation of the downscaling technique to increase resolution over target areas using the coupled REGCM system which was tested for East Africa in 2011 and is currently being integrated for a larger set of hindcasts within the EUFP7 projects HF/QWeCI (see Tefera Diro, Tompkins and Bi, Special Issue, Climate Dynamics, 2012 for the first discussion of this research)