



Project no. GOCE-CT-2003-505539

Project acronym: ENSEMBLES

Project title: ENSEMBLE-based Predictions of Climate Changes and their Impacts

Instrument: Integrated Project

Thematic Priority: Global Change and Ecosystems

**M6.9** Integration of seasonal-to-decadal application models using pre-production ENSEMBLES seasonal to decadal hindcasts

Due date of milestone: December 2007

Actual submission date: August 2008

Start date of project: 1 September 2004

Duration: 60 Months

Organisation name of lead contractor for this deliverable UNILIV

Final

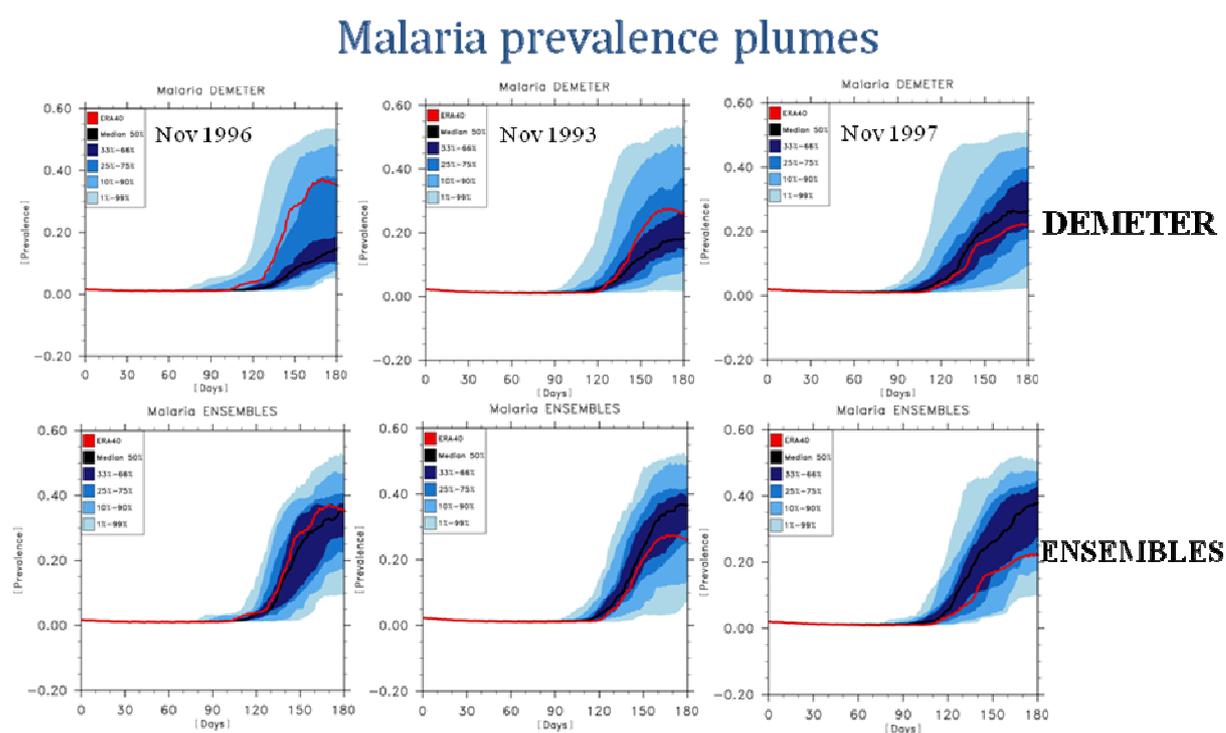
Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
<b>PU</b>	Public	✓
<b>PP</b>	Restricted to other programme participants (including the Commission Services)	
<b>RE</b>	Restricted to a group specified by the consortium (including the Commission Services)	
<b>CO</b>	Confidential, only for members of the Consortium (including the Commission Services)	

## Introduction

This milestone show examples of ENSEMBLES stream 1 seasonal to decadal data use with a range of impacts models. Further work has already been carried out using the more comprehensive DEMETER data set and was partly reported on in M6.5. As the DEMETER dataset is more comprehensive especially in the number of years of the integrations the majority of reference work has been undertaken with the older DEMETER data. However, the techniques, understanding and code development are of course are transferable to the ENSEMBLES data streams.

## Examples of ENSEMBLES stream 1 data use in impacts models

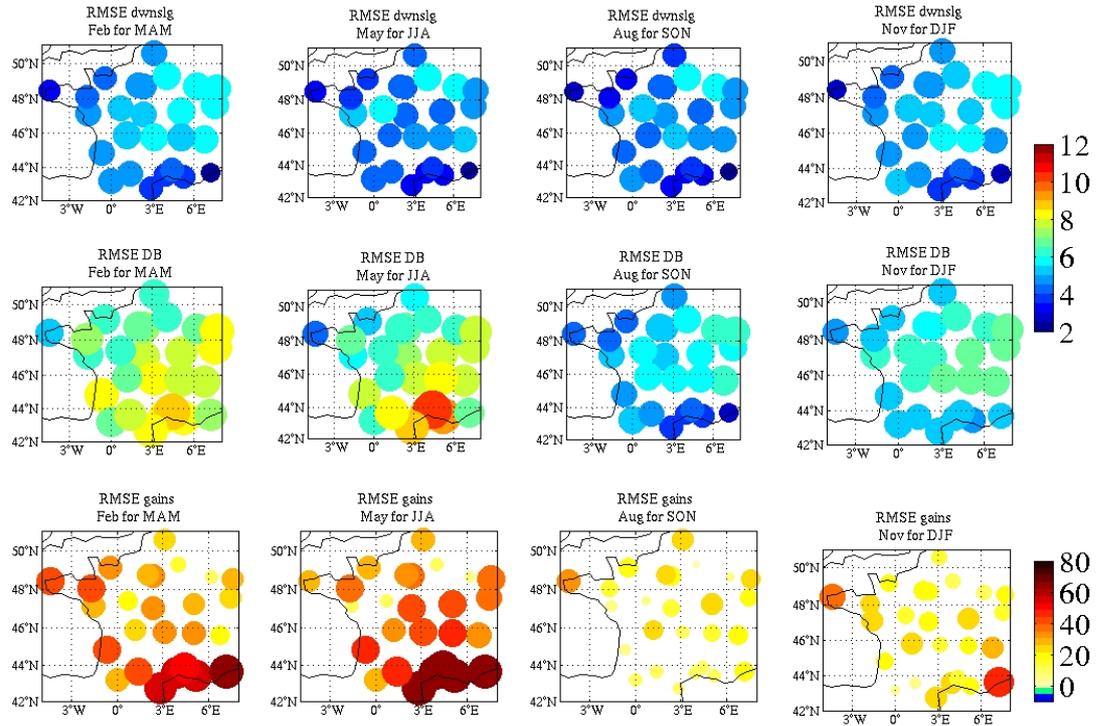
UNILIV in Figure 1 show a visual comparison of DEMETER and ENSEMBLES malaria prevalence plumes for an area in Botswana for a series of years with known high malaria prevalence.



**Figure 1** November forecast start date with Botswana grid (Origin 20E, 17.5S, 5x5 grid) averages, using the dynamic Liverpool Malaria Model driven by daily temperature and precipitation from the DEMETER and ENSEMBLES seasonal hindcasts. The years shown are for three highest malaria years (according to malaria index of Thomson et al.) from the ENSEMBLES stream 1 period (1991 to 2001). The red line is ERA-40 and the shaded blue plume shows the probability density of the DEMETER and ENSEMBLES hindcasts.

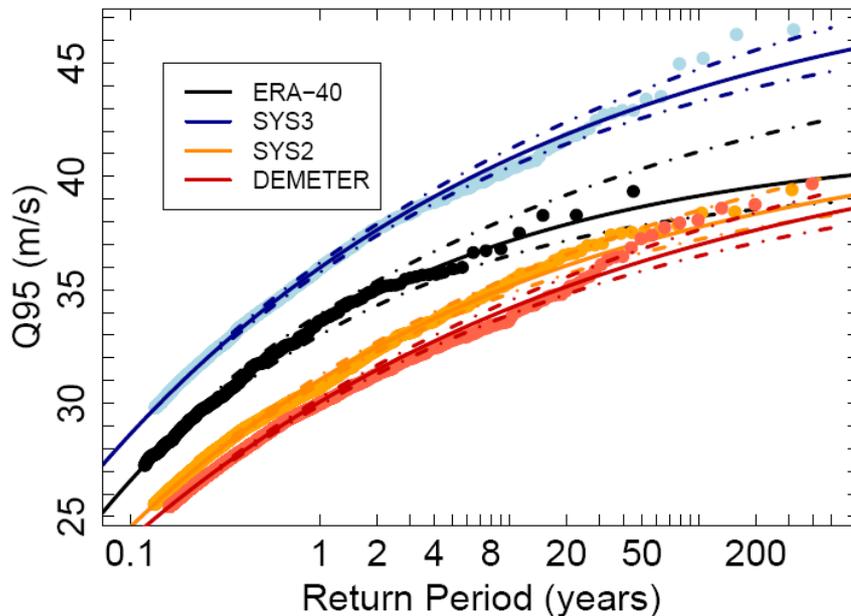
EDF show, Figure 2, the use of ENSEMBLES stream 1 data combined with the ENSEMBLES downscaling portal and the reaction is error when compared with observed data before and after downscaling.

### RMSE TMAX (DWNSSL vs BRUT) + GAIN - Model MULT



**Figure 2** shows the impact of downscaling on the reduction of errors in Tmax from the ENSEMBLES stream 1 data. The top row shows the RMSE after downscaling, the middle row the RMSE without downscaling and the bottom row show the difference thus the improvement due to downscaling

MeteoSwiss have worked with operational ECMWF data streams which are essentially the operational equivalents to DEMETER and ENSEMBLES hindcasts. Here they show differences in the 95<sup>th</sup> percentile wind speeds through a specifically defined extreme wind index.



**Figure 3:** The Return Period (RP, years) and Return Level (RL, m/s) of the GPD (solid coloured lines) of the Declustered Peak Other Threshold (DPOT) Q95 series, using geostrophic wind (GW) at 850hPa over the whole domain for ERA-40 (black line), and the s2d datasets, SYS3 (blue line), SYS2 (orange line) and DEMETER according to the legend in the top left of the figure. The solid coloured dots represent the DPOT series. Dashed dotted coloured lines show the upper and lower bounds of the CI of both RL and RP calculated using profile log-likelihood.

The MeteoSwiss group have developed techniques to calibrate the different forecast model streams to a reference climate in this case ERA-40 to allow different model outputs included ENSEMBLES outputs to be used in wind loss calculations for the insurance industry.

### Summary

This report shows some examples of the use of ENSEMBLES stream 1 seasonal probabilistic hindcasts (or operational equivalents) and techniques that have been developed for their use. The techniques that have been developed can be easily used with stream 2 data as it becomes available.