The importance of and findings from integrated climate-health projects in Africa: towards the establishment of 'epiclimatology'?

Andy Morse,

School of Environmental Sciences,

University of Liverpool,

Liverpool,

UK

(A.P.Morse@liv.ac.uk)

Cyril Caminade, Anne Jones, Andy Heath, Dave MacLeod

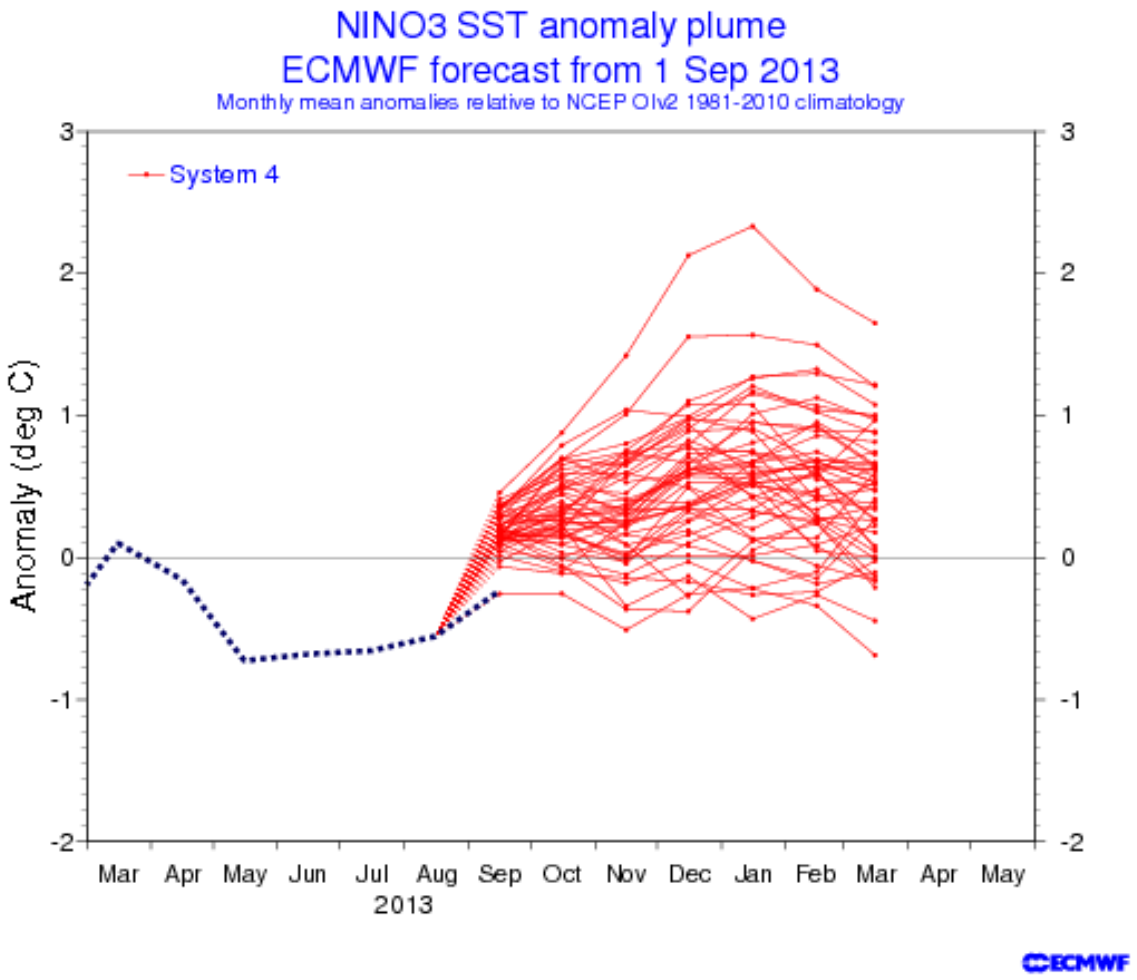
UNIVERSITY OF LIVERPOOL

Background

- Infectious disease models
- Climate model driven
- Climate model analysis
- Early warning development
- Big data (big and multiple sources)
- One Health

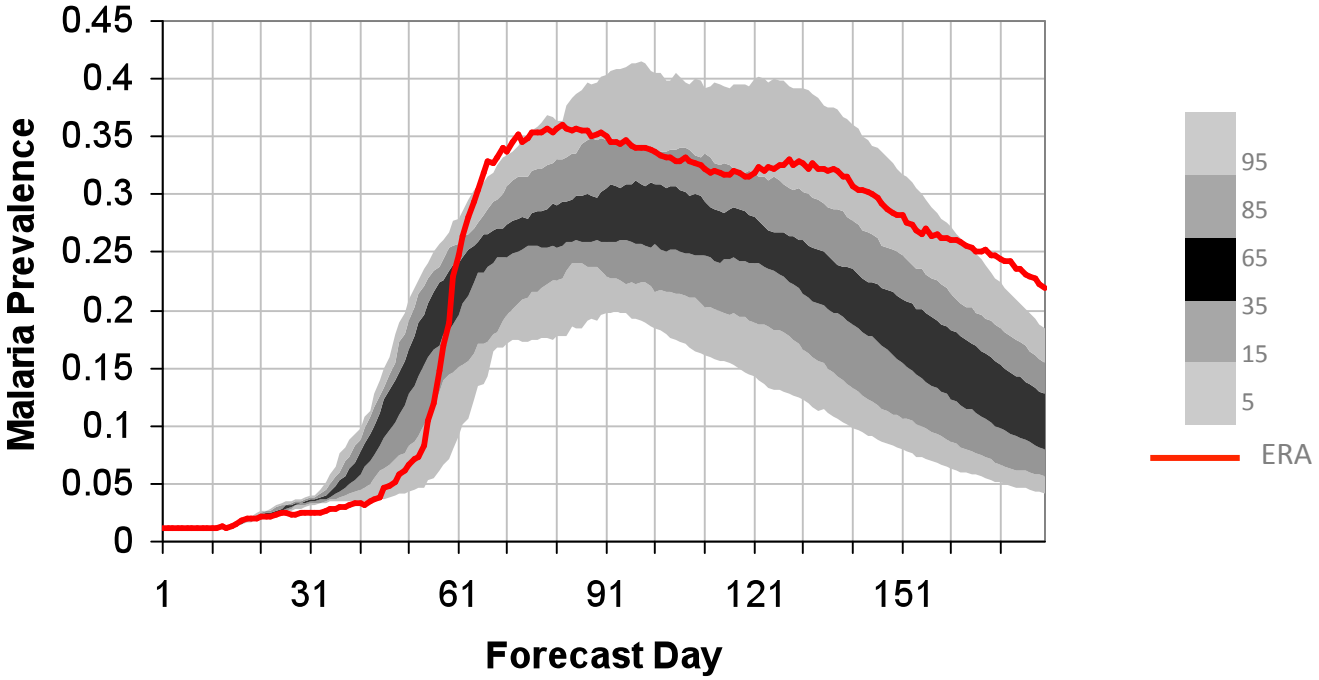
UNIVERSITY OF LIVERPOOL

Background – seasonal forecast data



UNIVERSITY OF LIVERPOOL

Research Examples – seasonal malaria prediction



Botswana malaria forecast for February 1989

LMM (Liverpool Malaria Model) (Hoshen and Morse, 2004) driven by DEMETER multi-model 63 members

(ERA-driven control model shown in red)

UNIVERSITY OF LIVERPOOL

Research Examples – malaria forecasts Botswana past performance

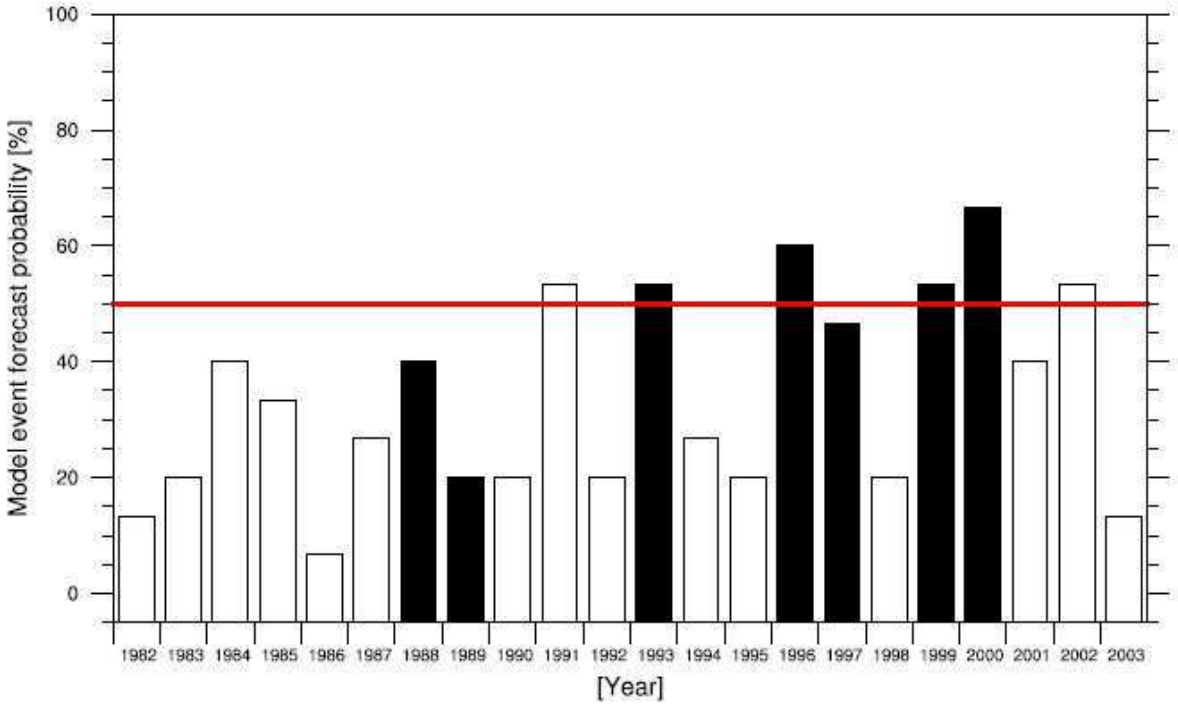


Figure concept highlighted in BIS (UK Dept Business, Innovation and Skills) Foresight Disaster Risk Reduction report 2012

4 hits
3 misses
2 false alarms
13 correct rejections
ROC area under curve =

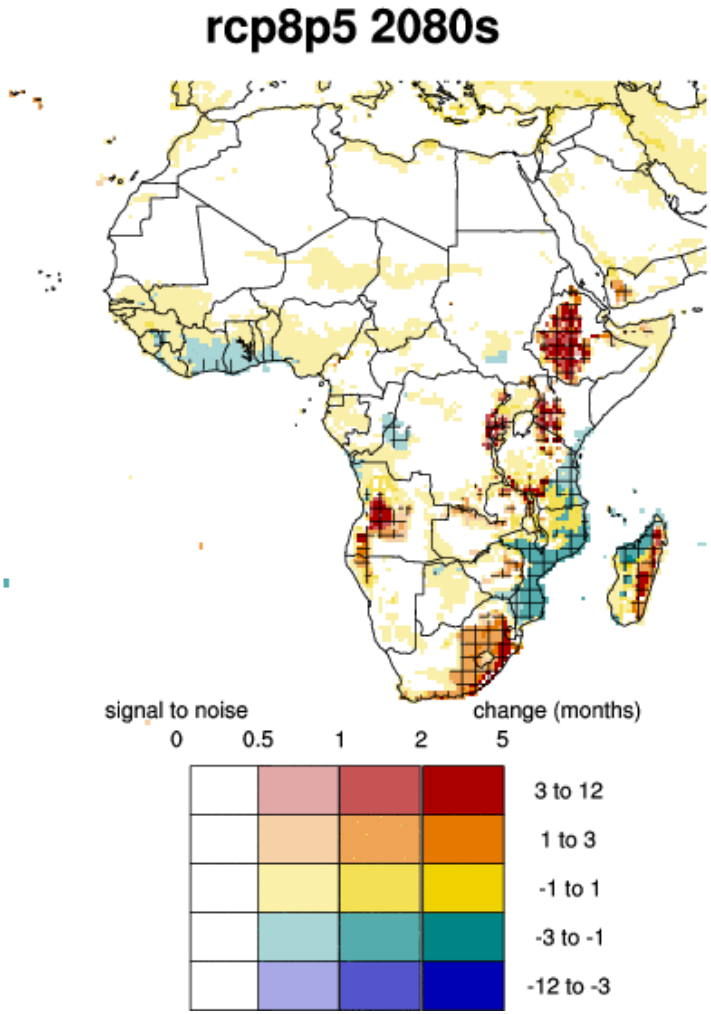
System 4 driven LMM incidence forecasts of above upper tercile events issued in **November** for MAM (5-7).

Black (white) bars indicate years where observed incidence is above (below) the upper tercile.
22 years correct 17 times. 77%.

UNIVERSITY OF LIVERPOOL

CMIP5 Malaria Model Projections: ISI-MIP

Future changes: length of the malaria transmission season rcp8.5 2069-99 vs 1980-2010



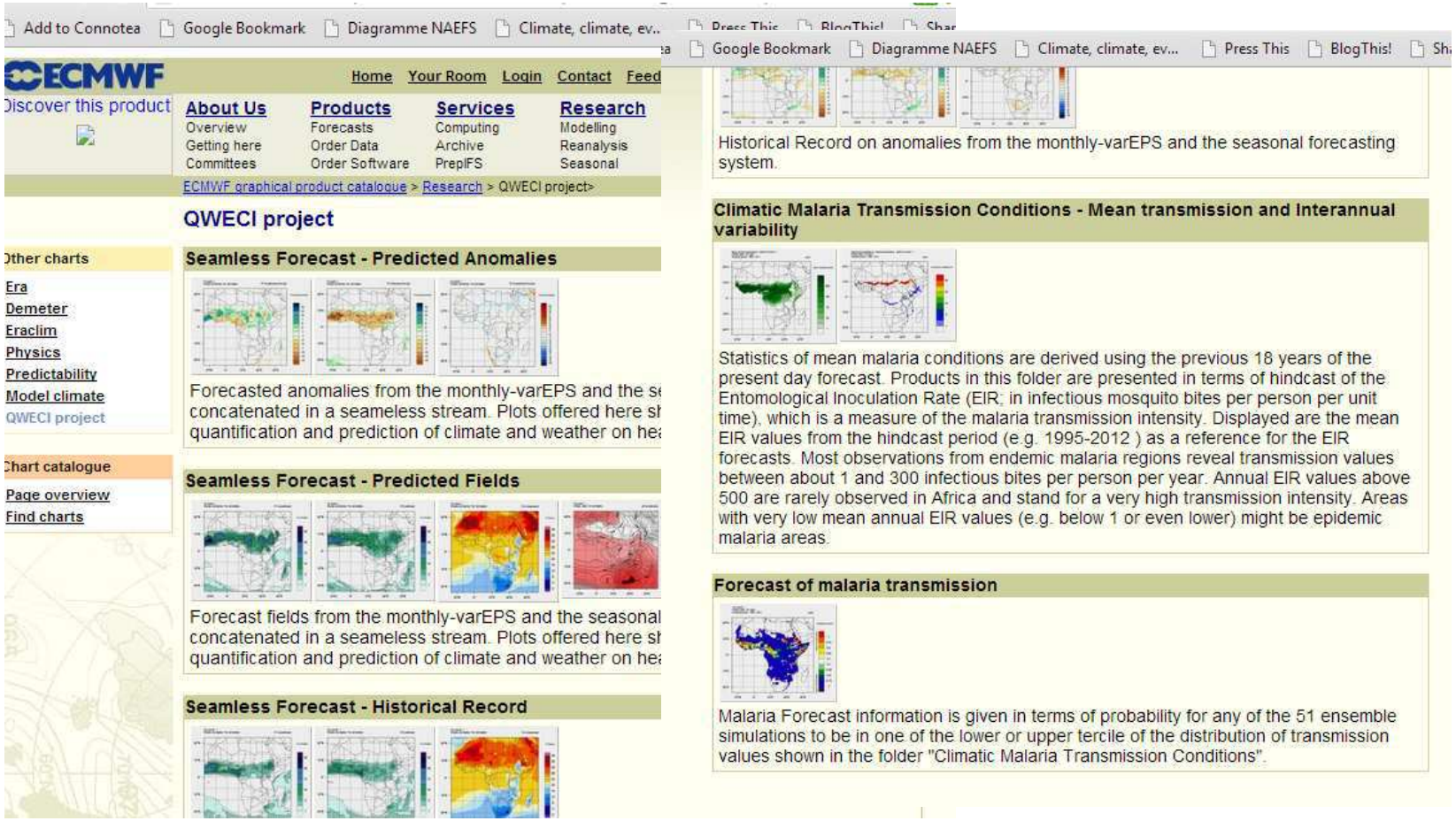
5 GCMs 3 malaria models.
The different saturations represent signal-to-noise (μ/sigma).

Matrix after Kaye, Hartley and Hemming 2012

See poster Cyril Caminade et al.

UNIVERSITY OF LIVERPOOL

Research Examples ‘Operational’ - ECMWF **Monthly to Seasonal Forecasts** portal - QWeCI project



UNIVERSITY OF LIVERPOOL

ECMWF

See Adrian Tompkins’ talk
http://www.ecmwf.int/research/EU_projects/QWECI/
www.liv.ac.uk/qweci

The case for epiclimatology

The subject areas of **hydrometeorology** and **agrometeorology** are well established.

Agrometeorlogy branch of meteorology - impacts of weather and climate on agriculture.

WMO AgMP and support through UN Food and Agriculture Organisation.

Established as far back 150 years ago.

Crop models driven by weather data

Organised impacts community - AgMIP The Agricultural Model Intercomparison and Improvement Project.

Crop models driven with Seasonal EPS and Global/Regional Climate Models

UNIVERSITY OF LIVERPOOL

The case for epiclimatology

Hydrometeorology branch of **meteorology and hydrology** - transfer of water and energy - atmosphere & land surface.

Droughts and flooding, evaporation processes.

Integral understanding energy transfer in coupled climate models.

Hydrological models driven by knowledge of forecasts of rain across a catchment.

Strong connections to agrometeorology

UNIVERSITY OF LIVERPOOL

The case for epiclimatology

Epiclimatology use of climate and weather information for the prediction of disease outbreaks and risks including impacting on chronic conditions.

Should this be seen as a Grand Challenge.

Chronic conditions: Heat waves (2003 European Heat Wave), cold spells (winters e.g. UK 2010/11) , air pollution and pollen levels –part established.

Establish use of climate and weather information for **infectious diseases** especially vector borne disease for humans and animals – under a One Health framework.

Non-infectious diseases already integrated Climate Services Agenda

UNIVERSITY OF LIVERPOOL

The case for epiclimatology

Emphasis on infectious diseases especially operational early warning.

Also future emerging disease risk.

Use of climate observations, monthly-seasonal to decadal prediction, and climate projections.

Need socio-economic data, disease surveillance, social science.

Build links through NMHS to MoHs, role for NGOs

Epiclimatology need emerging Future Earth agenda support and recognition within international organisations.

UNIVERSITY OF LIVERPOOL

Summary

Epiclimatology is a Grand Challenge.

Now established as a successful user of seasonal predictions and climate projections.

Feeds back on value of forecasting the projection systems to climate science community.

Malaria modeling is on the operational cusp.

Models for other diseases and vectors well advanced.

Very important for improving well being of people in Africa.

Need support within emerging African and Global research agendas.

UNIVERSITY OF LIVERPOOL

Questions?

Thank you for listening.

Thanks to our funders and project partners.

www.liv.ac.uk/qweci

www.healthyfutures.eu

www.equip.leeds.ac.uk

www.liv.ac.uk/enhance