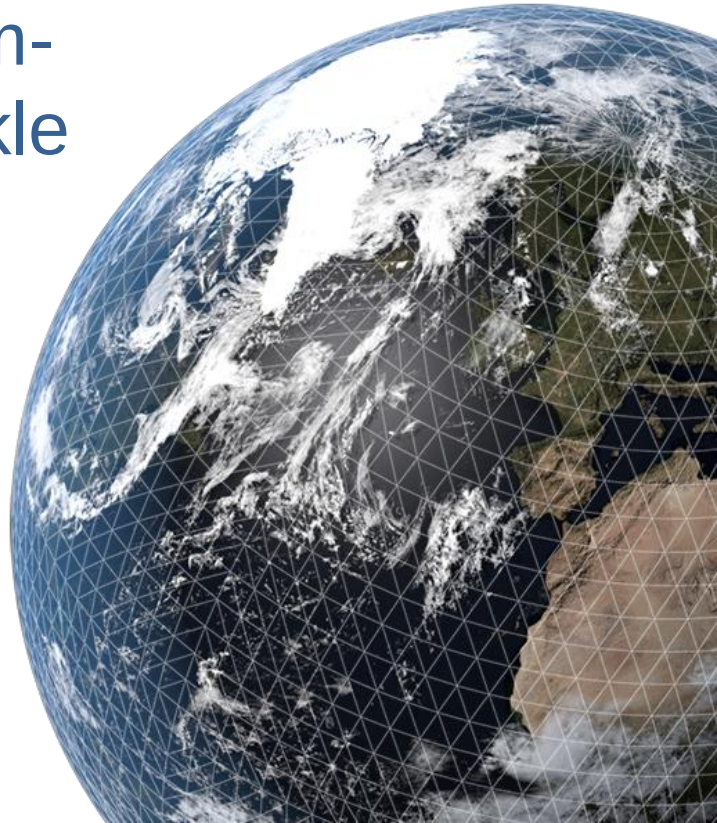
ECMWF & GloFAS

November 2, 2016

EUROPEAN CO-OPERATION AT ITS BEST

ECMWF's role is to address the critical and most difficult research problems in medium-range NWP that no one country could tackle on its own



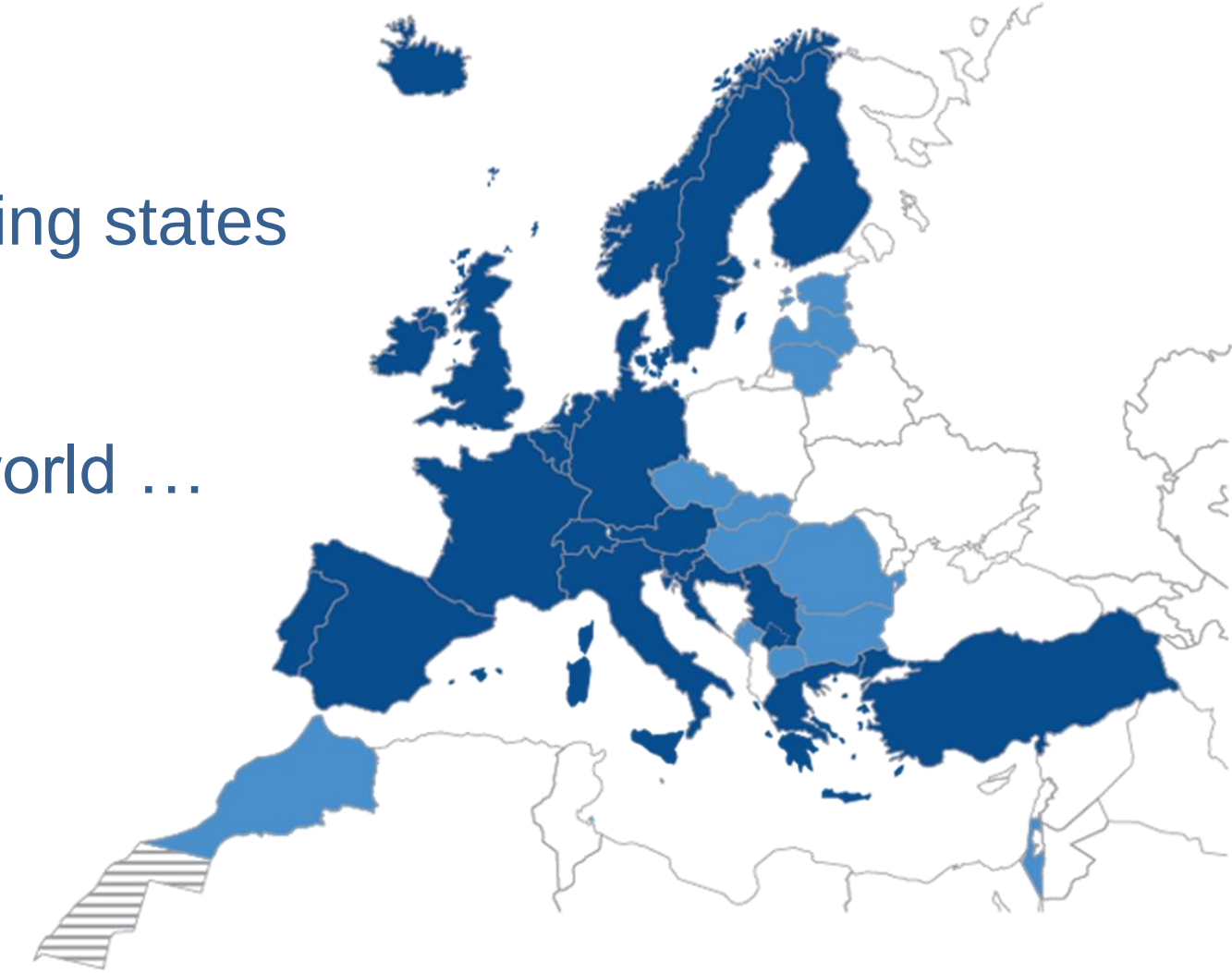
EUROPEAN CO-OPERATION AT ITS BEST

ECMWF's purpose is to develop a capability for medium-range weather forecasting and to provide such weather forecasts to the Member and Co-operating States

ECMWF is complementary to the National Meteorological Services and works with them in research, numerical weather predictions, supercomputing and training.

EUROPEAN CO-OPERATION AT ITS BEST

- 34 member and co-operating states
- 341 staff
- 30 countries
- Partnerships around the world …



EUROPEAN CO-OPERATION AT ITS BEST

- Global numerical weather forecasts
- Supercomputing & data archiving
- Education & training programme

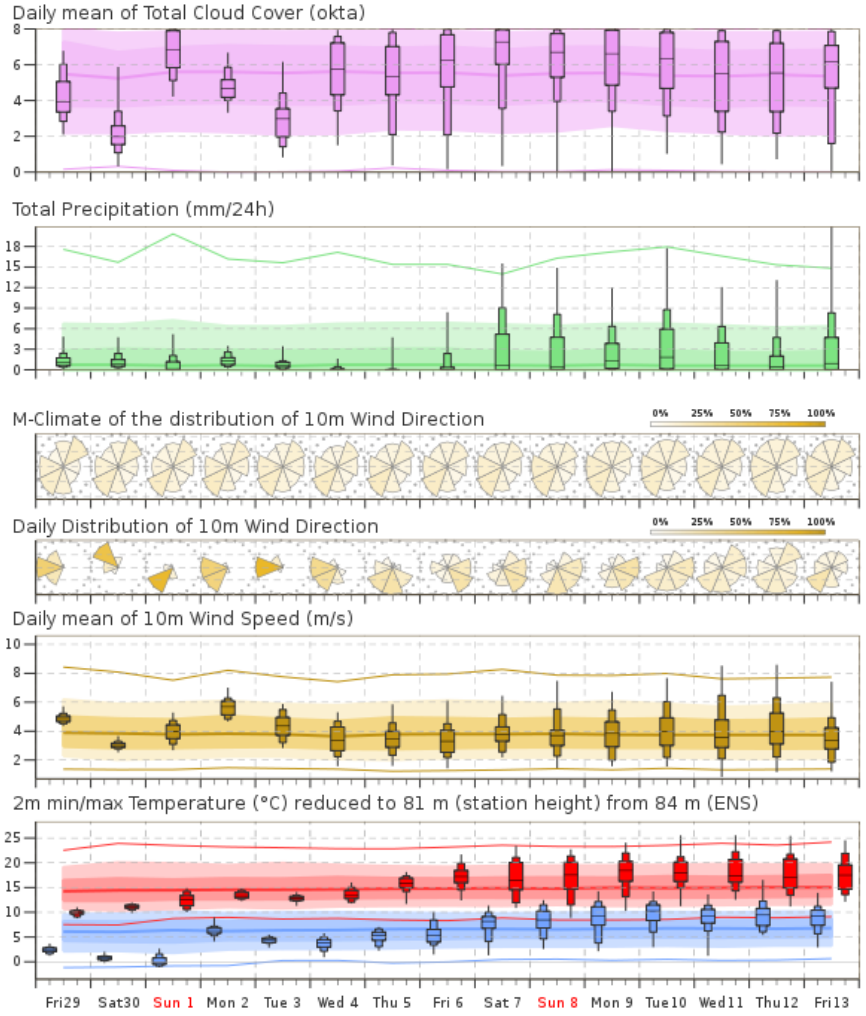
- EU activities: Copernicus Climate and Atmosphere Services, EFAS contribution

EUROPEAN CO-OPERATION AT ITS BEST

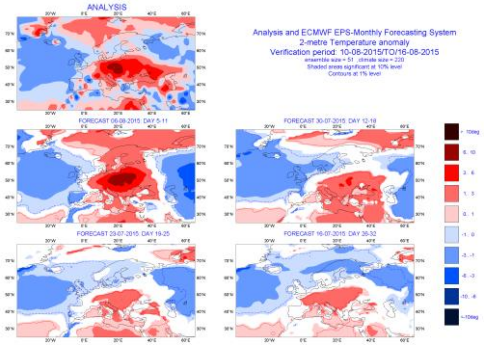
ECMWF Copernicus Department in its new offices…at Reading University!

DELIVERABLES: A FEW EXAMPLES

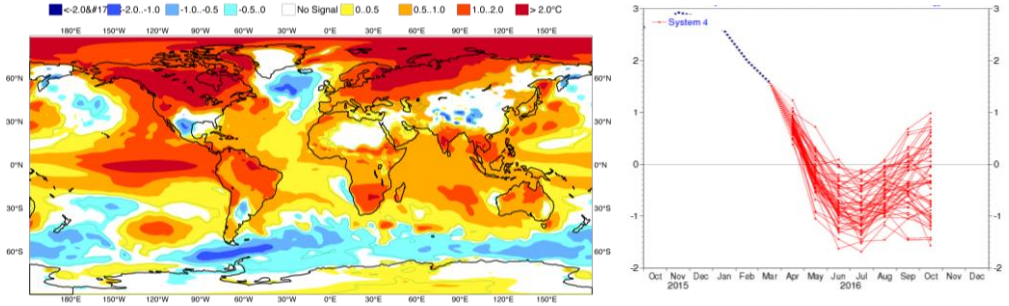
Medium-range



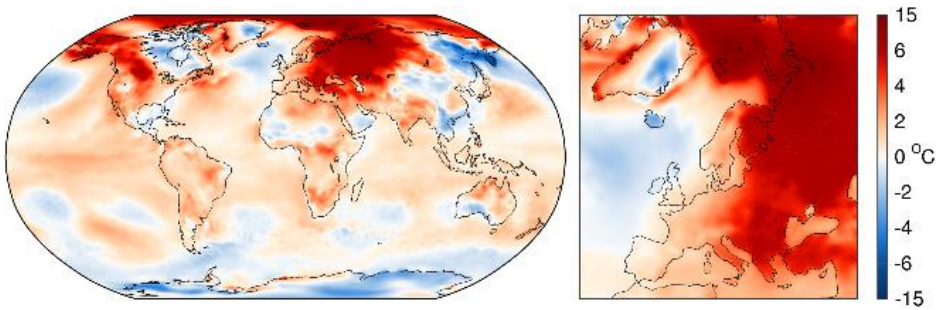
ENS-Monthly Forecasting System 2mt anomaly



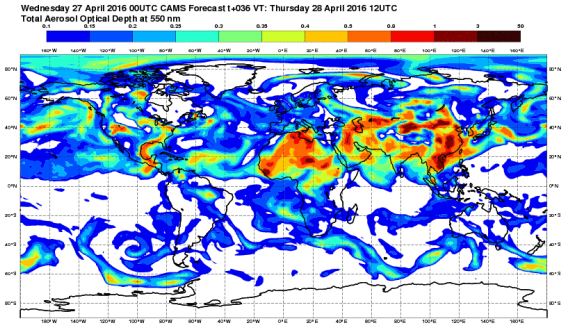
Seasonal Forecast



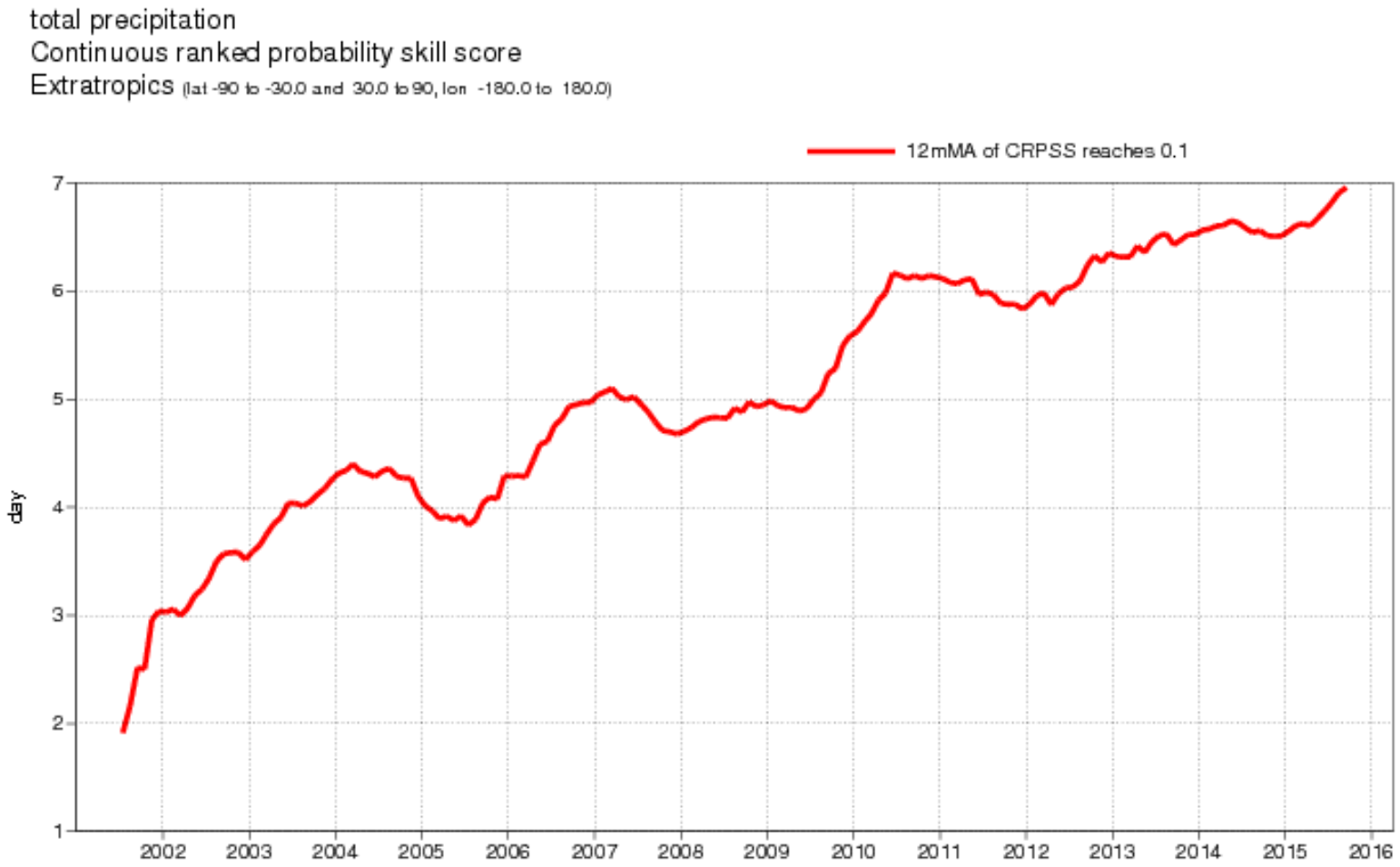
Global average temperatures



Forecast of Aerosols Optical Depth



CONTINUOUSLY AIMING TO IMPROVE



EXCITING TIMES

EXCITING TIMES: **41r2**

ECMWF EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS

41r2 SUCCESSFULLY IMPLEMENTED

Overview

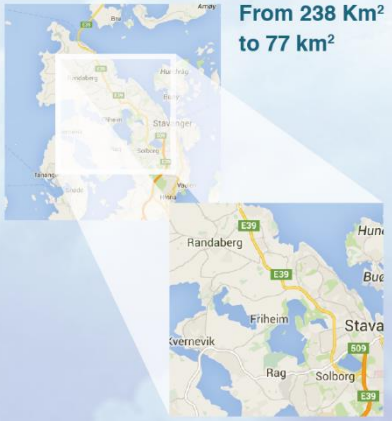
More global prediction points

Before After

There will now be over **900 million** grid points spaced more evenly around the globe. This is **triple** the number there were previously.

Greater forecast resolution

Before After



From 238 Km² to 77 km²

Each square that makes up the global weather forecast is less than a **third** of the size it was before; meaning we can tell what the weather will be in much greater detail.

Improved accuracy and extended range

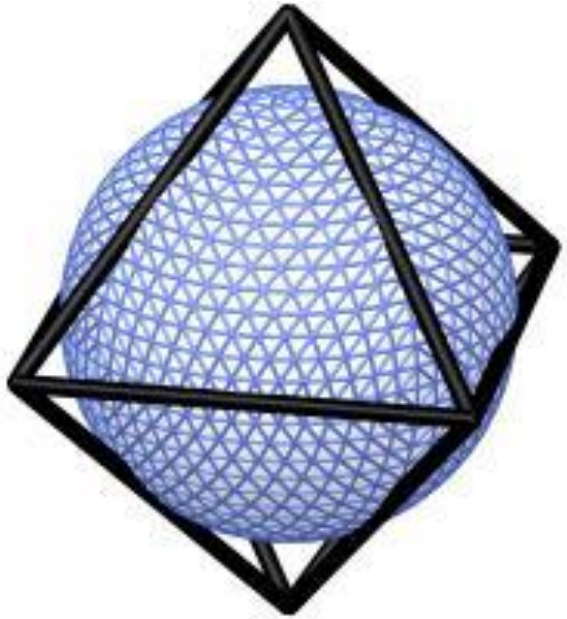
Accuracy will improve by **2-3%** for many of the parameters that make up the forecast. This will extend predictive skill by up to **half a day.**

A gateway to greater certainty and efficiency

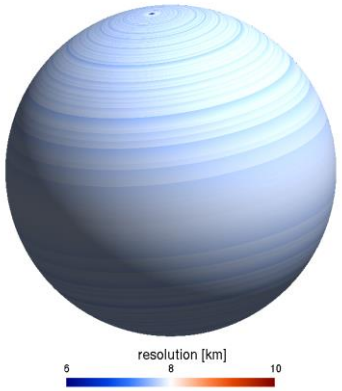
The upgrades also improve efficiency. This **saves energy**, clearing the way for future forecasts to provide even greater detail, further into the future.

41r2 SUCCESSFULLY IMPLEMENTED

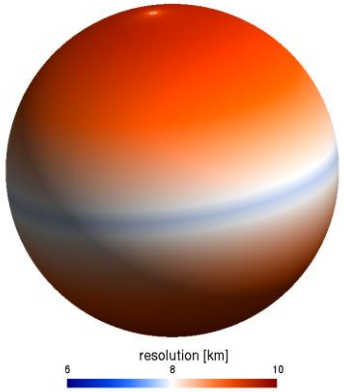
More specific resolution increases



- High resolution forecast (HRES): twice per day
  9 km 137-level, to **10 days ahead**
- Ensemble forecast (ENS): twice per day
  51 members, **18 km 91-level**, **to 15 days ahead**
- Monthly ENS extension: twice a week (Mon/Thursdays)
  51 members, **36 km 62 levels,** to **46 days ahead**

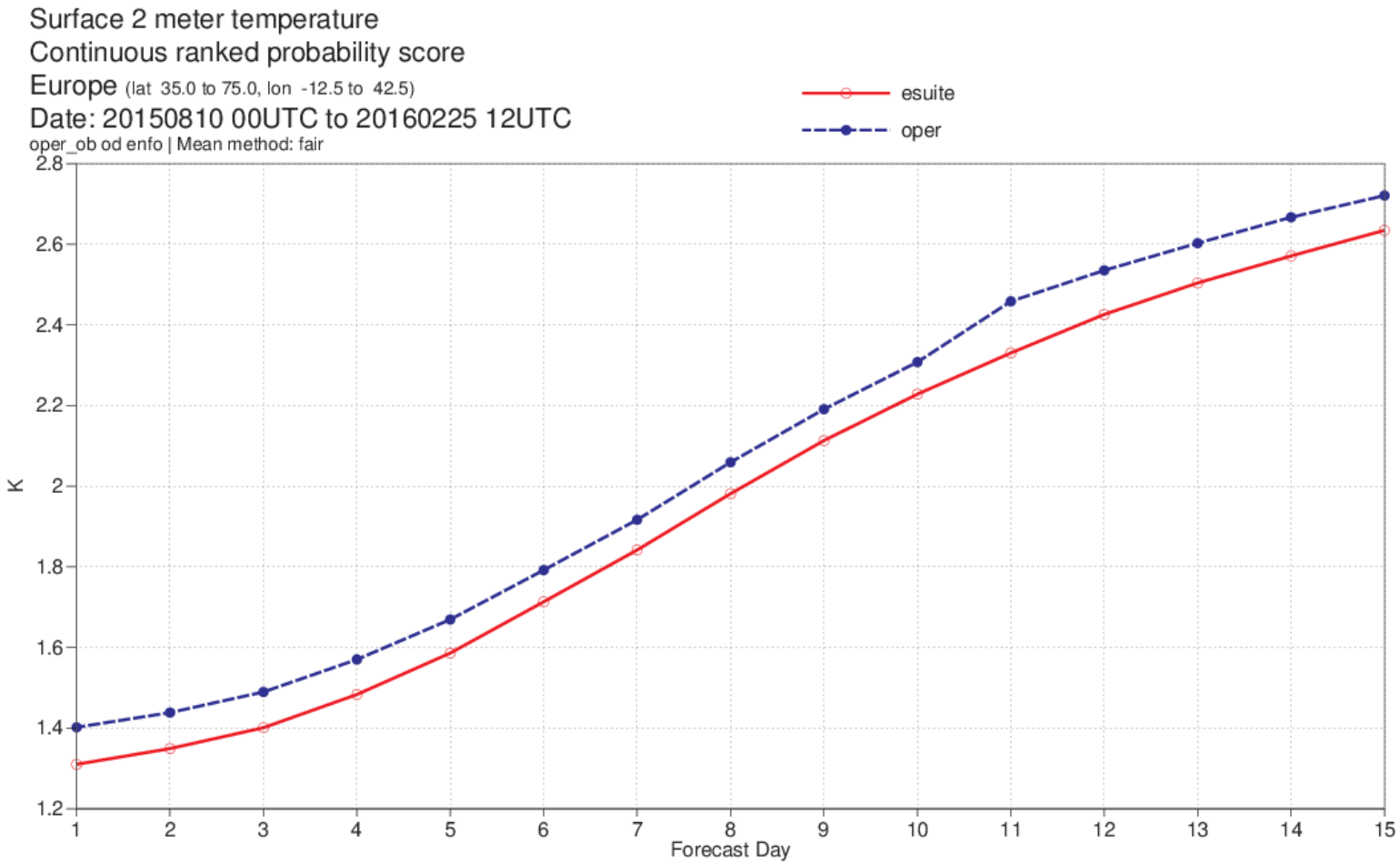


Comparing the global variations in resolution between current (Gaussian-reduced) and new (octahedral) grids at ~9km.



41r2 SUCCESSFULLY IMPLEMENTED

Probabilistic surface temperature scores

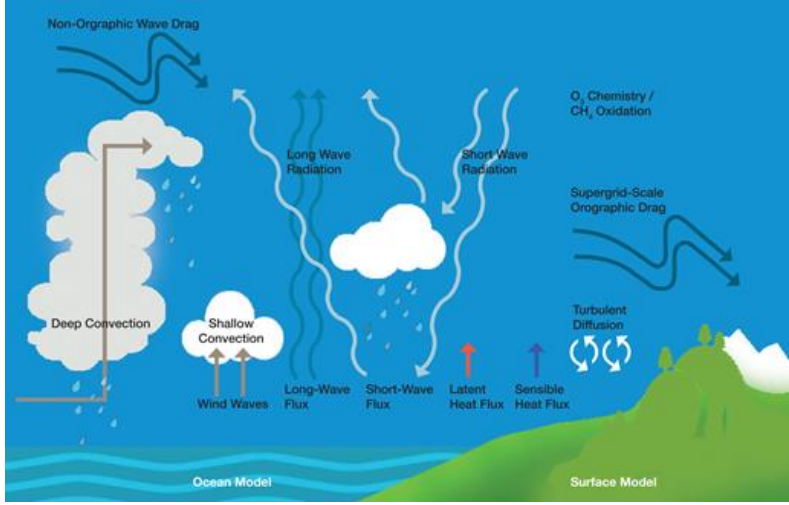


EXCITING TIMES: **THE NEXT TEN YEAR'S STRATEGY**

ECMWF EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS

THE STRENGTH OF A COMMON GOAL

At a glance

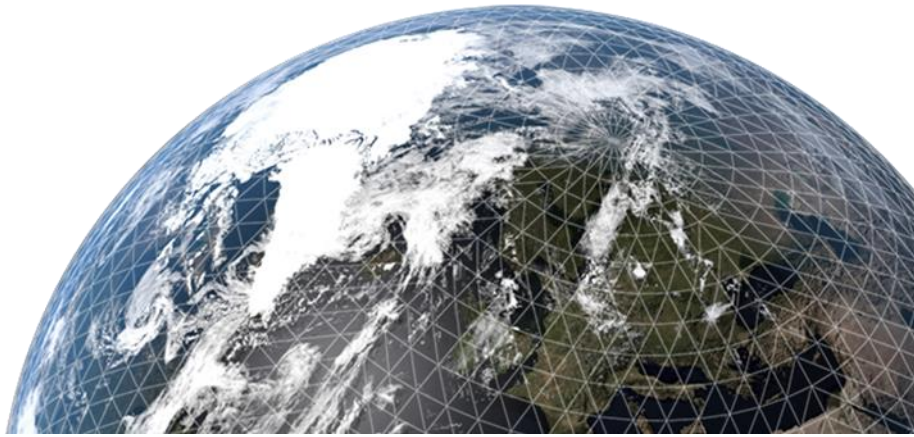


- Operational forecasts AND Research
- High-impact weather, regime transitions and global-scale anomalies
- Integrated ensemble at high resolution
- Earth-System model at all time-ranges
- Scalable computation
- Environmental information services: Copernicus

THE STRENGTH OF A COMMON GOAL

Forecast targets by 2025

- Ensemble predictions of **high impact weather** up to two weeks ahead
- Seamless approach, aiming towards predictions of **large scale patterns and regime transitions** up to four weeks ahead and **global-scale anomalies** up to a year ahead



ECMWF, READING UNIVERSITY & FLOOD PREDICTION

ECMWF EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS

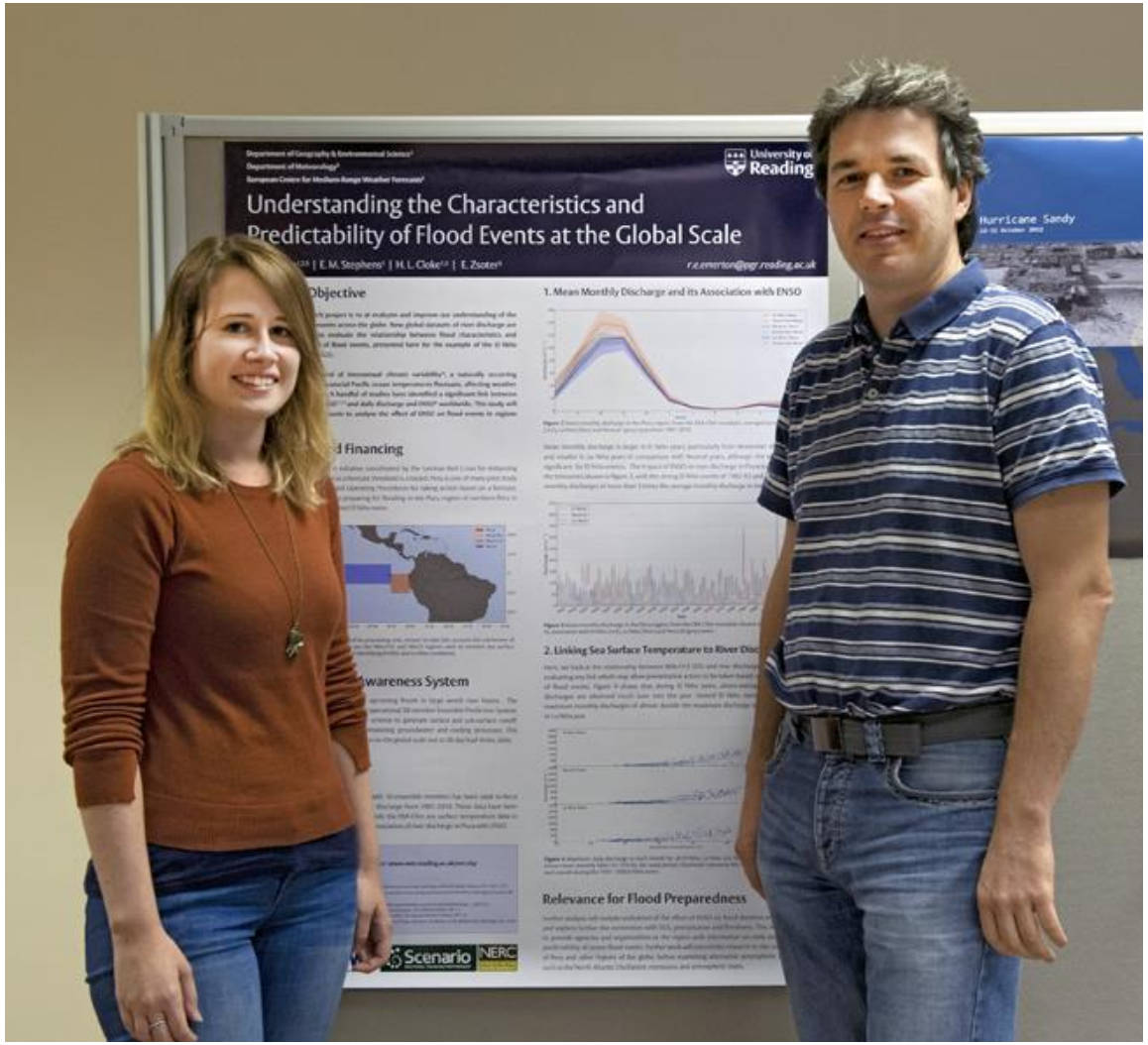
ECMWF & READING UNIVERSITY

- Informal scientist-to-scientist contacts
- Joint participation in major international projects
- Allocation of computing resources at the Centre for ‘special projects’ likely to be of interest to the general scientific community
- Educational programmes

ECMWF, READING UNIVERSITY & FLOOD PREDICTION

Sharing knowledge

ECMWF, READING UNIVERSITY & FLOOD PREDICTION



SHARING KNOWLEDGE: HACKATHON JANUARY 2016

FLOOD PREDICTION

European Flood Awareness System: meeting a European need

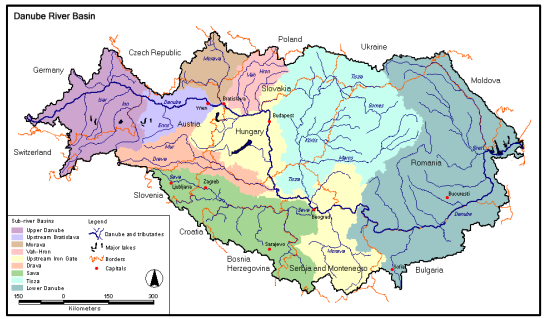
the problem	the solution	today	the ambition
No coherent flood information nor coordination	Improved preparedness and disaster management	Daily flood forecasts 24/7 to 51Member States Authorities	GO GLOBAL

FLOOD PREDICTION
EFAS deliverables

Benefits

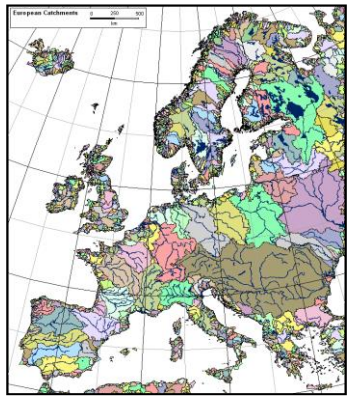
National Hydrological Services

- Catchment based information
- River basins larger than 4000 sq.km and regional cross-border dimension
- Longer lead-times up to 15 days through probabilistic information
- Network of operational services
- Promotion of novel tools, techniques and data sets (e.g. satellite data)



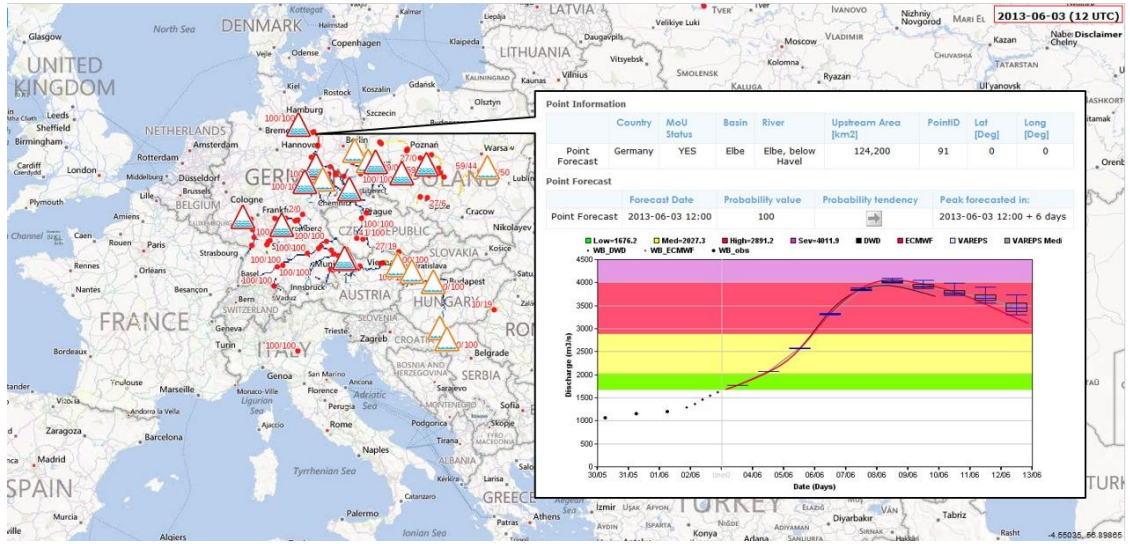
European Commission

- Comparable information across Europe
- Tool for anticipation of crisis management:
- Civil Protection aid assistance during crisis
- COPERNICUS Mapping Service



FLOOD PREDICTION

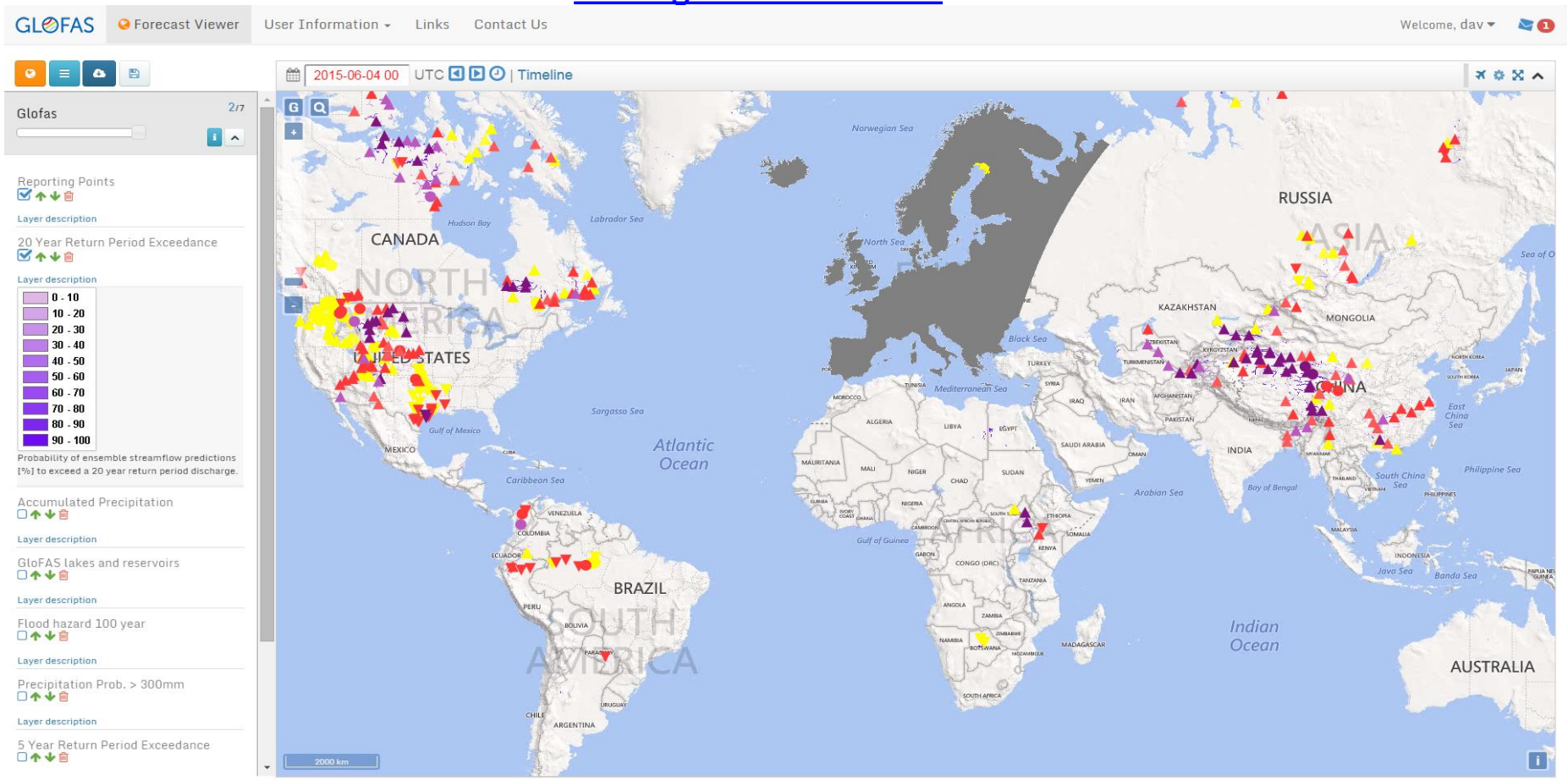
Central European floods in summer 2013



EFAS active alerts (red) and watches (orange) and details for the Elbe River at Wittenberg, Germany, on 12:00 3 June 2013, valid for the next 10 days.

FLOOD PREDICTION
The Global Flood Awareness System

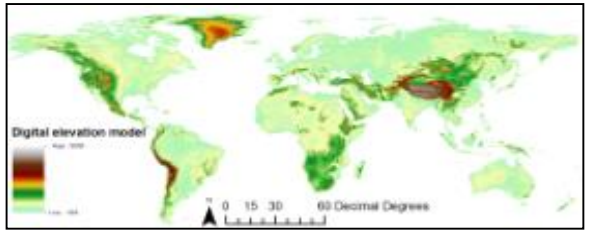
www.globalfloods.eu

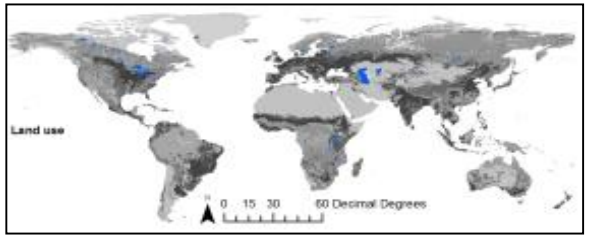


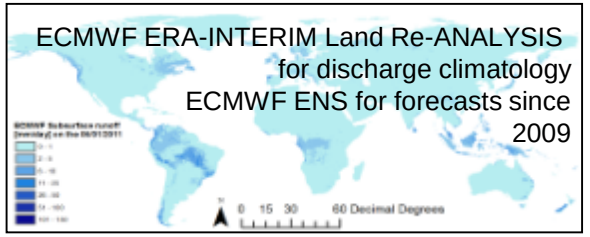
FLOOD PREDICTION

Global Flood Awareness System Set up

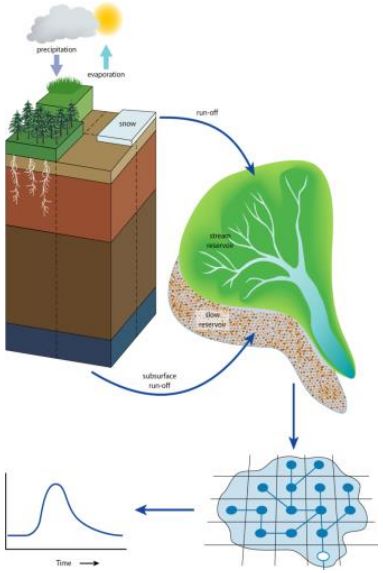
Input: global spatial data



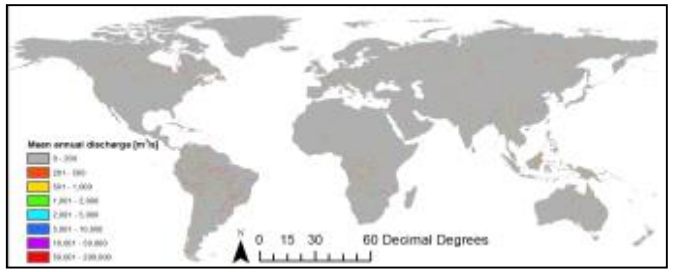


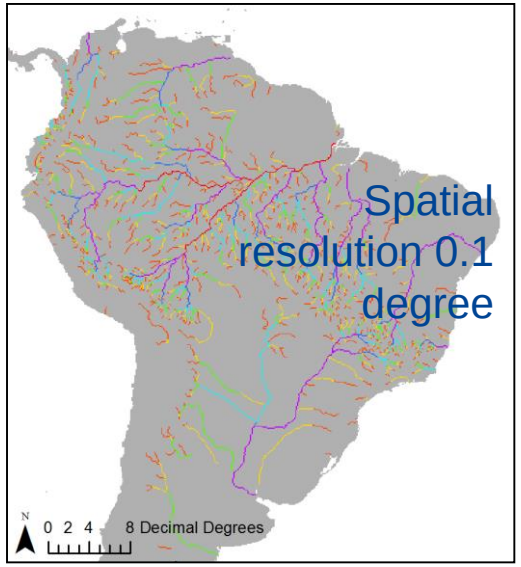


Hydro-Meteo model



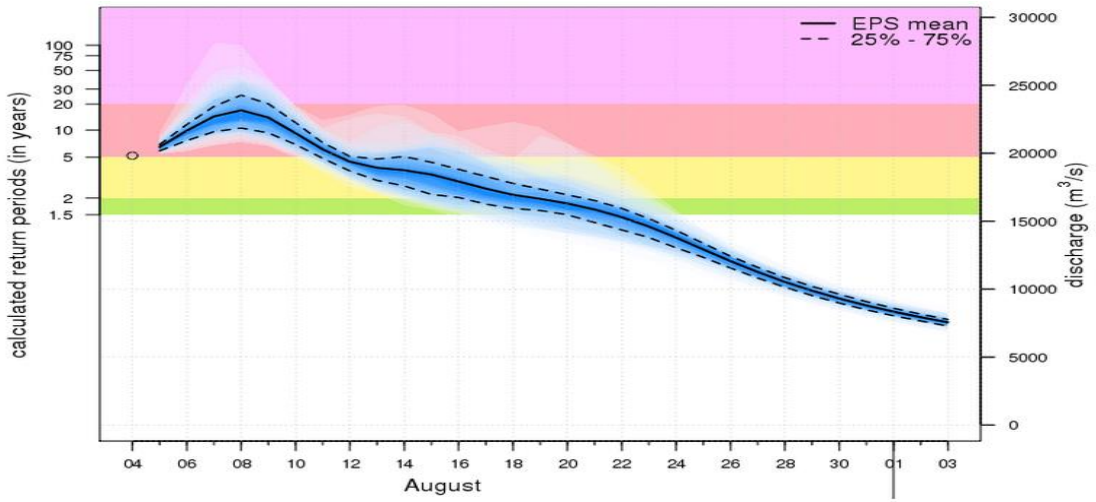
Output: global daily discharge



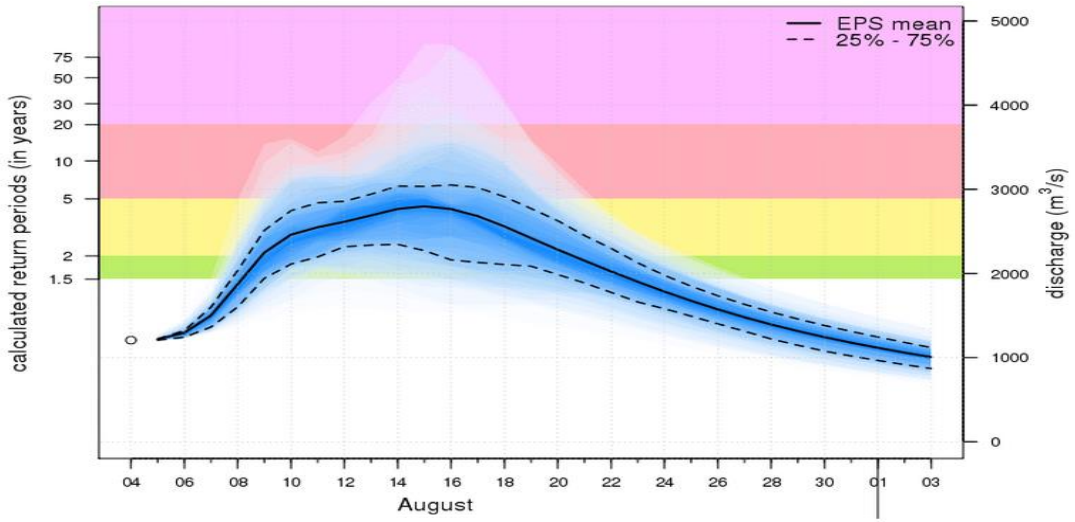


FLOOD PREDICTION

Myanmar 2015 floods, GloFAS Hydrographs



GloFAS forecast for the Thanlyin River at Mawlamyine (river outlet)



GloFAS forecast for the Tanintharyi River at Mergui

On 31 July, the President of the Union of Myanmar issued a statement declaring natural disaster zones in Chin and Rakhine states and in the Sagaing and Magway regions, stating “the following regions which are hugely affected by natural disasters.

And in the end…