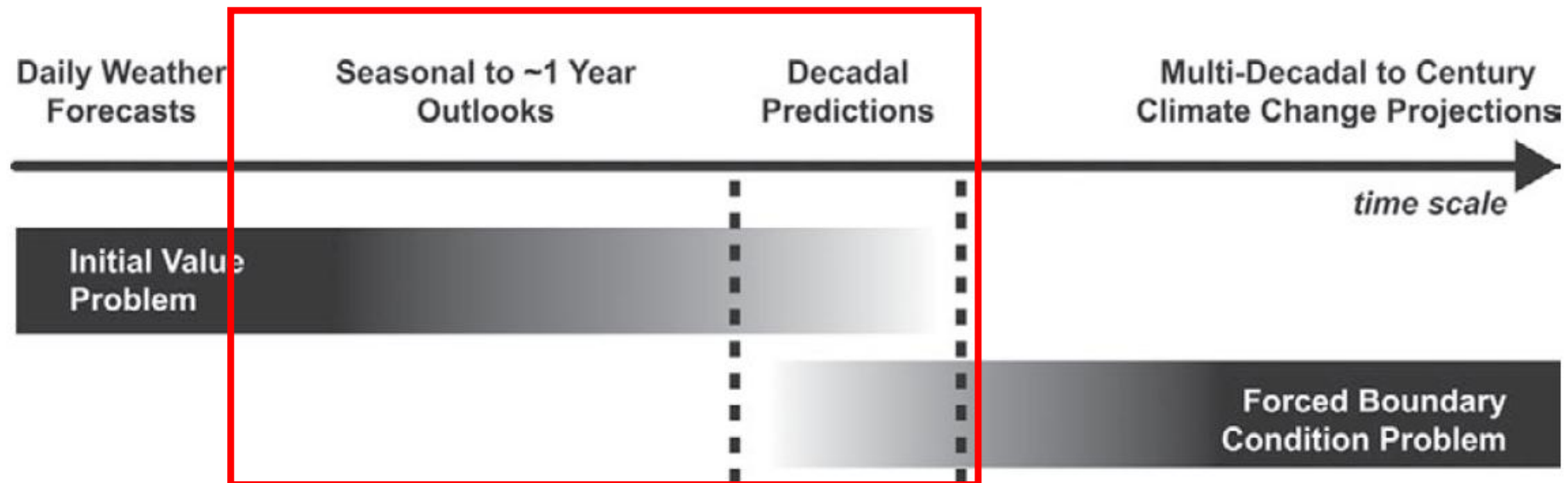

SPECS and EUPORIAS Contributions to ECOMS

F.J. Doblas-Reyes, IC3 and ICREA, Barcelona

Climate time scales

Progression from initial-value problems with weather forecasting at one end and multi-decadal to century projections as a forced boundary condition problem at the other, with climate prediction (**sub-seasonal, seasonal and decadal**) in the middle. Prediction involves initialization and systematic comparison with a **simultaneous** reference.



Meehl et al. (2009)

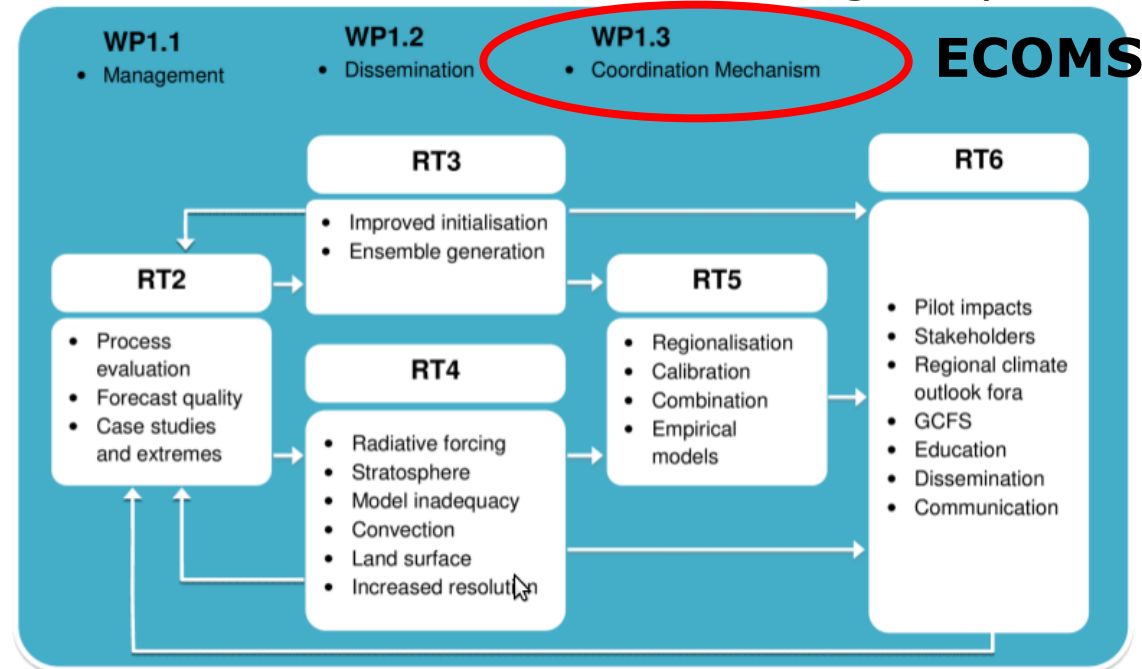
Some open fronts in climate prediction

- **Work on initialisation**: initial conditions for all components (including better ocean), better ensemble generation, etc. Link to observational and reanalysis efforts.
 - **Model improvement**: leverage knowledge and resources from modelling at other time scales, drift reduction. More efficient codes and adequate computing resources.
 - **Calibration and combination**: empirical prediction (better use of current benchmarks), local knowledge.
 - **Forecast quality assessment**: scores closer to the user, reliability as a main target, process-based verification.
 - **Improving many processes**: sea ice, projections of volcanic and anthropogenic aerosols, vegetation and land, ...
 - **More sensitivity to the users' needs**: going beyond downscaling, better documentation (e.g. use the IPCC language), demonstration of value and outreach.
-

SPECS FP7, overall strategy

SPECS will deliver *a new generation of European climate forecast systems, including initialised Earth System Models (ESMs) and efficient regionalisation tools to produce quasi-operational and actionable local climate information over land at seasonal-to-decadal time scales with improved forecast quality and a focus on extreme climate events, and provide an enhanced communication protocol and services to satisfy the climate information needs of a wide range of public and private stakeholders.*

Forecast System	Project Partners
CNRM-CM5	CNRM, CERFACS
EC-Earth	KNMI, SMHI, IC3, ENEA
IFS/NEMO	ECMWF, UOXF
IPSL-CM5	CNRS
MPI-ESM	MPG, UniHH
UM	UKMET



WP1.1: Management
 WP1.2: Dissemination
 WP1.3: Coordination across EUPORIAS, NACLIM & SPECS
 RT2: Evaluation of current s2d forecast systems
 RT3: Forecast strategies
 RT4: Improved systems
 RT5: Calibrated predictions at the local scale



SPECS is part of ECOMS

- European Climate Observations, Modelling and Services (ECOMS) initiative with these objectives:
 - ensure close coordination between projects and activities in Europe in the area of seasonal-to-decadal climate predictions towards climate services
 - provide thought leadership to the European Commission on future priorities in the area of climate predictions towards climate services.
- Three EU projects are the core of ECOMS: EUPORIAS, NACLIM and SPECS, with a total funding of 26 Meuros.
- All EU projects related to climate research and climate services are part of ECOMS.

SPECS impact

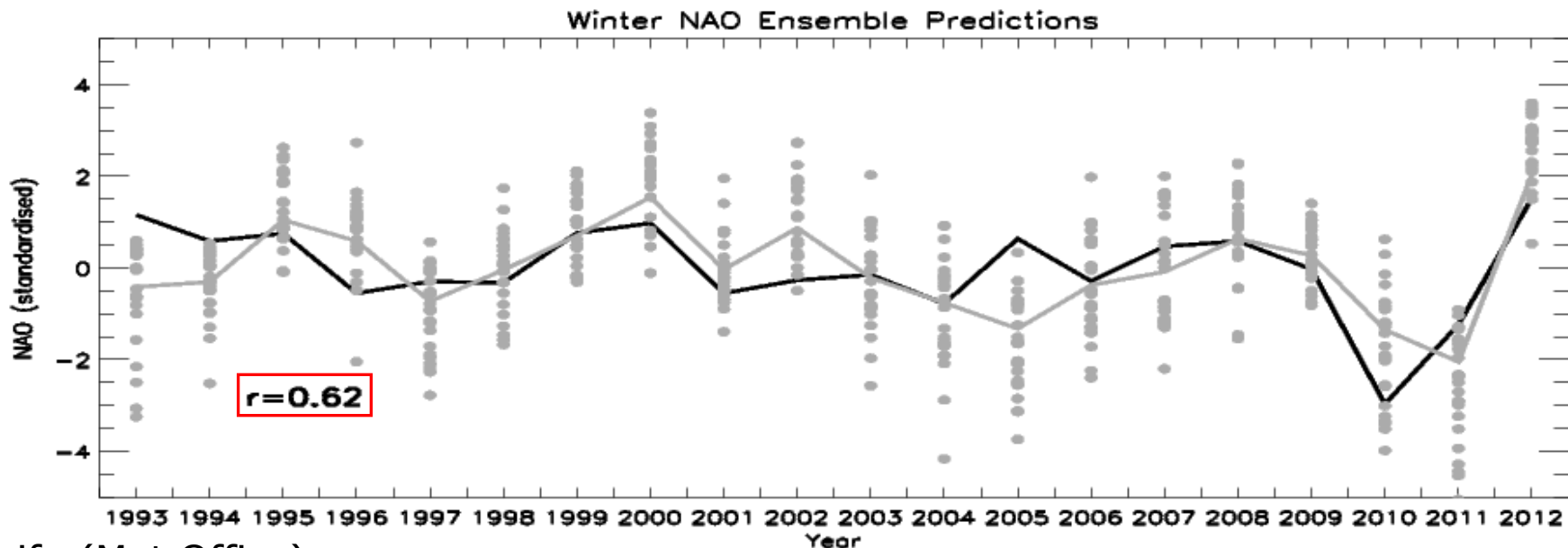
- SPECS brings together several communities: climate modelling, weather and climate forecasting, near-term impact modelling, downscaling.
- The main project deliverables are a set of public tools (R based) and hindcasts from coordinated seasonal-to-decadal global prediction experiments.
- Coordinated experiments
 - Core: impact of soil moisture and sea-ice initialization, increased resolution, improved stratosphere and enhanced sample size
 - Tier 1: impact of snow initialization, interactive vegetation/phenology, sensitivity to aerosol and solar irradiance.
 - **Central repository at BADC using a merged version of CMIP5/CORDEX and CHFP standards.**
- Large amount of documentation and use cases.

SPECS links to IS-ENES2

- SPECS should accelerate the integration of better climate products and services into adaptation processes, and to learn about the needs from the impact sector in a co-design process.
- **PRACE resources** are essential (always working towards dedicated facilities). Technology like Autosubmit make the use of these resources possible.
- Public data dissemination, **SPECS convention and ESGF** dissemination of hindcasts and forecasts, bringing closer together climate modelling and climate prediction: the convention is now adopted by CHFP and will be the basis for CMIP6 decadal. cdo enabled.
- Link of the data repository to the **Climate4impact portal**, documenting what is specific of climate predictions and projections.
- **Real-time** decadal prediction **exchange** already started.
- **CIM? Downscaling CV?**

Predicting NA atmospheric circulation

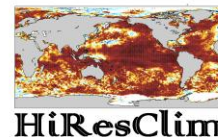
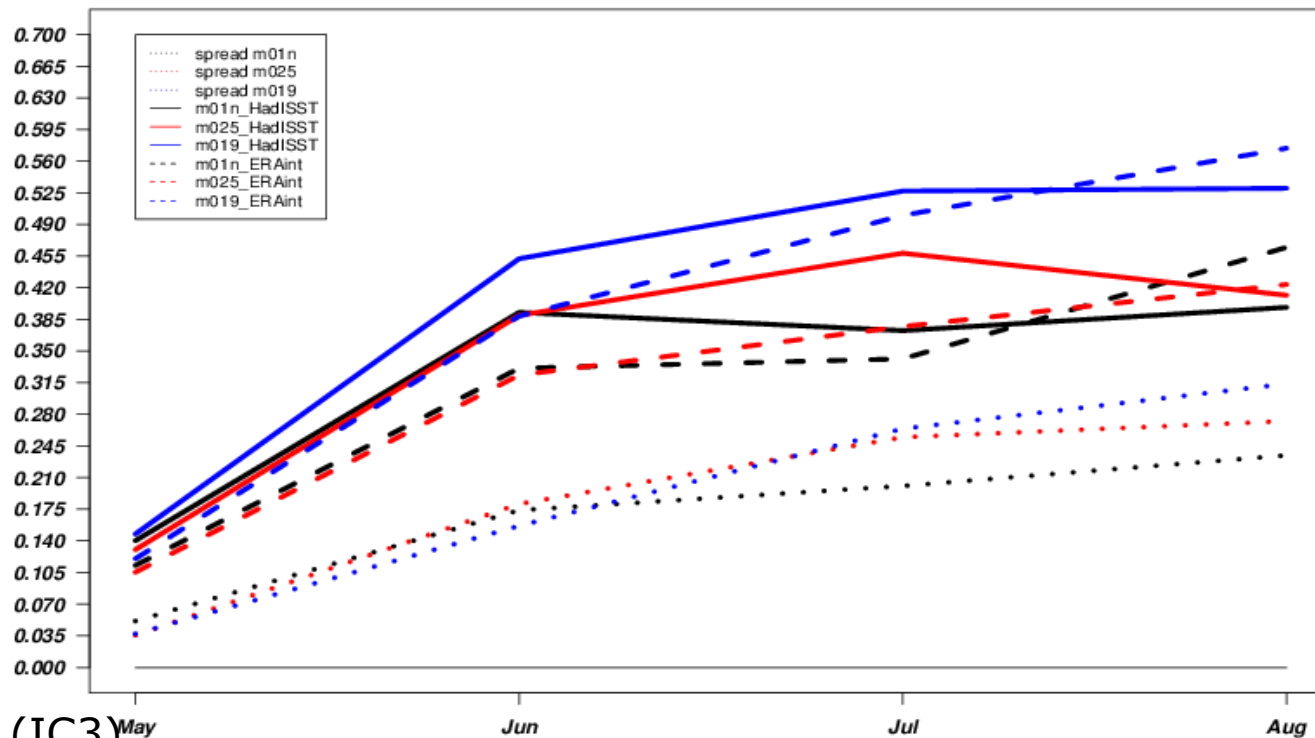
DJF NAO Met Office operational seasonal forecasts with HadGEM3H N216L850(0.25) with initial conditions from operational atmospheric analyses and NEMOVAR, 24 members, start date around the 1st of November (lagged method). Winter NAO correlation significant at the 98% confidence level.



A. Scaife (Met Office)

Increase in resolution: ENSO skill

RMSE and spread of Niño3.4 SST (versus HadISST-solid and ERAInt-dashed) from four-month EC-Earth3 simulations: **T255/ORCA1**, **T255/ORCA025** and **T511/ORCA025**. May start dates over 1993-2009 using ERA-Interim and GLORYS initial conditions and ten-member ensembles.



Real-time decadal prediction exchange

Figures now available, predictions distributed soon.

<http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/long-range/decadal-multimodel>

Multi-model decadal forecast exchange

The Met Office coordinates an informal exchange of near-real time decadal predictions. Many institutions around the world are developing decadal prediction capability and this informal exchange is intended to facilitate research and collaboration on the topic.

[The contributing prediction systems](#) are a mixture of dynamical and statistical methods. The prediction from each institute is shown below, alongside an average of all the models. When possible, observations for the period of the forecast are also shown. Currently three variables are included: surface air temperature, sea-level pressure and precipitation. These are shown as differences from the 1971-2000 baseline. More diagnostics, including ocean variables are planned for the future. Please use the drop-down menus below to explore the data collected to date.

This work is supported by the European Commission SPECS project.



To learn more about decadal forecasts at the Met Office, see our current [decadal forecast](#).

Images last updated 2014-02-20

Issued

2012

Period

year 1

Element

surface air temperature

Decadal forecast exchange 2012 predictions for year 1 surface air temperature

Those things typically missing

- Better understanding of the impact models, and best way to adapt them to the useful climate information available.
- Bias correction.
- Calibration and combination.
- Downscaling, when necessary.
- Documentation (follow the IPCC calibrated language), demonstration of value and outreach.
- **The EUPORIAS project, working alongside SPECS, is considering solutions to address some of these problems.**

EUPORIAS

- EUPORIAS intends to improve our ability to maximise the societal benefit of climate prediction technologies.
- The project wants to develop a few fully working prototypes of climate services addressing the need of specific users.
- The time horizon is set between a month and a year ahead with the aim of extending it towards the more challenging decadal scale.
- This should increase the resilience of European society to climate change by demonstrating how climate information becomes usable by decision makers in different sectors.
- EUPORIAS is also part of ECOMS.

EUPORIAS

EUPORIAS

Four main blocks:

RT1: **understand**

- Users needs and current use of s2d
- Sector specific vulnerability

RT2: **improve**

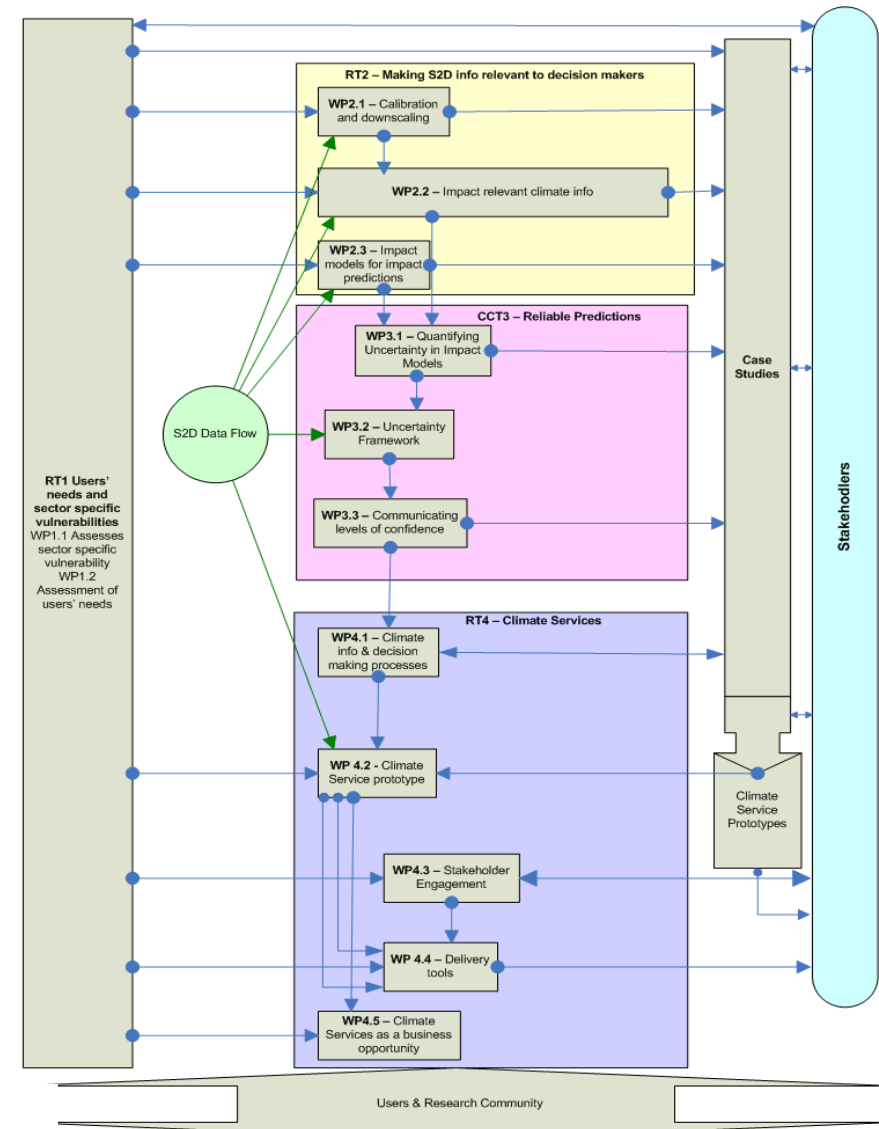
- Decision-relevant scales: downscale
- Decision-relevant parameters: impact models and post-processing

CCT3: **uncertainty**

- Impact models' uncertainties
- Combining uncertainties
- Communicating level of confidence

RT4: **engage and demonstrate**

- Decision making process
- Climate service prototypes
- Delivery and engagement
- Business opportunity



EUPORIAS

EUPORIAS: some activities

- Stakeholder workshop:
 - User-relevant parameters differ from sector to sector, but temperature and precipitation among the most required
 - Seasonality of the requirements
 - Appetite to improve large-scale predictability rather than granularity
 - Huge need for *education and training*
- Workshop on “Climate services providers & users’ needs”:
 - Current users (operational/strategic level) related to the energy, insurance, or transport sectors
 - Majority use predictions with lead time of a month up to a season
 - Barriers: Low skill, limited capacity and usability of data available, accessibility/communication of information
 - Solutions to overcome barriers: training and communication, improve skill, public funding

EUPORIAS



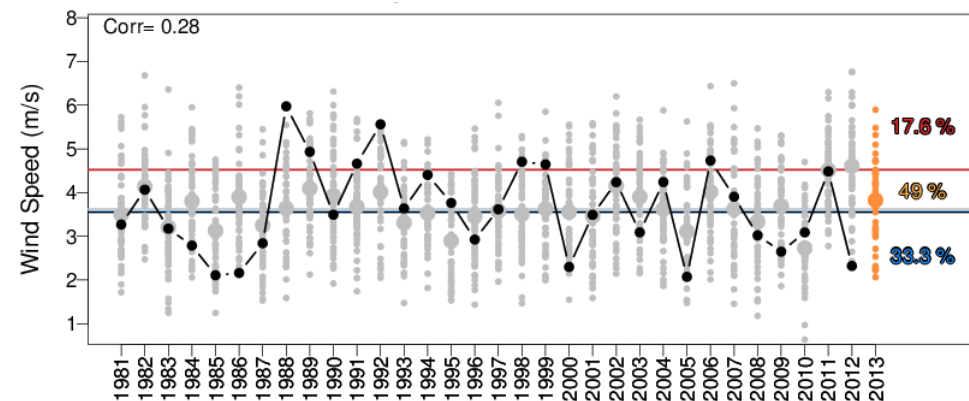
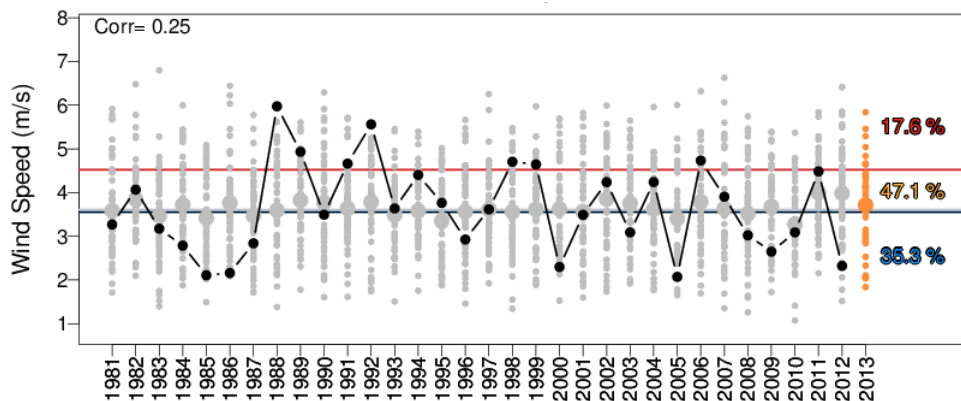
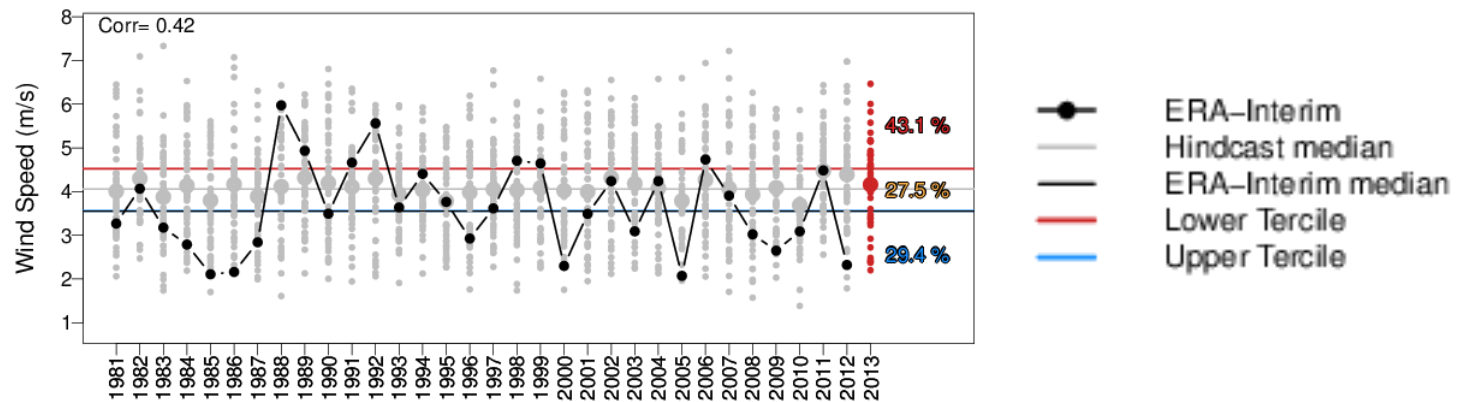
EUPORIAS: prototypes

- The prototypes will represent the main outcome of the project, providing a real example of what a climate service may look like for s2d time scales in Europe.
- Six proposals selected by an external panel based on value to the users, skill in the predictions, stakeholder engagement, robustness of the impact model.
 - Outlook for UK winter conditions to inform transport industry
 - Food security in East Africa for WFP
 - Winter land management for Clinton Devon Estate
 - Renewable energy management
 - River management in two French catchment areas
 - Hydroelectric production in Sweden
- From March 2014 a monthly update is provided.
- **Next general assembly along with SPECS in October in Toulouse.**

EUPORIAS

Bias correction and calibration

Bias correction and calibration have different effects and reduce skill. ECMWF S4 predictions of 10 m wind speed over the North Sea for DJF starting in November. Raw output (top), bias corrected (simple scaling, left) and ensemble calibration (right). One-year-out cross-validation applied.



V. Torralba (IC3)

Progress on the open fronts

- **Work on initialisation**: initial conditions for all components (including better ocean), better ensemble generation, etc. Link to observational and reanalysis efforts.
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