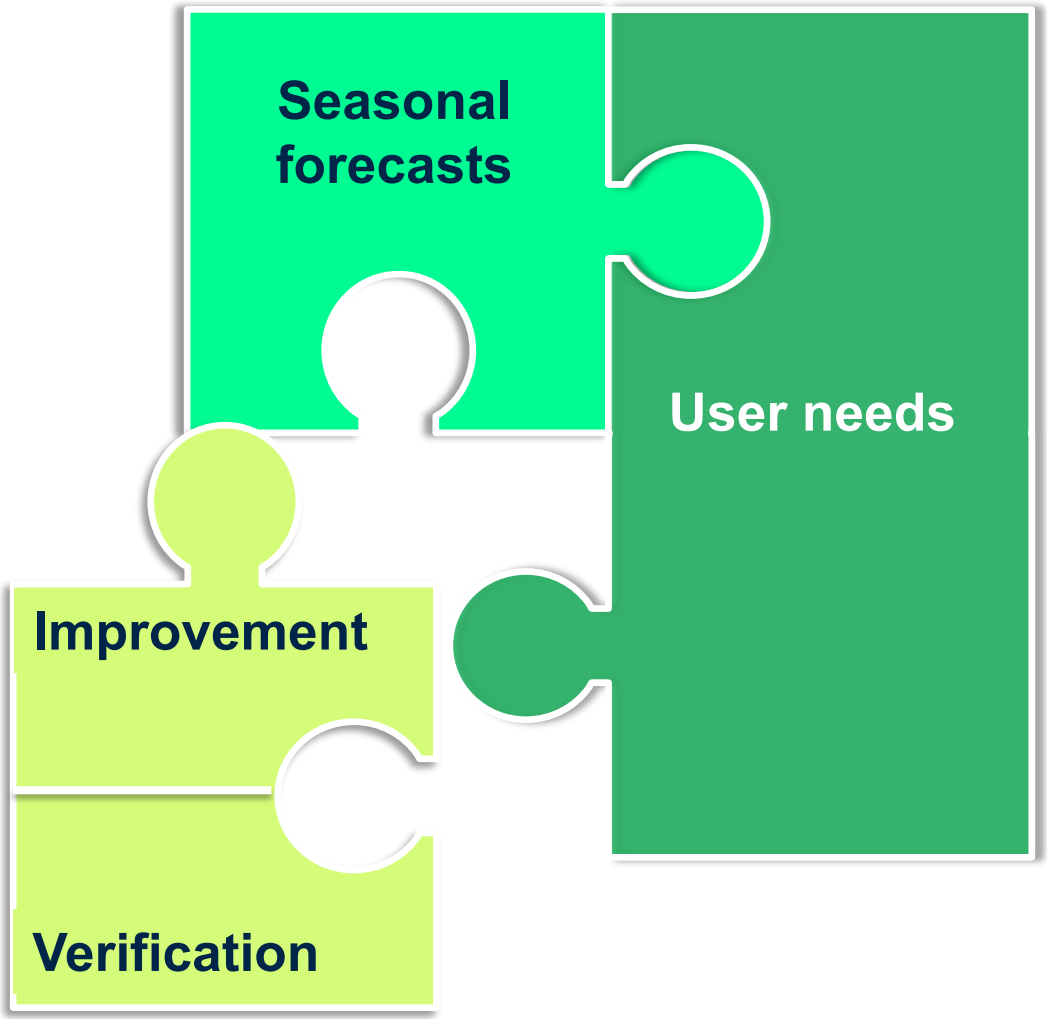
CLIMATE SERVICES for agriculture



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Scientific user-driven research

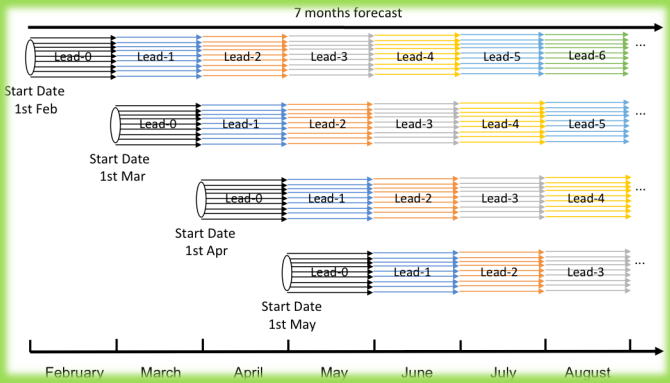
Barcelona Supercomputing Center
Centro Nacional de Supercomputación

EXCELENCIA SEVERO OCHOA

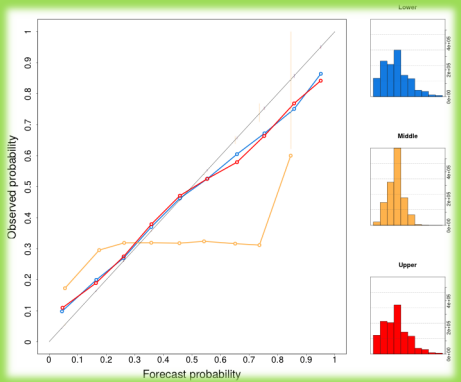
The VISCA project

VISCA
VINEYARDS INTEGRATED
SMART CLIMATE APPLICATION

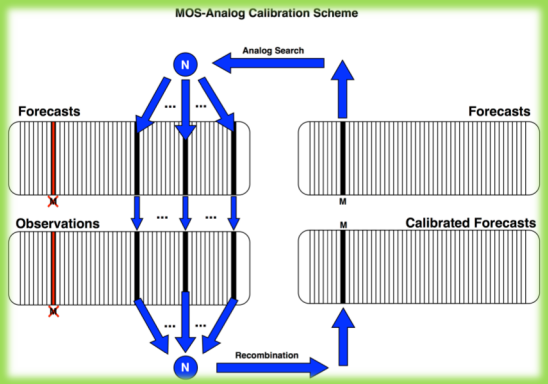
How we can help?



Bias correction



Downscaling



The VISCA project

VISCA is a **Climate Service (CS)** and **Decision Support System (DSS)** that integrates **climate, agricultural** and **end-users´ specifications** to design medium- and long-term **adaptation strategies to climate change on vineyards.**

The main **objective** of VISCA is to make European wine industries resilient to climate changes while minimizing costs and risks through an improvement of the production management.

VISCA

VINEYARDS INTEGRATED
SMART CLIMATE APPLICATION

The VISCA project

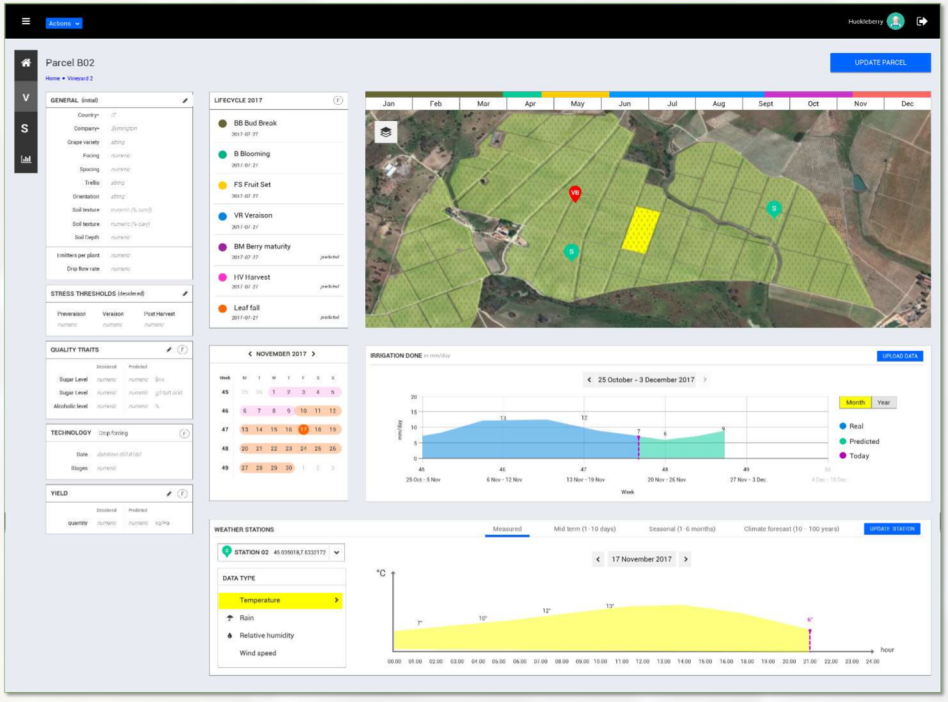
Several data sources will be integrated into a Geospatial database:

Inputs

- End-users' requirements
- Irrigation modelling data
- Phenological modelling data
- Weather (short, medium-term and seasonal) forecasting data

Outputs

Suggestions of best actions for crop management to adjust the life cycle of the vineyard.



VISCA Demo-sites

- Spain (**Codorniu**)
- Italy (**Mastroberardino**)
- Portugal (**Symington**)

The VISCA project

Seasonal / Meteorological

Tmax, Tmin, precipitation, humidity, radiation, wind speed

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METEO SIM

End-users empirical models

Phenological and irrigation models

IRTA
RECERCA I TECNOLOGIA AGROALIMENTÀRIES

Generalitat de Catalunya

Outcomes:

- Critical phenological events

(Bloom, Berry et, veraison and harvest)

- Wine alcoholic category
- Water demand
- Extreme events

CODORNÍU

SYMINGTON
Family Estates

Mastroberardino
1878

Integrated assessment

VISCA project webpage:
http://visca.eu/

How we can help?

CLIMATE SERVICES ADDED VALUE

RESEARCH ADDED VALUE

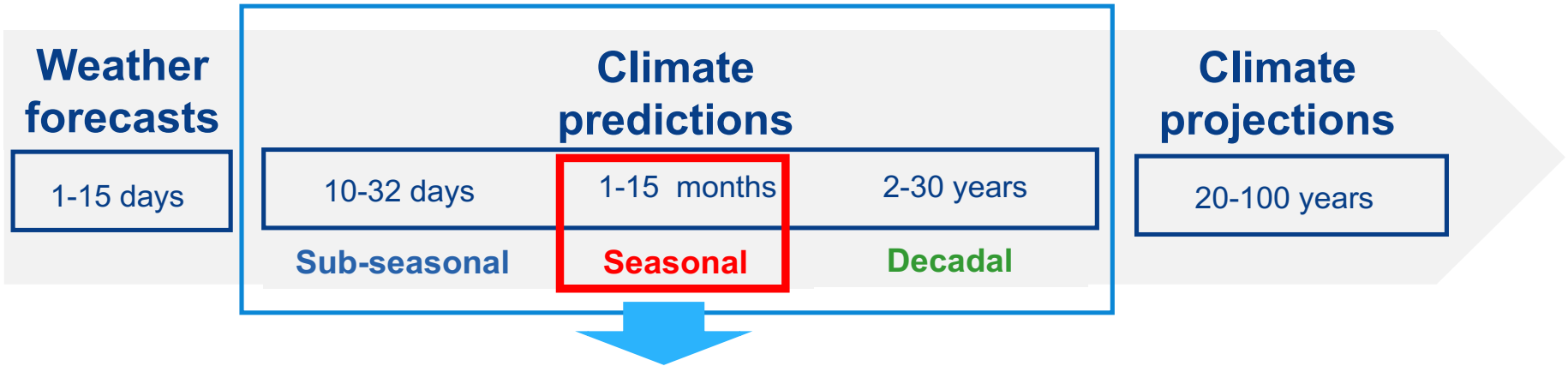
SEASONAL PREDICTIONS

- NMME, EUROSIP
- Global domain
- Aggregated output in terciles
- Forecast of extremes

- **Forecast quality assessment**: comparison to observations
- **Bias adjustment**: model correction
- **Seasonal predictability**: teleconnections
- **Data management**

- **User-defined information:** timescales, domain, var…
- **User interface Platform:**
- E.g. Resilience prototype
- **Knowledge transfer:** Technical reports and factsheets
- **Performance assessment:** demonstrating value for decision making

How we can help?



The available seasonal predictions can provide additional value for vineyard management e.g.:

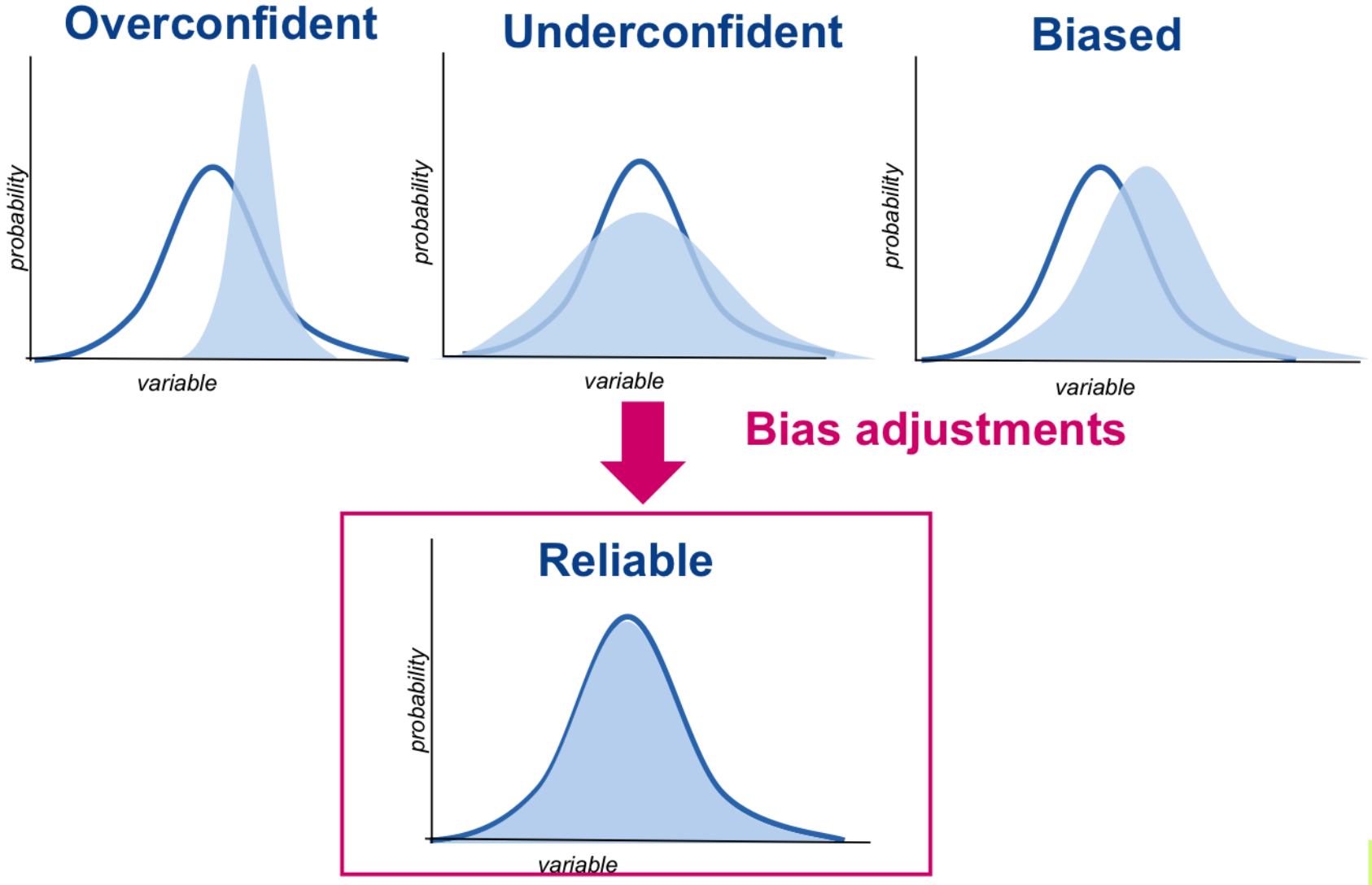
- Phenology
- Irrigation
- Resource allocation

How we can help?

- **Seasonal forecasts (dynamical)**
  - Include comprehensive range of sources of predictability
  - Predict joint evolution of ocean and atmosphere flow
  - Includes a large range of physical processes
  - Includes uncertainty sources, important for prob. Forecasts
  - **Systematic model error is an issue!**
  - **Low resolution limits its applicability to local scales**

Need for **bias adjustment** and **downscaling methods**

Bias correction

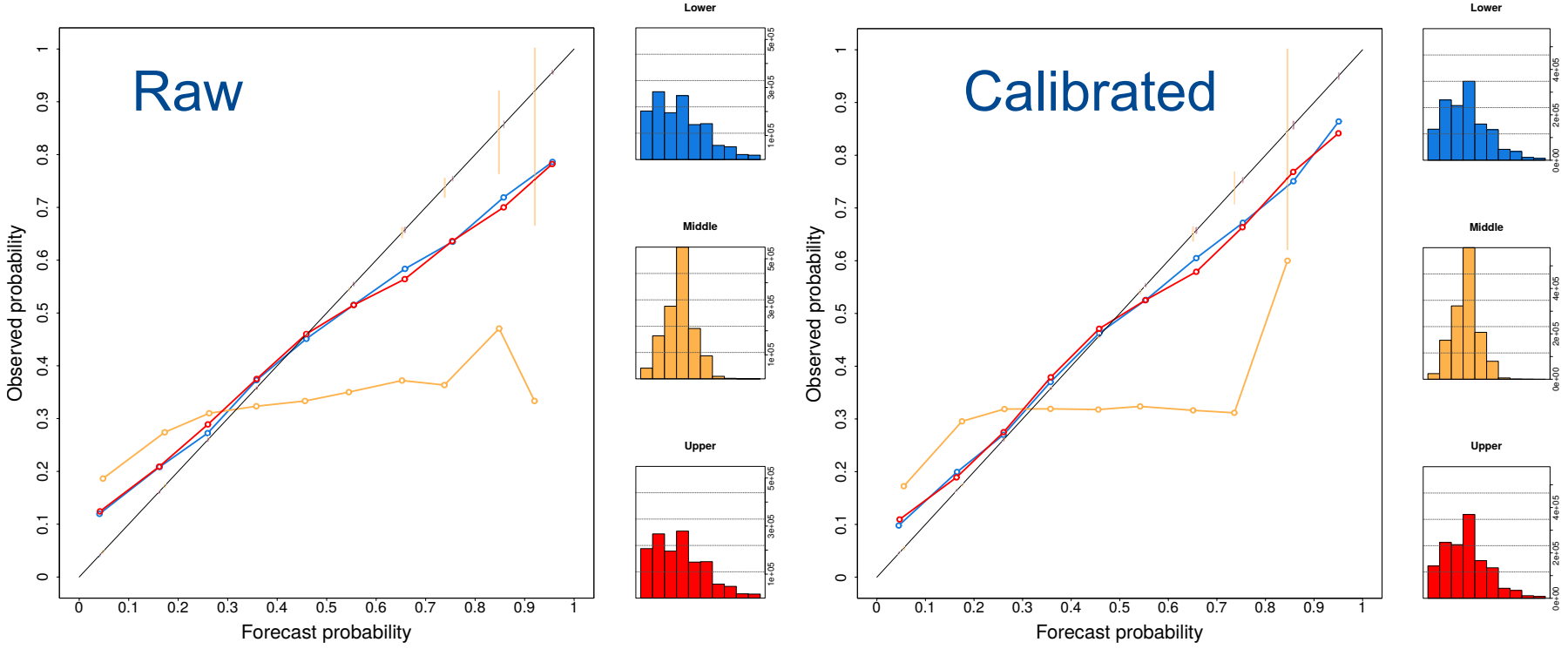


Bias correction

Method	Equation	Description
Simple bias correction	$y_{j,i} = (x_{ij} - \bar{x})\frac{\sigma_{ref}}{\sigma e} - \bar{o}$	Based on the assumption that both the reference and forecasted distribution are well approximated by a Gaussian distribution.
Calibration method	$y_{j,i} = \alpha x_i + \beta z_{ij}$	Variance inflation modifies the predictions to have the same interannual variance as the reference dataset and corrects the ensemble spread to improve the reliability.
Quantile mapping	$y_{j,i} = (ecdf^{ref})^{-1} ecdf^{mod}(x_{ij})$	It determines for each forecast to which quantile of the forecast climatology it corresponds, and then they are mapped to the corresponding quantile of the observational climatology.

Bias correction

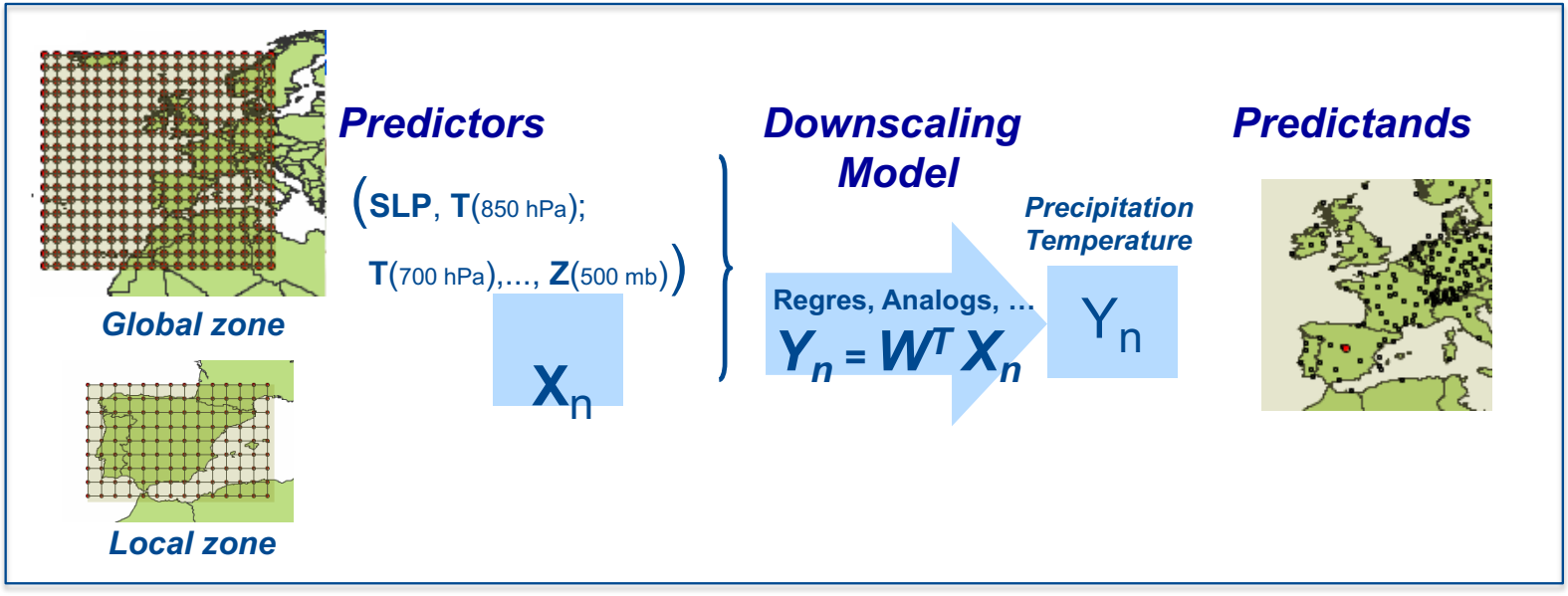
AMJ / system5_m1 / jra55 / tas / 1981-2015 / Lead-1 / Europe / Reliabilty



Downscaling

Perfect prognosis approach:

- In the training phase the statistical model is calibrated using observational data for both the predictands and predictors (e.g. reanalysis data)
- Typical techniques: transfer functions, analogs, weather typing, weather generators, etc. (Maraun et al. 2010)

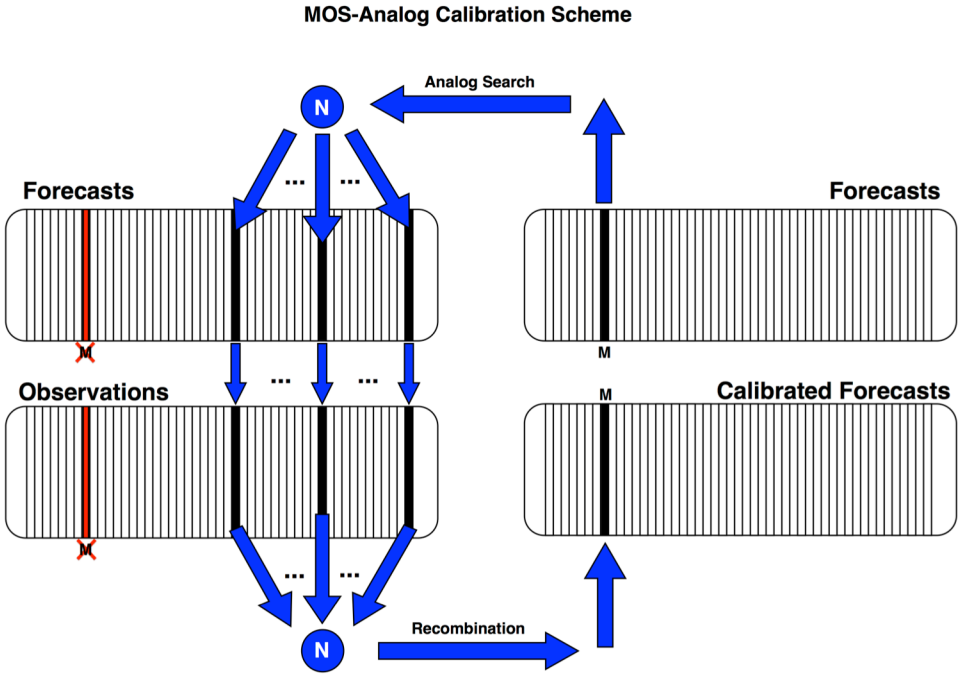


Source: José M. Gutiérrez, University of Cantabria

Downscaling

MOS (Model Output Statistics) approach:

- The predictors are taken from the same model for both the training and downscaling phases (e.g. Eden and Widmann 2014)



Source: Marcos et al. 2018

Results soon in http://visca.eu

www.bsc.es

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EXCELENCIA SEVERO OCHOA

Thank you !

raul.marcos@bsc.es

imprex

VISCA
VINEYARDS INTEGRATED SMART CLIMATE APPLICATION

HIATUS

GOBIERNO DE ESPAÑA
MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

MEDSCOPE
MEDiterranean Services Chain based On climate PrEdictions

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