Seasonal forecast applications at ARPAE-SIMC

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MedCOF7

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Outline

- ARPAE-SIMC and seasonal prediction applictions
- **iColt**: *Irrigation and Classification of current crops by remote sensing.*

Operational probabilistic seasonal predictions

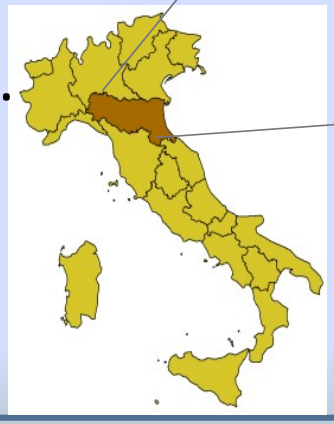
of irrigation water need

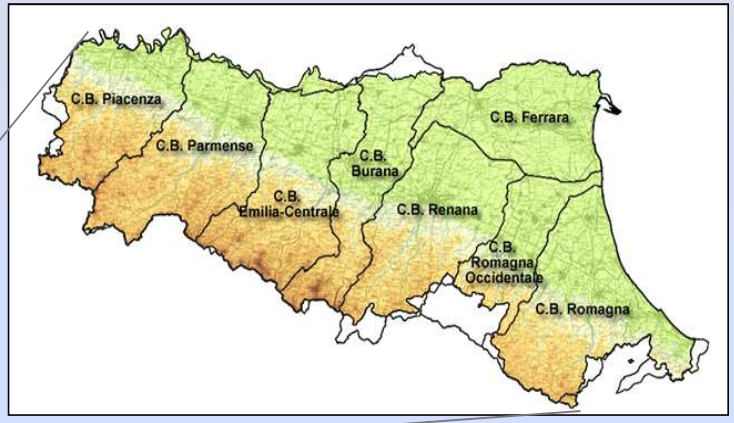
- **MOSES**: *Managing crOp water Saving with Enterprise Services* (H2020, European Innovation Action Project)

What is ARPAE-SIMC?

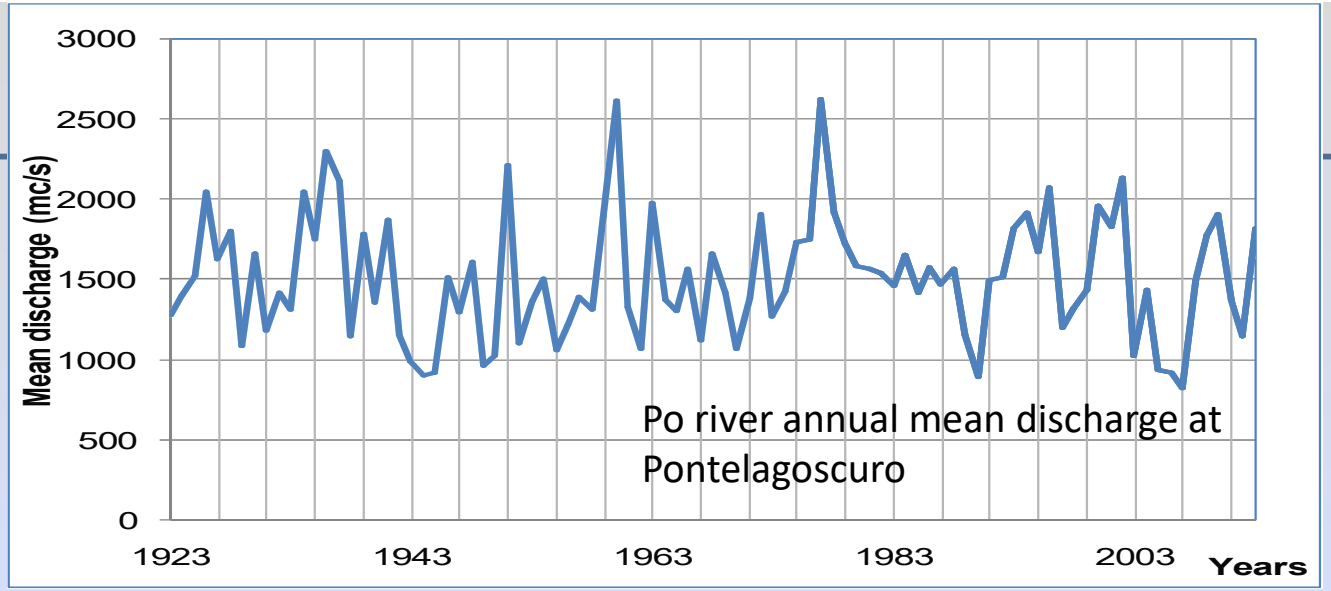
It is the **Regional Hydro-Meteo-Climate Service** of the Italian Region Emilia-Romagna.

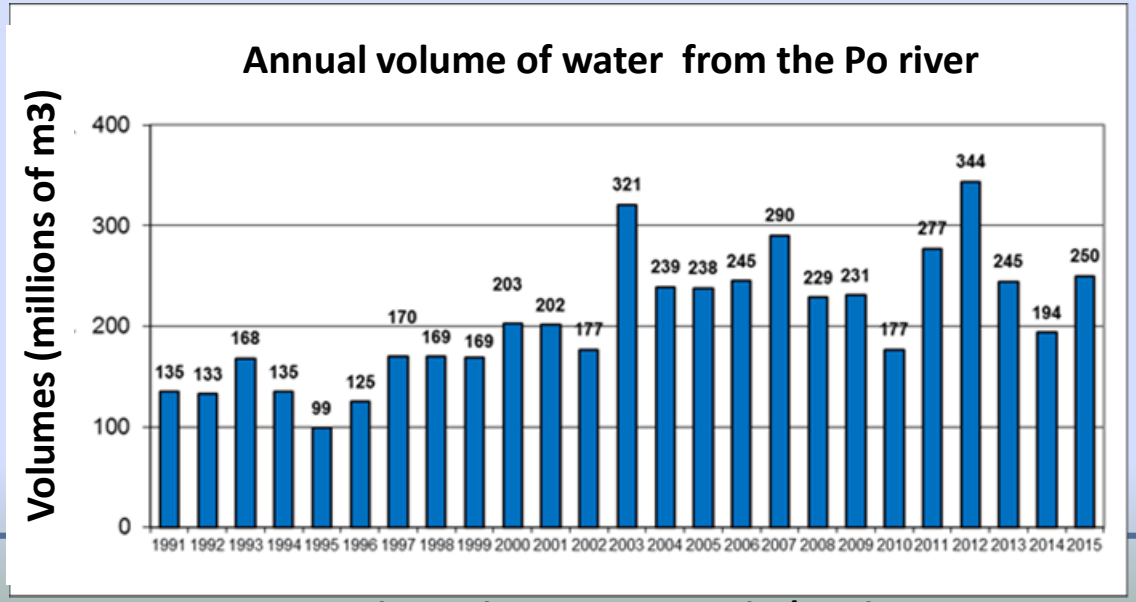
- Weather monitoring and predictions;
- Climate monitoring and predictions;
- Hydrological monitoring and predictions;
- Services for agriculture;
- Air quality monitoring and predictions.

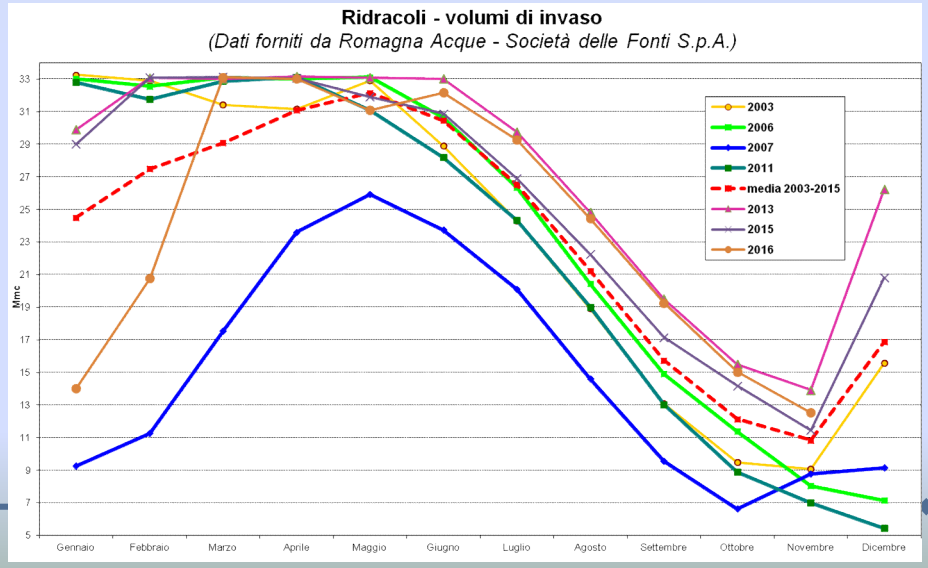




Motivation

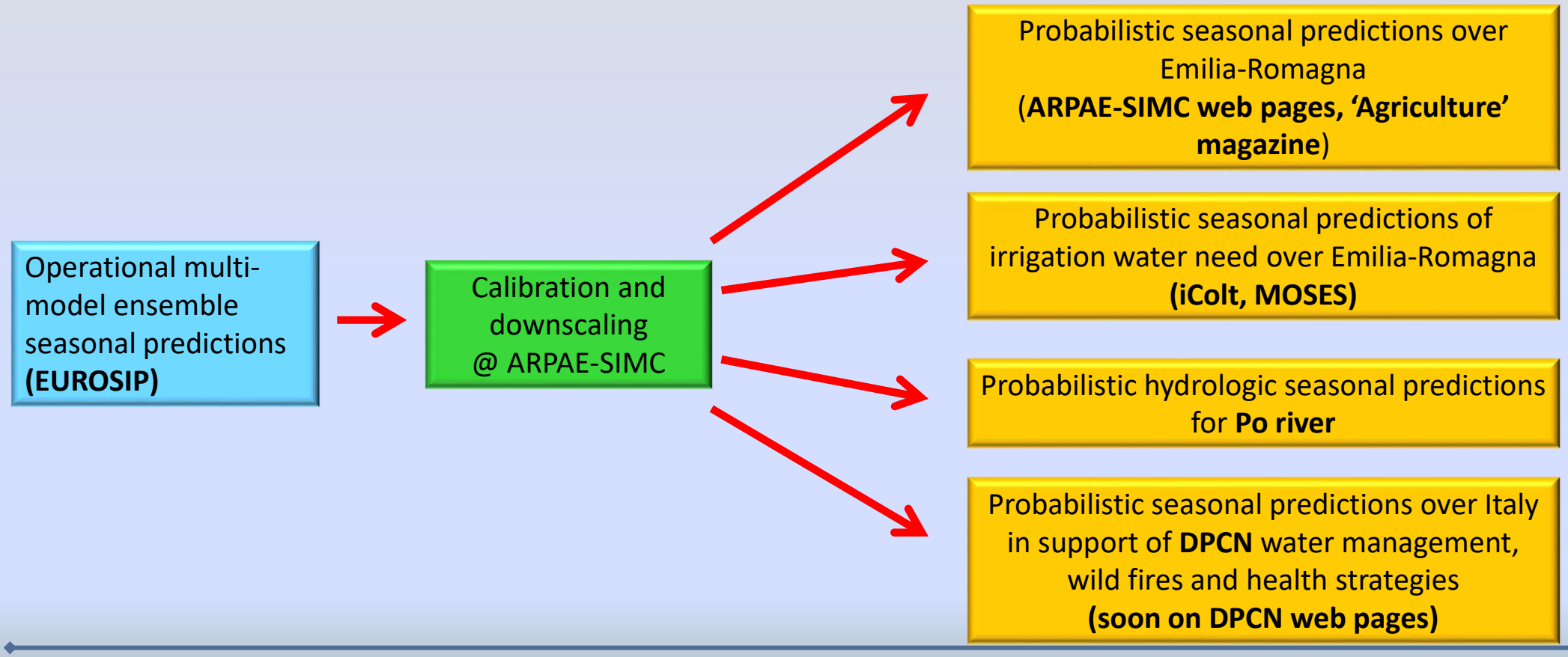






Source: CER – Canale Emiliano Romagnolo (Emilia-Romagna, Italy)

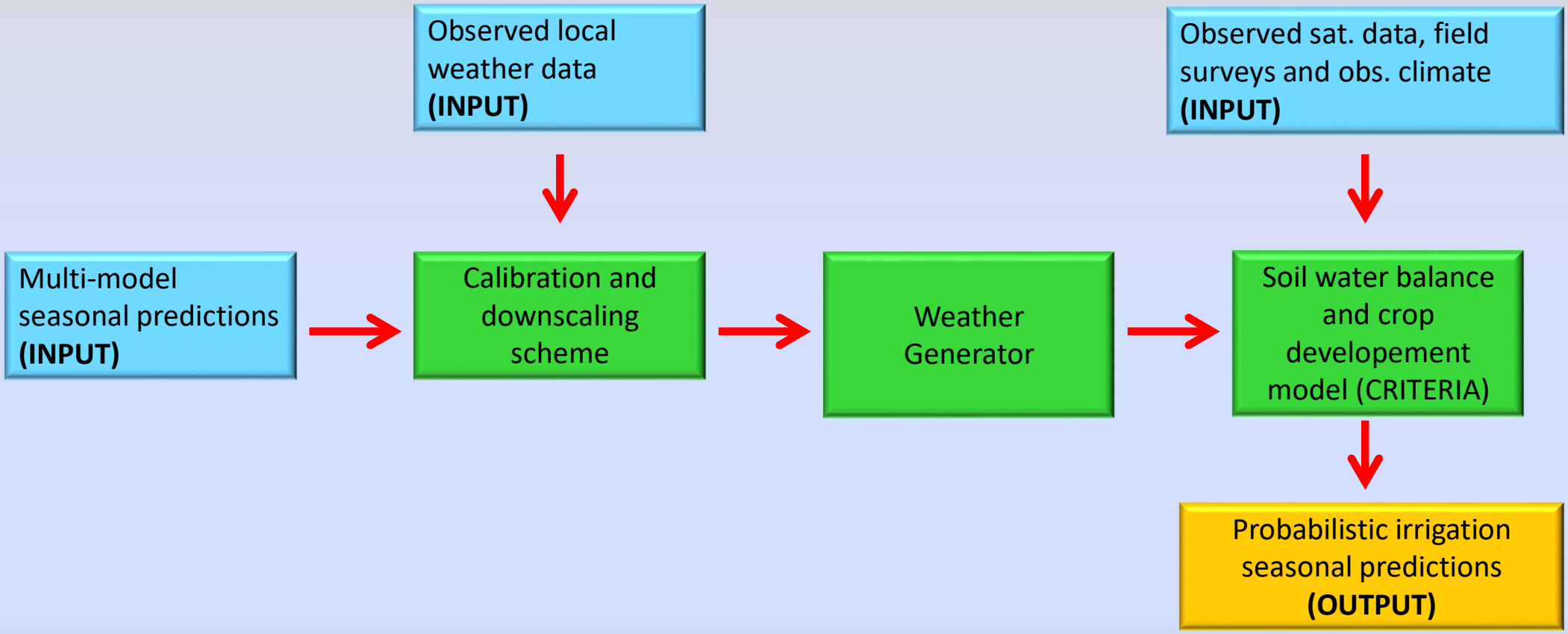
Seasonal prediction applications @ ARPAE-SIMC



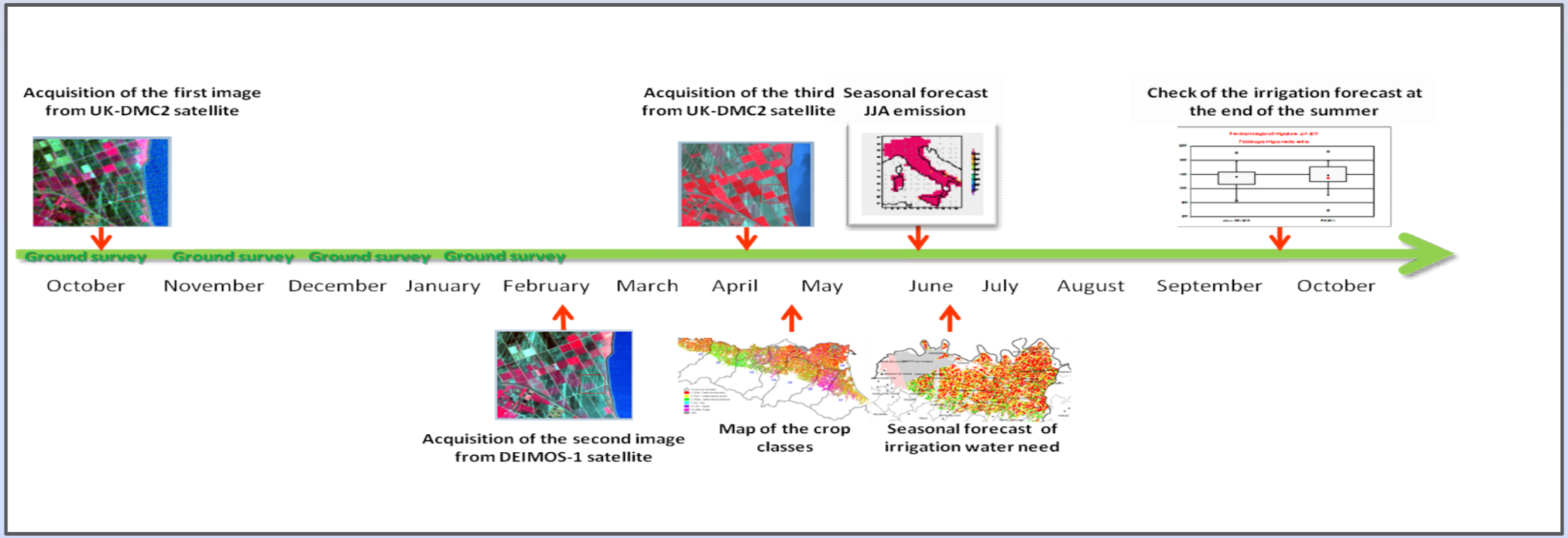
The iCOLT system

- Provides a probabilistic early assessment of irrigation demand of crops over the Emilia-Romagna regional plain area.
- Combines satellite info on crop distribution, seasonal forecast products, meteo-climatological monitoring data and water balance modelling.
- Has been operational since 2010.
- Generates products published via the ARPAE-SIMC web site.

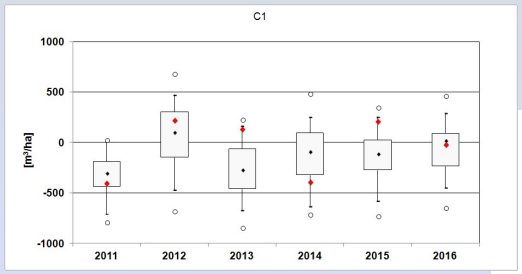
The iCOLT system scheme

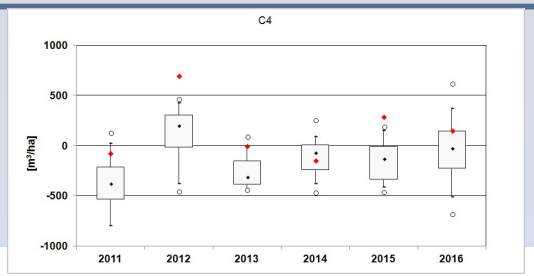


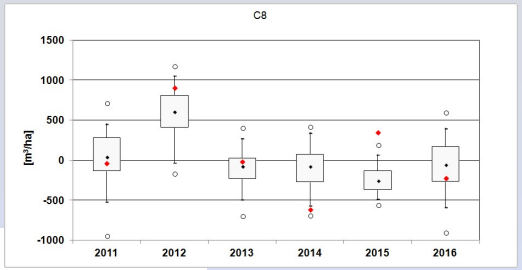
The iCOLT system workflow

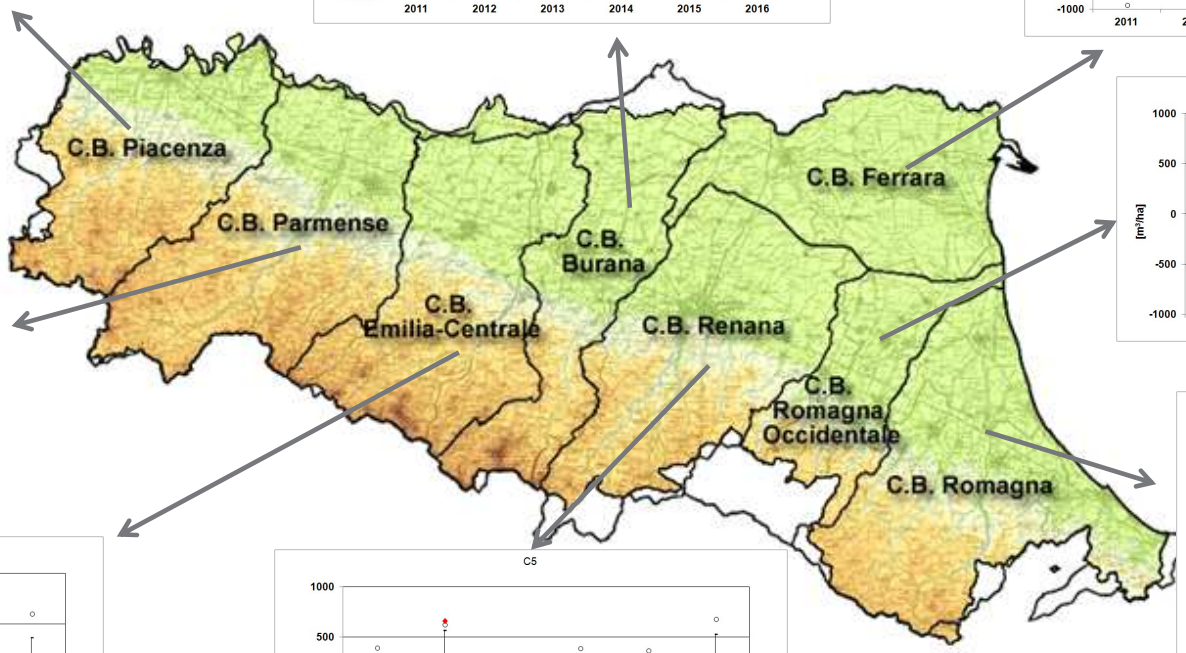


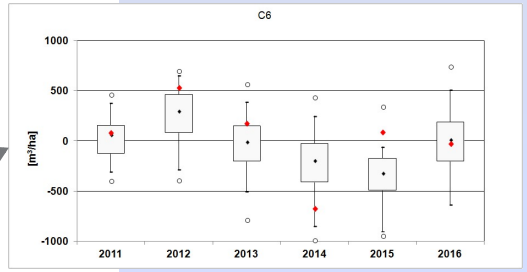
Seasonal irrigation anomaly predictions - results

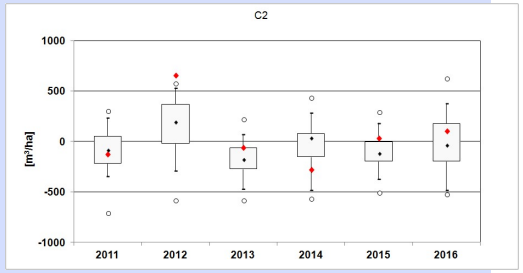


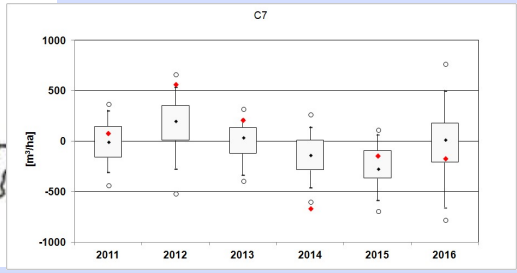


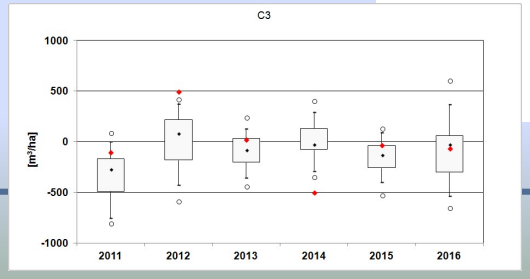


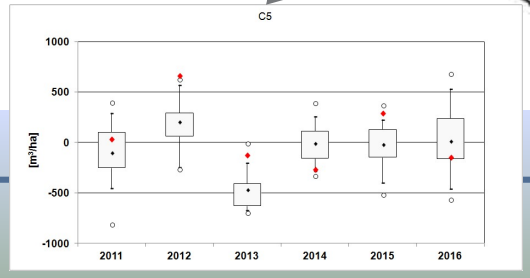




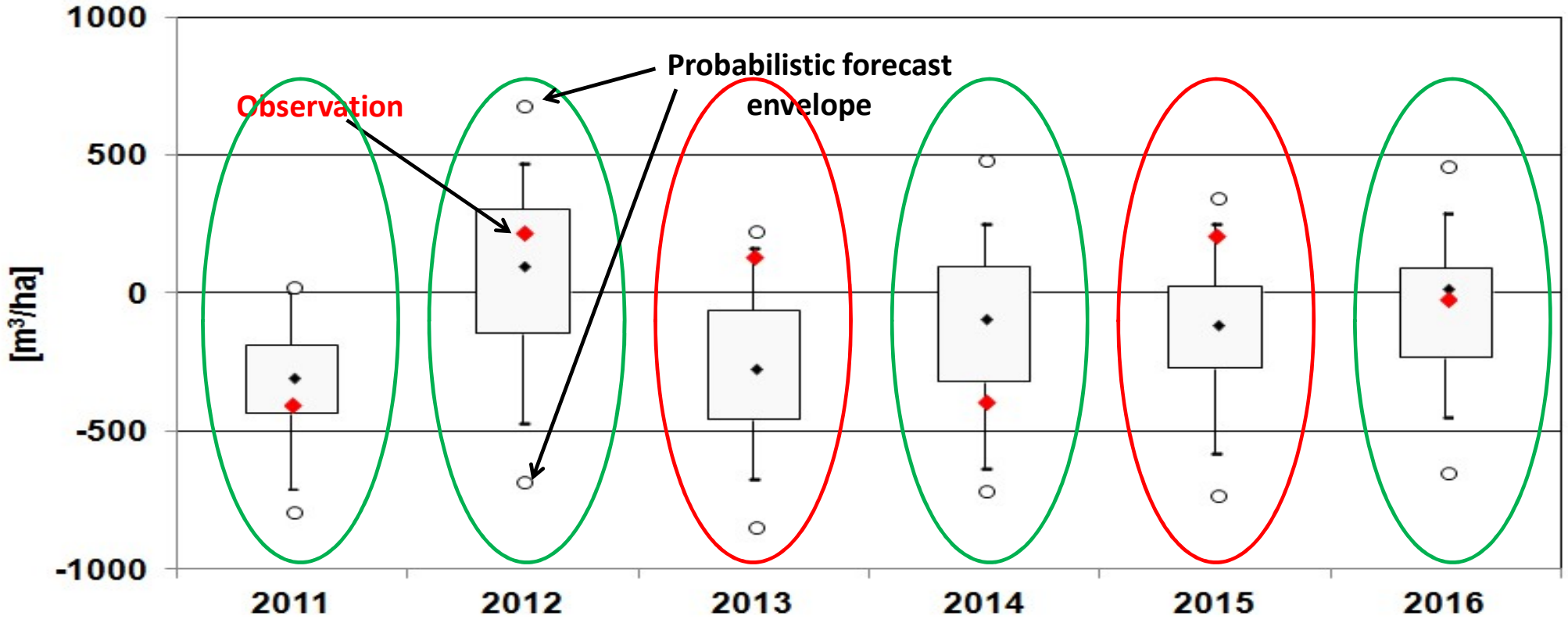




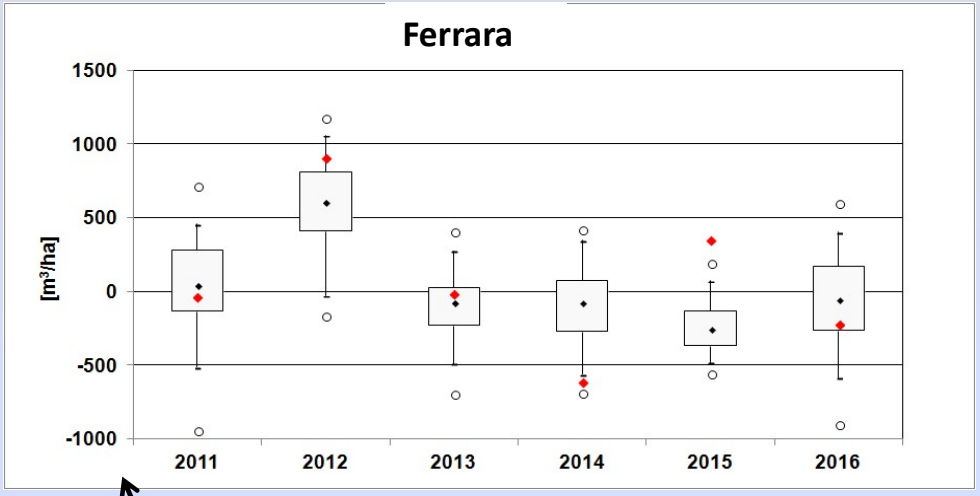


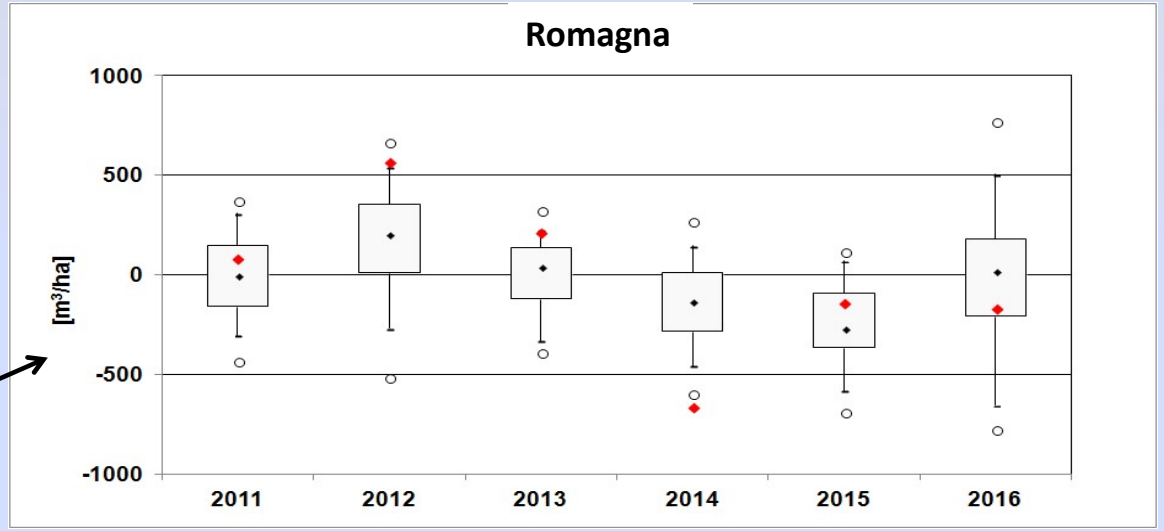


Seasonal irrigation anomaly predictions - results



Seasonal irrigation anomaly predictions - results





Different areas may have different scales

Seasonal irrigation predictions - results

Validation from 2011 to 2016

1- The sign of the anomalies is mostly captured, but not their amplitude

2- Spatial variability is captured

Villani et al, 2014, ECMWF Newsletter, 138, 30-33.

iCOLT sources of predictability

1. Sub-surface water table depth, linked to observed precipitation up to May
2. Spatial distribution of crop types (with different irrigation needs!)
3. Seasonal predictions

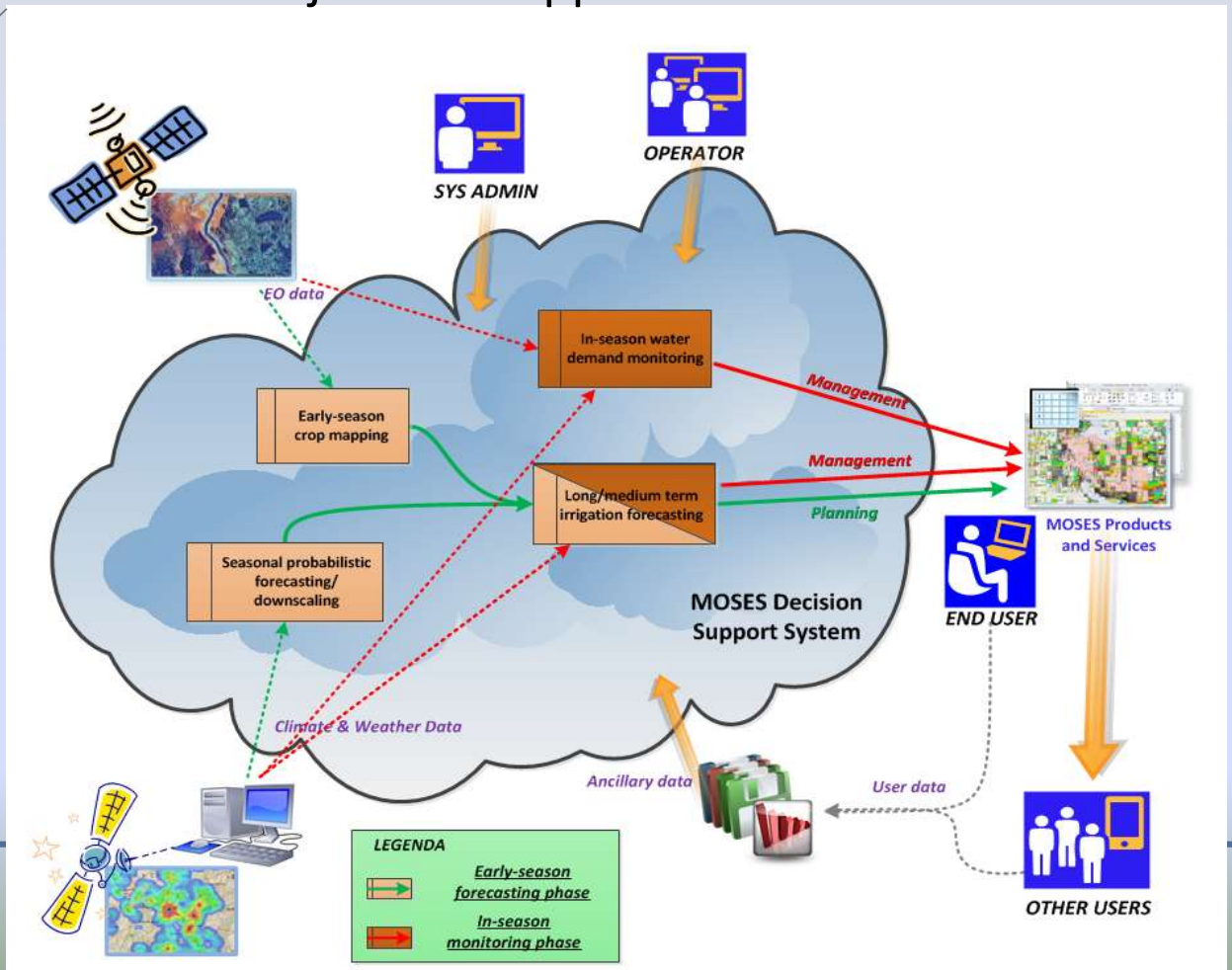
From iColt to MOSES

MOSES - Managing crOp water Saving with Enterprise Services.

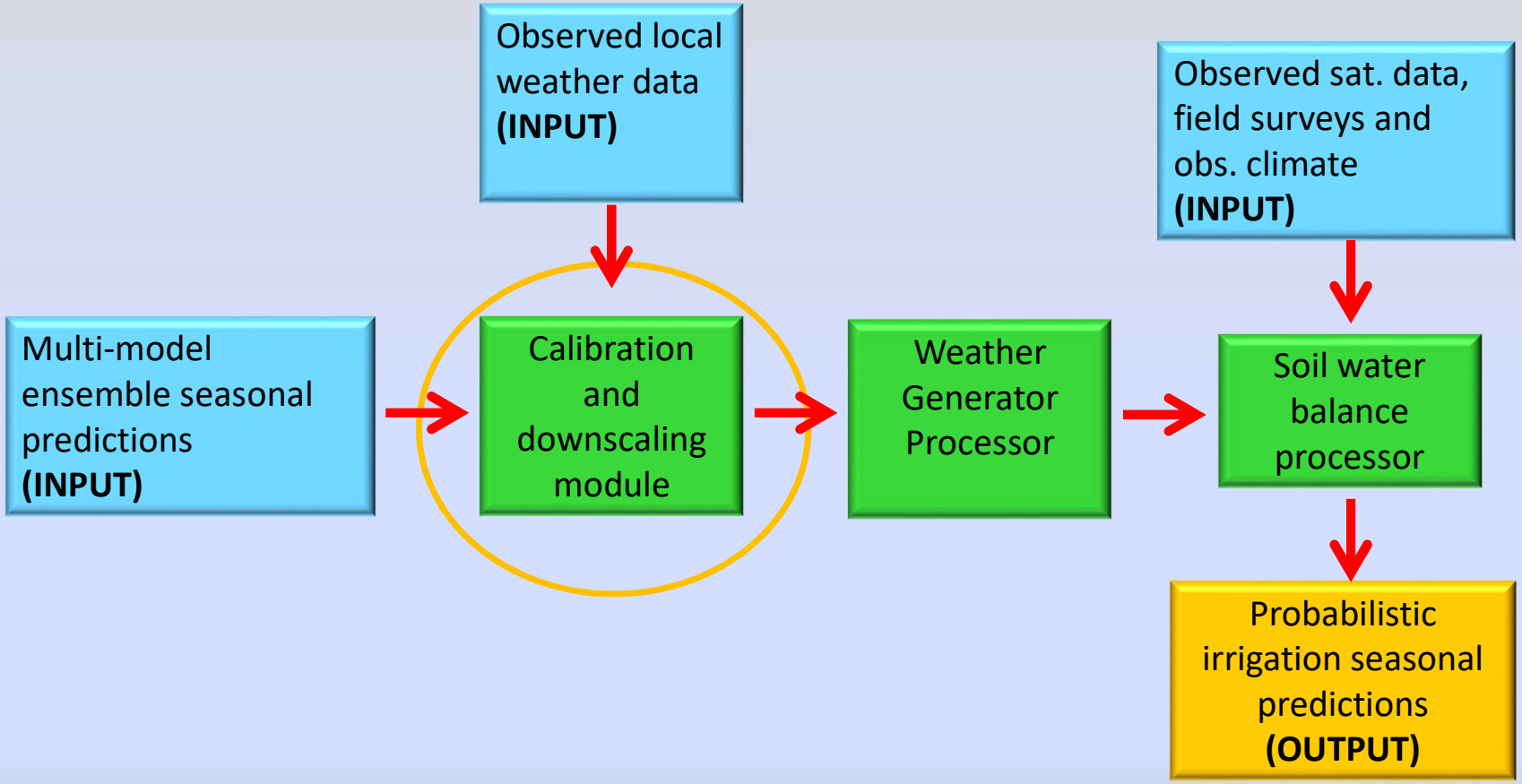
H2020 European Innovation Action Project with application over the Euro-Med region

iColt - irrigation and classification of current crops by remote sensing

Probabilistic seasonal predictions of irrigation water need for Emilia-Romagna



Scheme of the MOSES "Seasonal Predictions" module



The default MOSES downscaling and calibration method

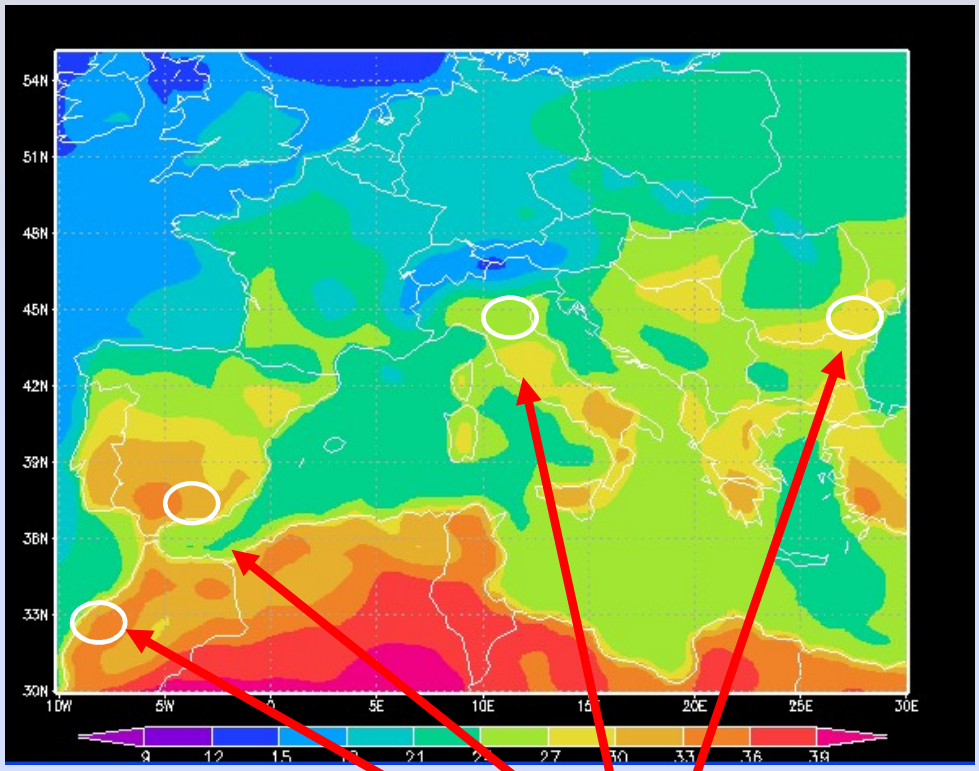
The default downscaling method in MOSES is a **quantile mapping (QM)** between the E-OBS data set and the EUROSIP multi-model seasonal predictions.

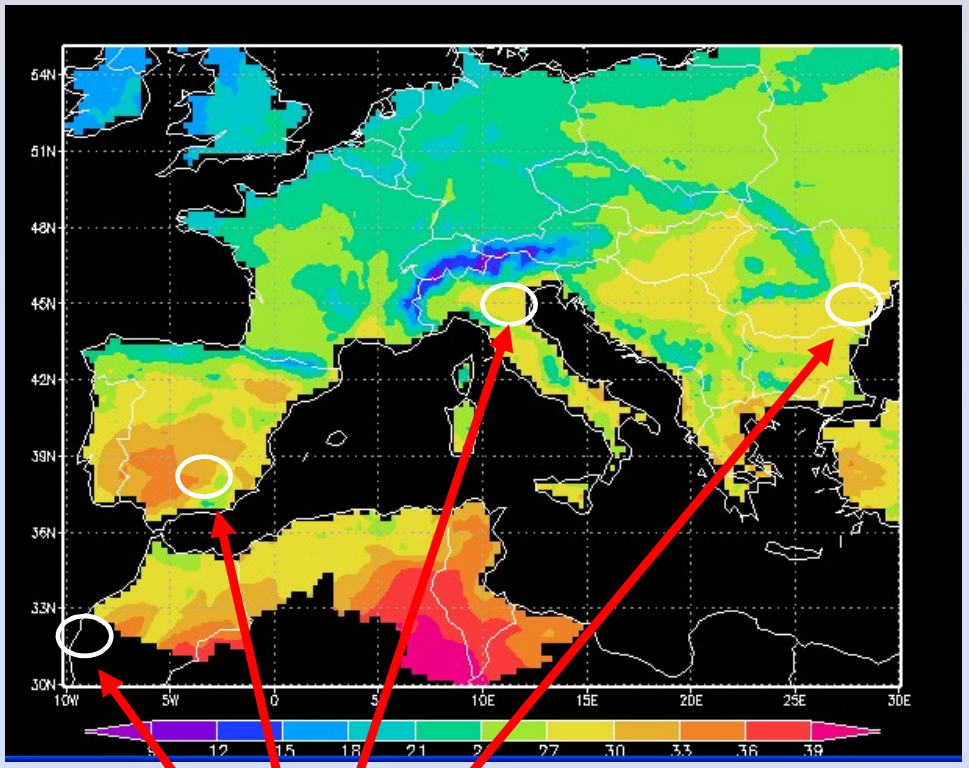
QM does not improve the forecasts in terms of correlations or Brier Score, but it makes them more similar to local observations in terms of mean value and total variance (good for impacts).

It is applied to 6 climate indices used as input by the weather generator.

T_{max} jja (°C) – DMO

T_{max} jja (°C) – QM





Demonstration Areas

Default MOSES seasonal forecast data-set

The MOSES seasonal forecast data-set is the operational EUROSIP data-set system. In the future MOSES will migrate to Copernicus data-set.

From the system data extracted are:

- Hindcasts 1991-2014 of ECMWF (SFEC) and Meteo France (LFPW)
- Forecasts

Unfortunately, Meteo France has just migrated to SYS 5. At present hindcasts for 2015 have not been archived yet, so in order to produce a calibrated multi-model ensemble of seasonal forecasts we need to use as calibration period the years from 1991 to 2014.

Conclusions

ARPAE-SIMC produces **operational probabilistic irrigation water needs predictions** over the Emilia-Romagna region (Italy).

This operational product presents **some skill**.

It is one of the products of the **H2020 Innovation Action MOSES** which will deliver an instrument to produce probabilistic irrigation water need over Euro-Mediterranean region.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Managing crOp water Saving with Enterprise Services
H2020-WATER-1a-2014 First application and market replication
This project has received funding from the European Union's Horizon 2020
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Thank you for your attention!