

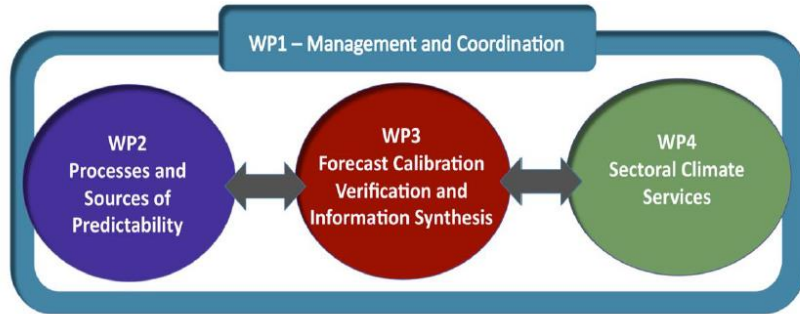
# Current status of MEDSCOPE climate services prototypes

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# MEDSCOPE Partners



- MEDSCOPE wants to **enhance the exploitation of climate predictions**, particularly seasonal forecast, maximizing the potential of their application in different economic sectors of relevance for the Mediterranean region.
- MEDSCOPE develops **methodologies and tools** aimed at improving climate forecast capabilities and related services, maximizing the societal benefit of climate predictions in the Mediterranean.
- MEDSCOPE mainly focuses on the seasonal timescale **using the wealth of forecasts that is already available**, particularly Copernicus (C3S).

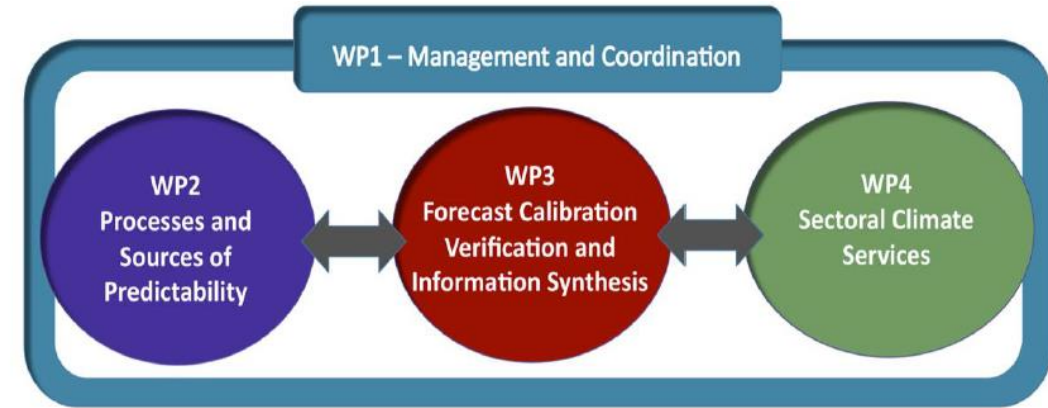


<https://www.medscope-project.eu/>



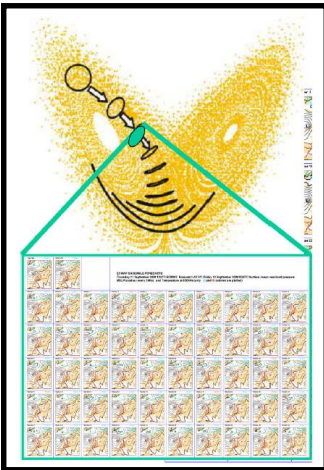
# MEDSCOPE WP4 (Development of CS prototypes)

- **Renewable energy (BSC)**
  - Capacity factor prediction (BSC)
  - Summer hydropower from snow amount (MF)
  - Hydropower from S-ClimWaRe (AEMET)
- **Hydrology (MF)**
  - Extension of RIFF using SURFEX and TRIP (MF)
  - Extension of S-ClimWaRe using SURFEX and SIMPA (AEMET)
  - Forecast of snowpack and glaciers (CNR)
  - Water availability for hydro-power and irrigation using SCHEME (RMI)
- **Agriculture and Forestry (INRA)**
  - Harvest prediction tool using AquaCrop (AEMET)
  - Seasonal soil wetness forecasts (MF, INRA)
  - Agro-climatic indicators (INRA)
  - Water requirements for irrigation (INRA)
  - Drought and fire indicators (INRA)
  - Forest indicators (INRA)
  - Agriculture, forestry and forest fire risk indicators (CMCC)

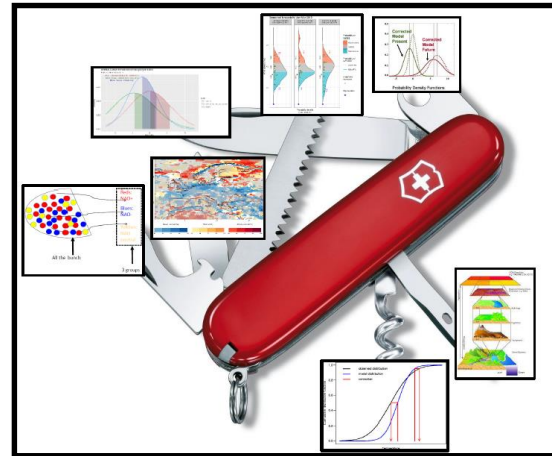


# General flow

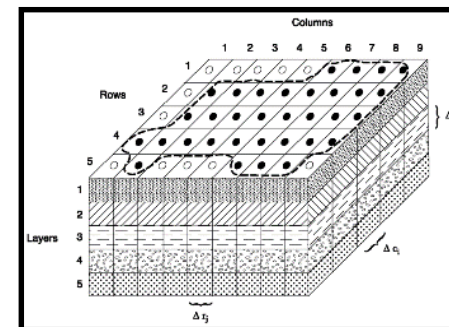
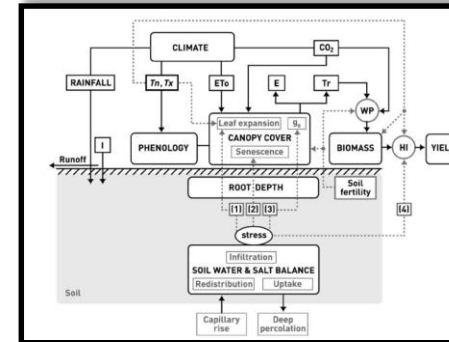
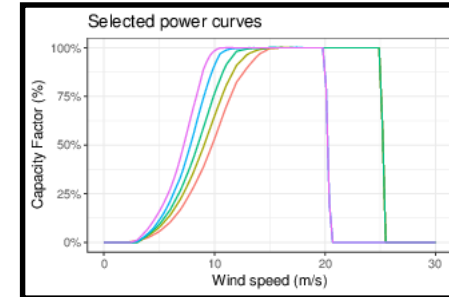
Copernicus CDS  
+ others



CS-tools



Application model



Verification:  
skill scores, other

Deterministic

- Anomaly. Correlation
- RMSE
- etc

Probabilistic

- RPSS
- BSS
- ROC area
- etc

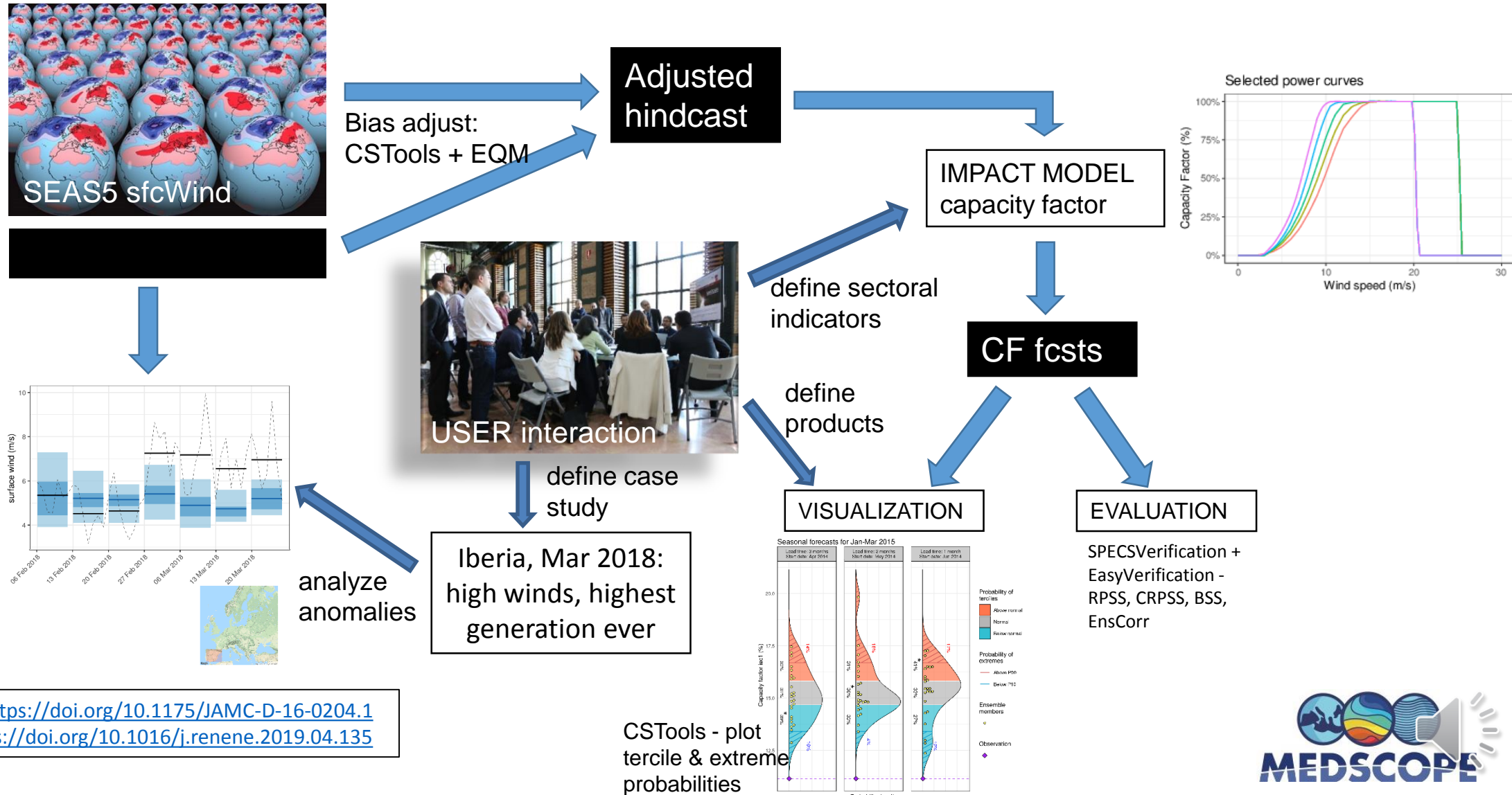
Variables:

- Wind power
- Yield
- Water inflow
- etc

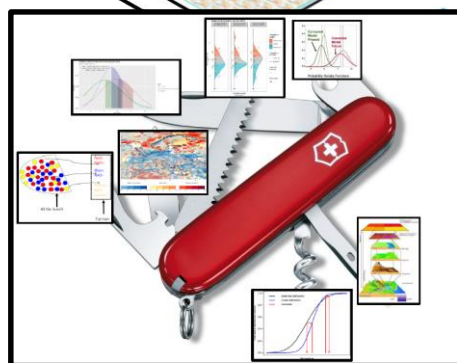
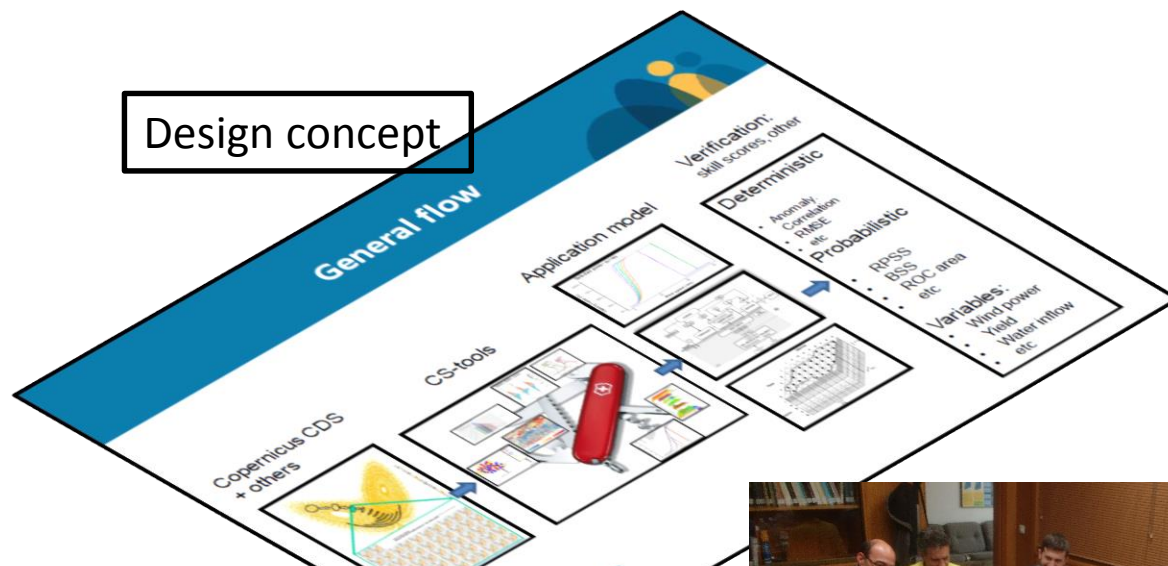




# Example Renewable Energy: Scheme of Wind Energy prototype (BSC)

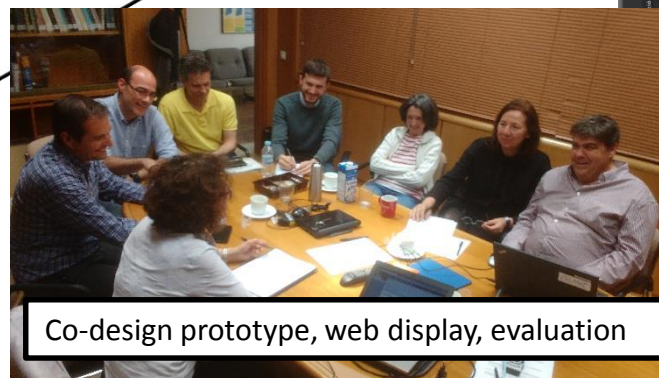


# Example Hydrology: Web-based decision support toolbox for Spanish reservoirs (AEMET)

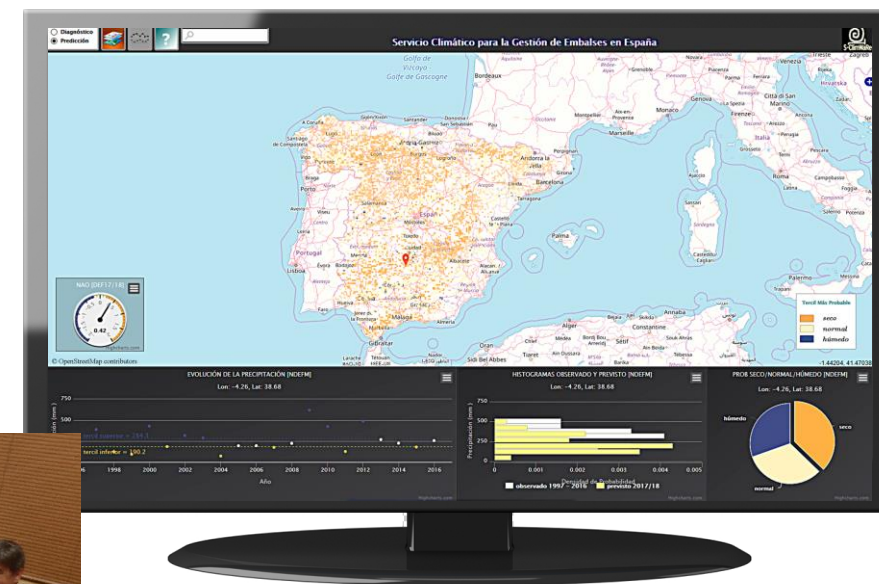


Adapted or developed specific tools:

- Analogue Downscaling
- EPS members weighting
- Hydro model



Co-design prototype, web display, evaluation



Different stakeholders → Different roles:

- Final users (Dam managers)
- Sectoral developers (CEDEX)
- Governmental (DG Water, Basin river authorities)

Voces et al. 2019, <https://doi.org/10.5194/asr-16-157-2019>

Sanchez et al. 2019, <https://doi.org/10.5194/asr-16-165-2019>



# Regionally improved seasonal forecast of precipitation through Best estimation of winter NAO

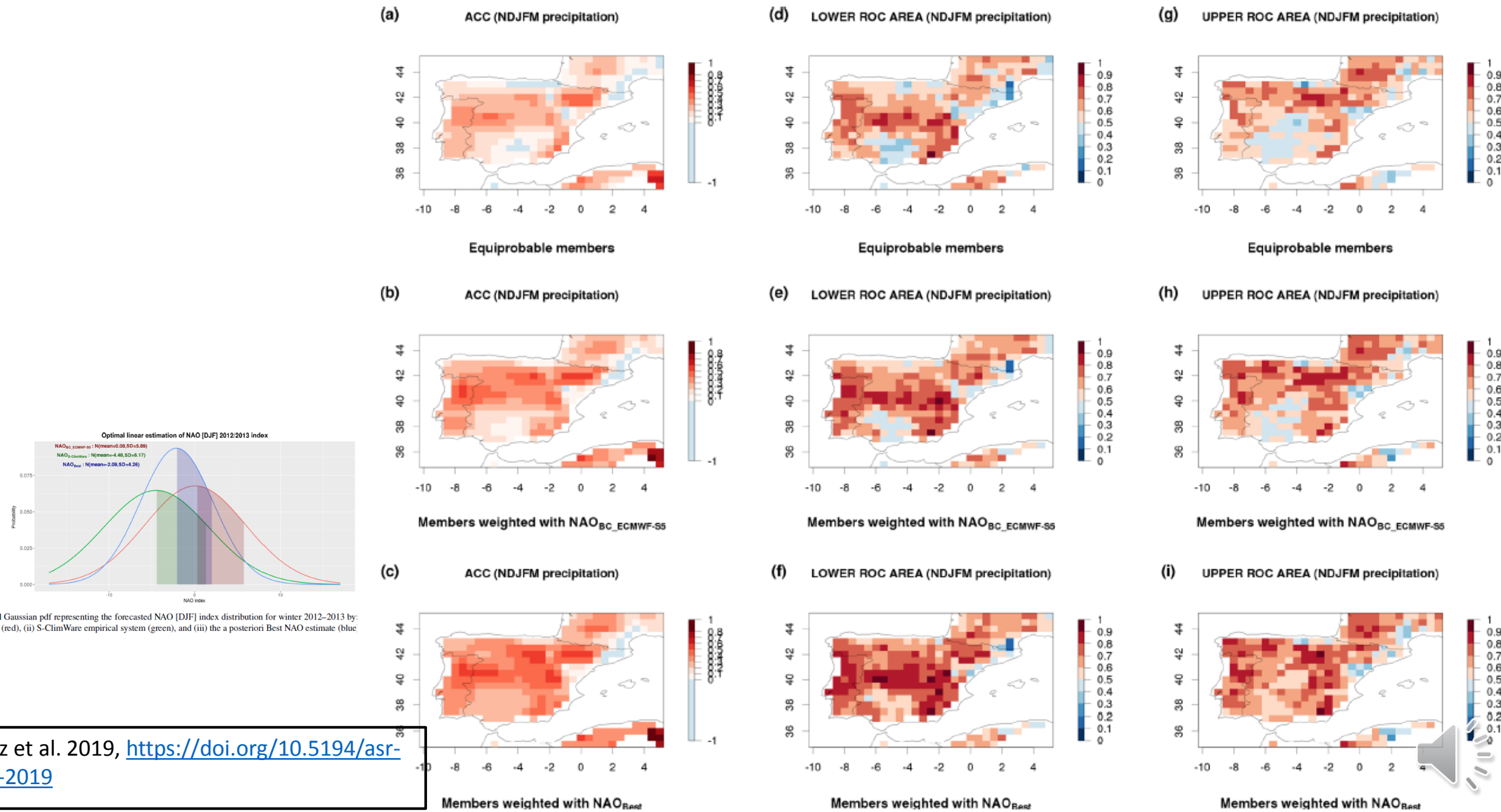
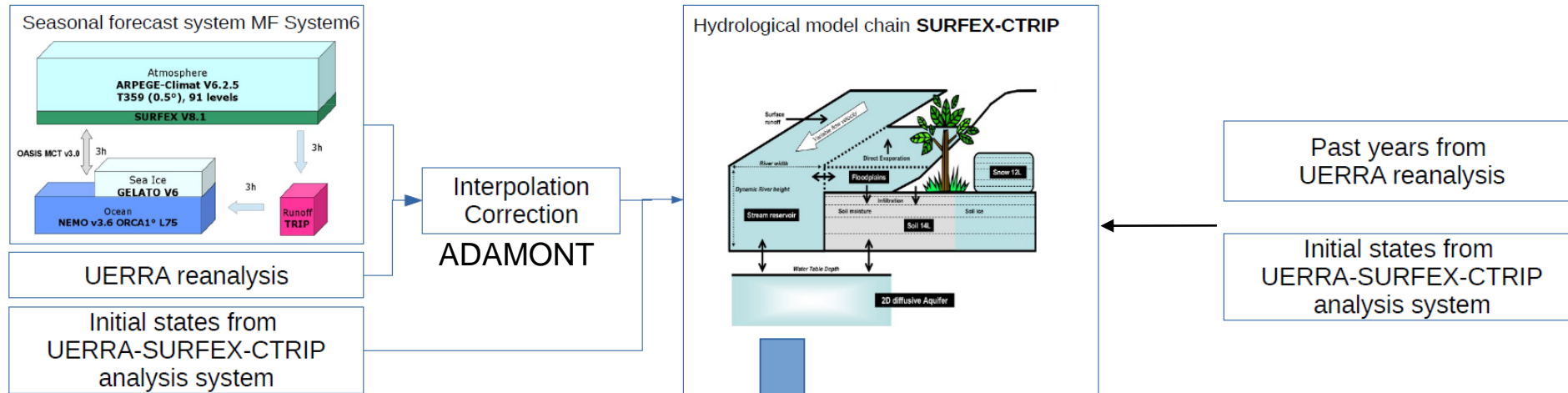


Figure 3. Adjusted Gaussian pdf representing the forecasted NAO [DJF] index distribution for winter 2012–2013 by: ECMWF System 5 (red), (ii) S-ClimWare empirical system (green), and (iii) the a posteriori Best NAO estimate (blue)

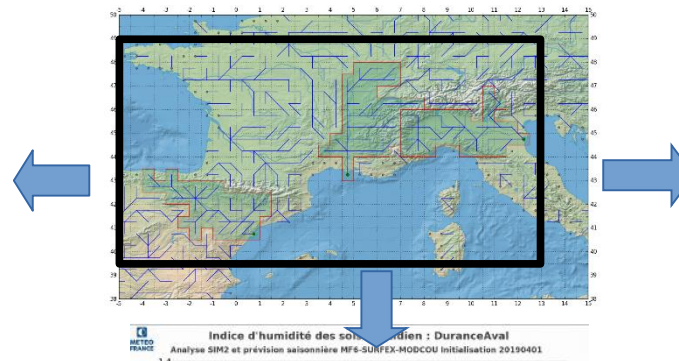
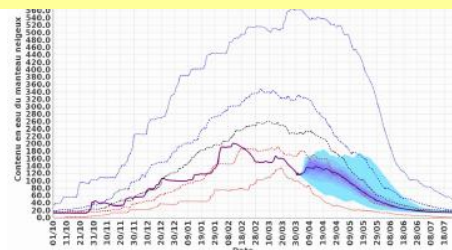
Sanchez et al. 2019, <https://doi.org/10.5194/asr-16-165-2019>



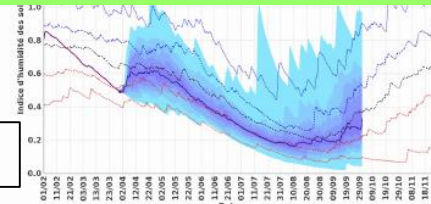
# Example Hydrology: Scheme of the Meteo-France prototype



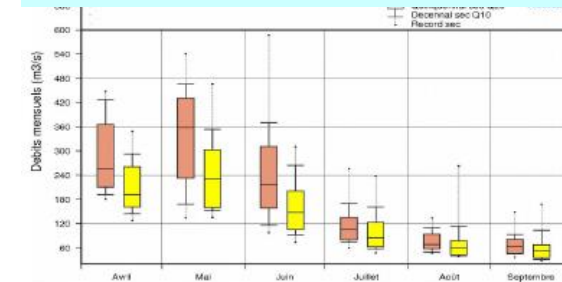
Energy : snow water equivalent



Agriculture : soil water content



Water resource : river discharge





# Example Hydrology: Forecast of snowpack and glaciers (CNR)

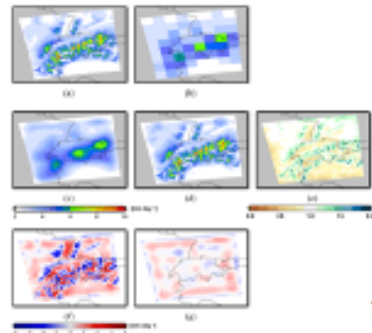
**Step 1** Evaluation of the seasonal forecast variables used to force the snow and glacier models, based on observed AWS data in NW Alps



**Step 2** Off-line evaluation of snow and glacier models driven by optimal forcing (observations) -> ability to reproduce observed snow water equivalent, depth, glacier length



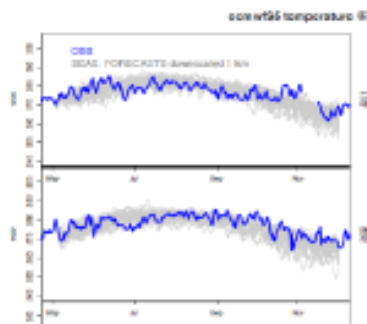
**Step 3** Set up the modelling chain to forecast the evolution of snowpack, snow-water resources, and glaciers in the Alps



OBSERVED DATA VALIDATION and QUALITY CHECK

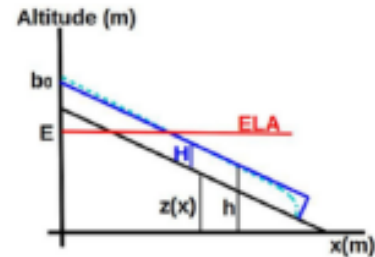
STOCHASTIC DOWNSCALING RainFARM

Terzago et al., 2018; Hardenberg, 2018



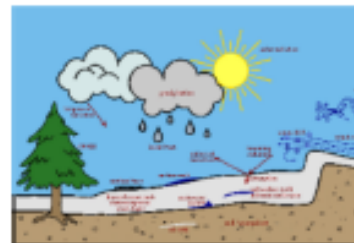
SEASONAL MODELS VALIDATION

MINIMAL GLACIER MODEL  
Oerlemans, 2011

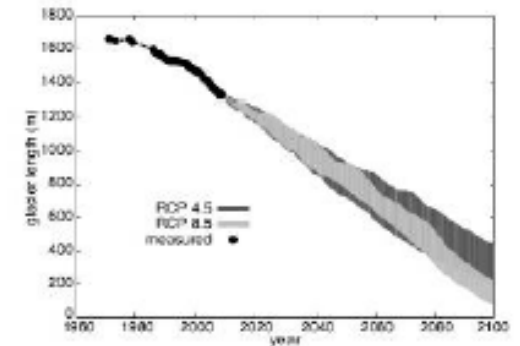


Peano et al., 2016

SNOWPACK  
Lehning et al., 2002



SLF, 2019



Peano et al., 2016



# Example of Agriculture: winter cereal yield forecast (AEMET/ITACyL)

a) Historical climate data (1994-2018)

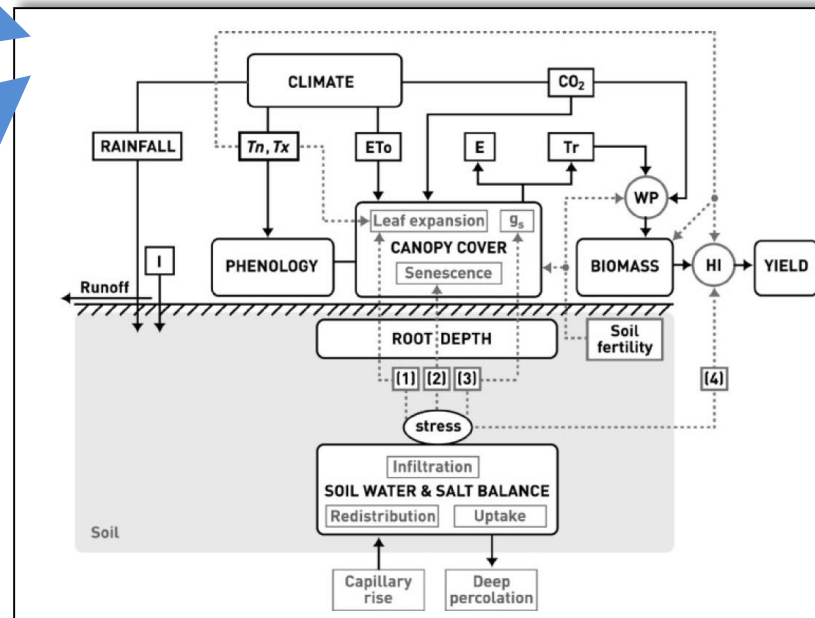
b) ECMWF S5

Adapted or developed specific tools:

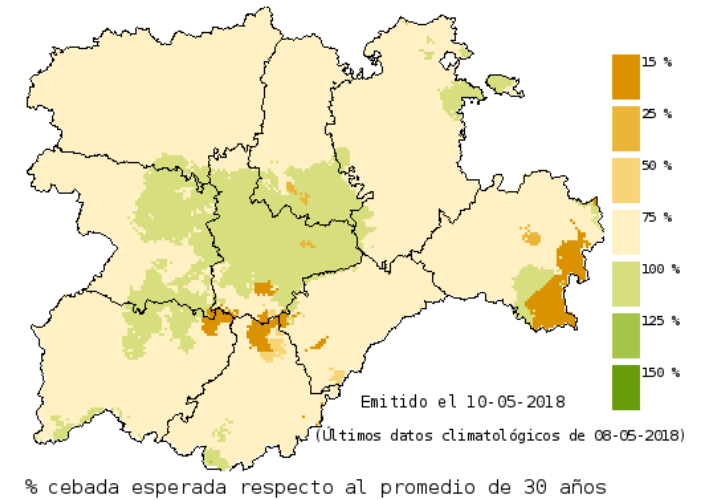
- Analogue Downscaling
- EPS members weighting



AquaCrop model



Yield probabilistic forecast on a 5km grid over Castilla y Leon (Spain)



Two alternative meteorological forcings to AquaCrop:

a) Ensemble of climatological escenarios

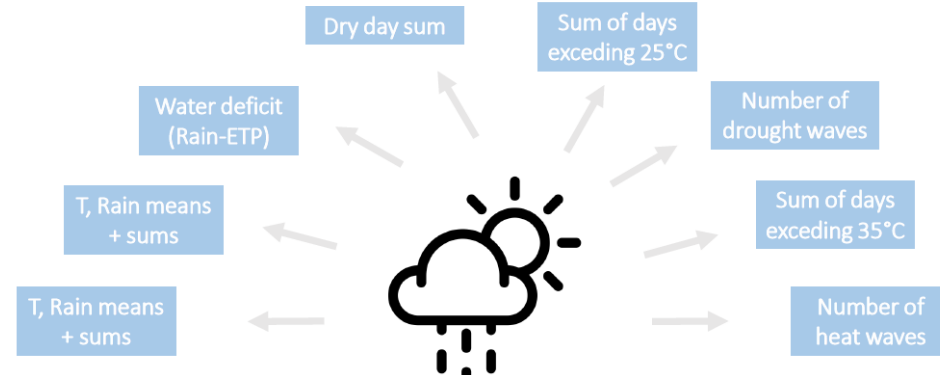
b) AMJ seasonal forecasts



# Example of Agriculture: Agro-climatic and forest indicators (INRA)

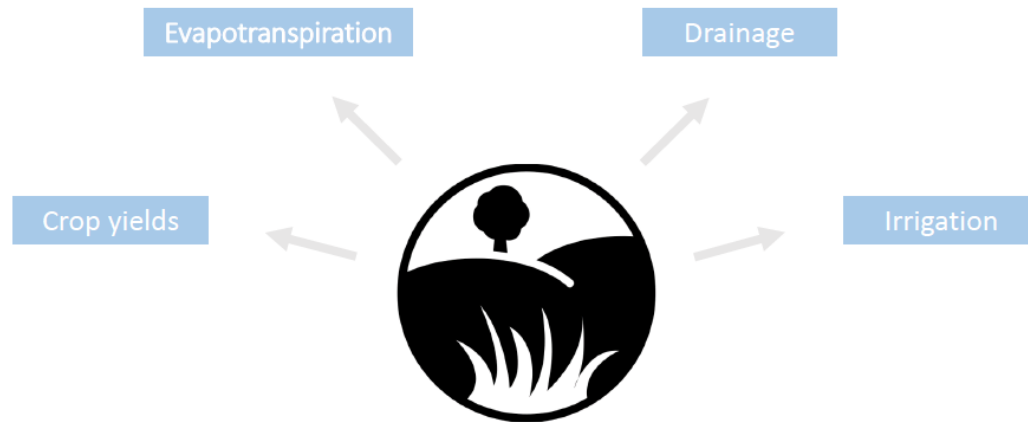
## Climatic risk indicators :

**yield prediction and pest risk** (Administration, food industry, market trader, agricultural cooperative, farmer advisors)



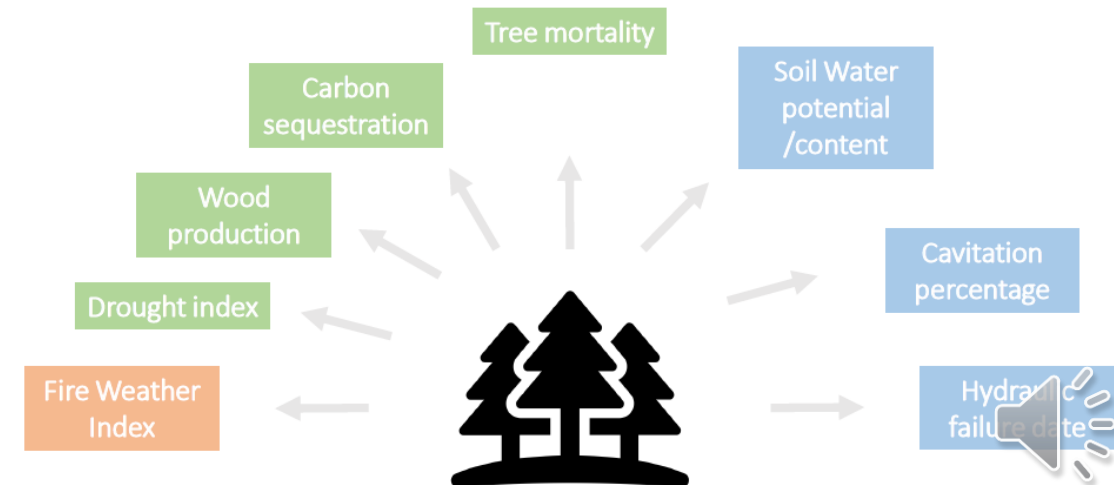
## Crau's grassland indicators

**Use of the water from Serre Ponçon reservoir** : irrigation association, administration



## Forest indicators

**Tree mortality (logging planing), fire risk (fire protection deployment)** : forest administration, forest manager, civil protection ).



# MEDSCOPE WP4 (Development of CS prototypes)

## Main achievements:

- Identification of a **common framework**
- **Sharing of tools** (CS-Tools). Backup solutions while CS-Tools still under development
- **Communication of uncertainty**
- Postprocessing/**visualization** well advanced in some cases
- In some cases, **partnership with active users/stakeholders** established
- Definition of **verification strategy and verifying data**

## Main criticalities:

- Appropriate **verification metrics for each product**
- Appropriate verifying data for final products
- **Access and uncertainties of verifying product** data (yield, inflow, river discharge, wind power,...)
- **Calibration** of a set of application model parameters
- In some cases, postprocessing/visualization still to be defined
- Skill/quality of **different components**





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Thanks for your attention!

