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)

- Adjusted hindcast
  - Bias adjust: CSTools + EQM

- CF fcsts
  - define sectoral indicators
  - define products

- EVALUATION
  - SPECSVerification + EasyVerification - RPSS, CRPSS, BSS, EnsCorr

- VISUALIZATION
  - CSTools - plot tercile & extreme probabilities

- USER interaction
  - define case study

- Iberia, Mar 2018: high winds, highest generation ever

- analyze anomalies

- Torralba et al 2017 [https://doi.org/10.1175/JAMC-D-16-0204.1](https://doi.org/10.1175/JAMC-D-16-0204.1)
Example Hydrology: Web-based decision support toolbox for Spanish reservoirs (AEMET)

Design concept

Co-design prototype, web display, evaluation

Adapted or developed specific tools:
- Analogue Downscaling
- EPS members weighting
- Hydro model

Different stakeholders → Different roles:
- Final users (Dam managers)
- Sectoral developers (CEDEX)
- Governmental (DG Water, Basin river authorities)

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

Example Hydrology: Scheme of the Meteo-France prototype

Seasonal forecast system MF System\(\text{S}\): Meteo-France prototype

Hydrological model chain SURFEX-CTRIP

Interpolation Correction

UERRA reanalysis

Initial states from UERRA-SURFEX-CTRIP analysis system

Past years from UERRA reanalysis

Energy: snow water equivalent

Water resource: river discharge

Agriculture: soil water content

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

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

a) Historical climate data (1994-2018)

b) ECMWF S5

Adapted or developed specific tools:
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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)
- Dry day sum
- Sum of days exceeding 25°C
- Number of drought waves
- Water deficit (rain-ETP)
- T, Rain means + sums
- Sum of days exceeding 35°C
- Number of heat waves

Crau’s grassland indicators
- Use of the water from Serre Ponçon reservoir: irrigation association, administration
- Evapotranspiration
- Drainage
- Crop yields
- Irrigation

Forest indicators
- Tree mortality (logging planing), fire risk (fire protection deployment): forest administration, forest manager, civil protection
- Carbon sequestration
- Wood production
- Drought index
- Fire Weather Index
- Soil Water potential /content
- Cavitation percentage
- Hydraulic failure

Indicators Evaluation and result communication implementation
**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!