

FORWARD



TSK Electrónica y Electricidad (**TSK**)
SUMAQUA (**SUM**)
Technical University of Denmark (**DTU**)
Technical University of Madrid (**UPM**)
University of Oviedo (**UNO**)

Water JPI
WaterWorks2015 Cofunded Call
6 April 2017, Stockholm

MOTIVATION

Human development + Climate change (more extremes) = Pressure on ecosystems



High impact in agriculture and forestry (water-limited regions)



Assessment of the stability and resilience of agricultural and forest ecosystems and Prediction of the consequences of the impact

Decision making support to develop mitigation measures



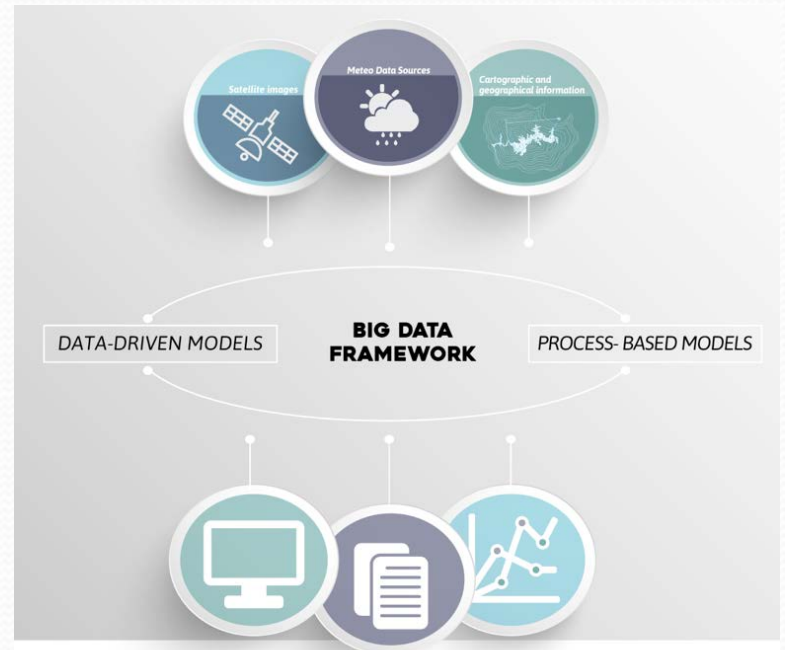
Traditional approaches (SQL-based approaches) can't tackle the different scales (spatial and temporal) involved in ecohydrological processes



OBJECTIVES

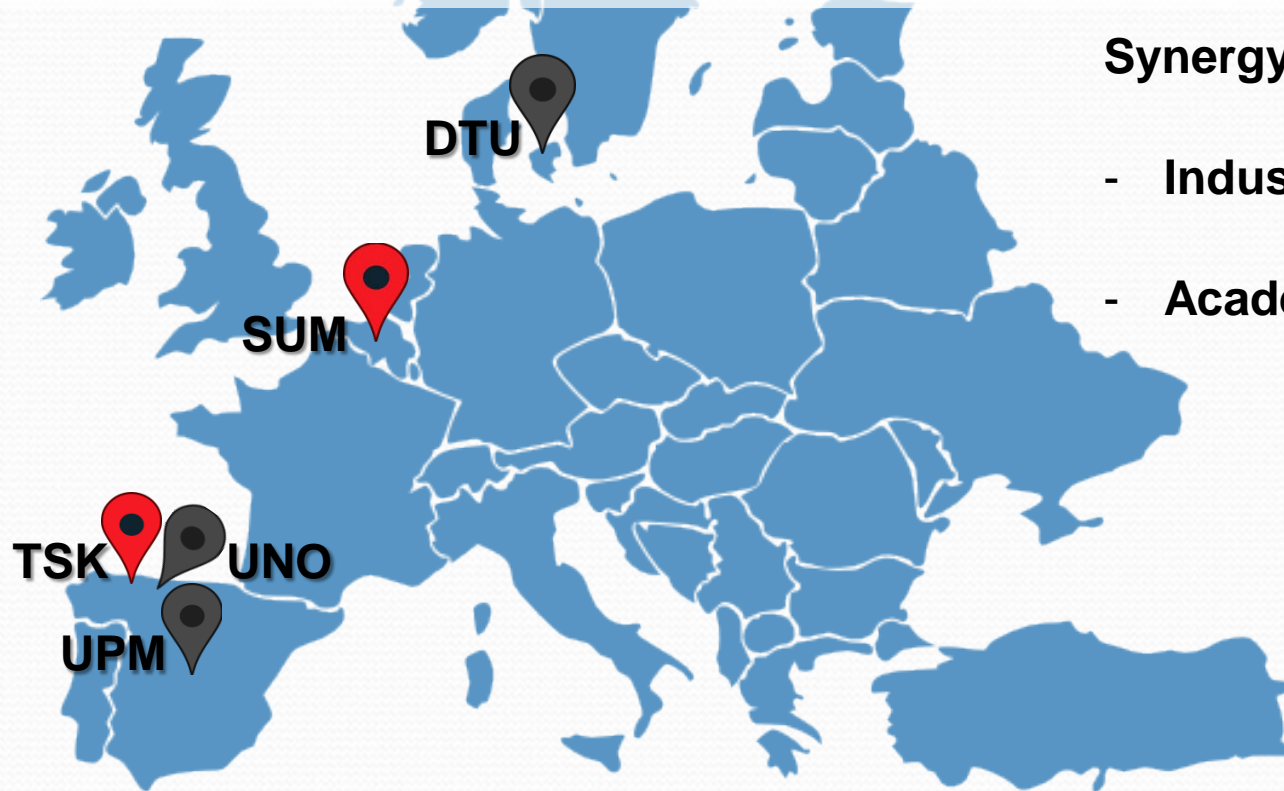
- **To design and implement a Big Data architecture**, capable to collect data from various sources, analyse them and make predictions through data-driven, process-based models and machine learning techniques combination
- **To develop improved forecasting models of eco-hydrological variables** considering different temporal and spatial scales and monitoring ecohydrological parameters
- **To understand the resilience of agricultural and forested ecosystems to climatic extremes** (droughts, temperature)

FORWARD: New approach to assess the stability and resilience of agricultural and forest ecosystems



CONSORTIUM DESCRIPTION

- SUM** - Belgian start-up (originated from the KU Leuven)
- DTU** - Technical University of Denmark
- UPM** - Technical University of Madrid → in subcontracting by TSK.
- UNO** - University of Oviedo → in subcontracting by TSK.
- TSK** - Spanish company (Coordinator).



Synergy of:

- Industry[
- Academia[

WPI

Big Data Framework: data management and processing

- **Participants:** ALL. **Leader:** TSK.
- **Description:** Data gathering, pre-processing and integration based on Big Data technologies according to the volume, velocity and variability of the sources of information.
- **Objectives:**
 - Data identification and gathering.
 - Indicators of resilience definition.
 - Architecture deployment and data interfaces definition.

WP2

Data-mining and data driven modelling

- **Participants:** TSK (UPM). **Leader:** SUM.
- **Description:** Combining data mining, data-driven modelling and statistical techniques to quantify variability, extremes and resilience in space and time.
- **Objectives:**
 - Data mining, statistical and data-driven modelling techniques.
 - Select the most suitable data mining approaches to characterize the variability and extremes in ecosystem historical time series.
 - Select and implement the preliminary set of data driven modelling techniques to create prediction models.

WP3

Historical Process-based models using EO data

- **Participants:** TSK (UNO). **Leader:** DTU.
- **Description:** Modelling using Earth Observation time series. Evapotranspiration and water use efficiency (WUE) from satellite and other spatial climatic databases
- **Objectives:**
 - Protocol to estimate Evapotranspiration (ET) and Water Use Efficiency (WUE) with Earth Observations (EO) Data.
 - Geospatial database with input and output EO variables.
 - Estimation of ET, WUE, and the evaporative fraction.

WP4

Integration and analysis of results

- **Participants:** ALL. **Leader:** TSK
- **Description:** Final integrated analysis studying and validating the sensitive across regions, regimes and vegetation types.
- **Objectives:**
 - Implementation of WVP2 and WVP3 techniques in the Big Data Framework.
 - Simulation and impact analyses of a defined scenario.
 - Identify future climate change and derive key indicators for quantifying water resources.

WP5

Communication and dissemination

- **Participants:** SUM. **Leader:** DTU.
- **Description:** To maximize dissemination of the outcomes of FORWARD.
- **Objectives:**
 - Set up project website to make public scientific knowledge.
 - Scientific publications in international journals and conferences,
 - Stakeholder questionnaires to identify needs and collect data.
 - Participate in public engagement plans.

Expected Impact of the Project

SCIENTIFIC	INNOVATION	SOCIAL
<ul style="list-style-type: none">• New techniques for data-mining and analytics.• New knowledge and understanding of the processes underlying resilience of agriculture and forestry	<ul style="list-style-type: none">• Deliver of essential tools for efficient and future proof water management and decision making.• Deliver of Big Data tools and techniques in environmental fields.	<ul style="list-style-type: none">• Creation of direct and indirect jobs.• Contribution to public engagement plans in collaboration with local governments, increasing the awareness about climate change, extremes and resilience.



To share expertise, knowledge, and skills to impact on project results:

- Teams made up of professionals from different disciplines

Promote multi-disciplinary work?

Enhance collaborative research and innovation during the project life and beyond?

- Close contact between partners:**
- Multidisciplinary WVP
 - Scheduling periodic face-to-face meetings

How will your project target to following aims of the call TO...

Synergy of industry and academia:

- Industrial partners: R&D experience, software implementation
- Academic partners: increase R&D potential and connection with researches

Encourage proposals with fundamental and/or applied approaches

Stimulate mobility of researchers within the Consortium

- FORWARD provides new opportunities to the research community:**
- New understanding
 - Big Data analytics into water science



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