



chist-era



CHIST-ERA Projects Seminar 2023

Novel Computational Approaches for Environmental Sustainability (CES)

April 05, 2023



Programme co-funded by the
EUROPEAN UNION

Introduction: Projects of CES

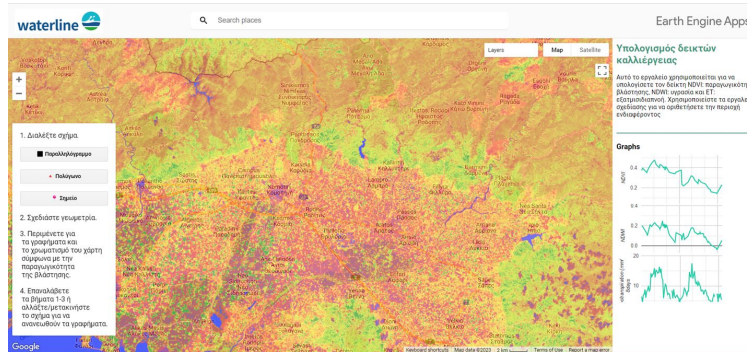
“As environmental models become more complex and more adaptable in real time, it is necessary to change the way we work with these models, to be more integrative, more reactive and reduce the amount of computational power being used. This will improve the computational models that we have and allow better predictions on the future of our planet.”

— CHIST-ERA Call 2019

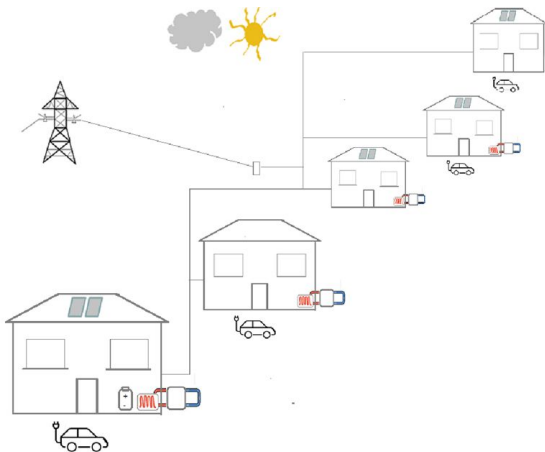
- ❖ 4Map4Health - Mapping of forest health, species and forest risks using Novel ICT Data and Approaches
- ❖ SEC-OREA - Supporting Energy Communities- Operational Research and Energy Analytics
- ❖ SWAIN - Sustainable Watershed Management Through IoT-Driven Artificial Intelligence
- ❖ WATERLINE - New Solutions for data assimilation and communication to improve hydrological modelling and forecasting

Projects:

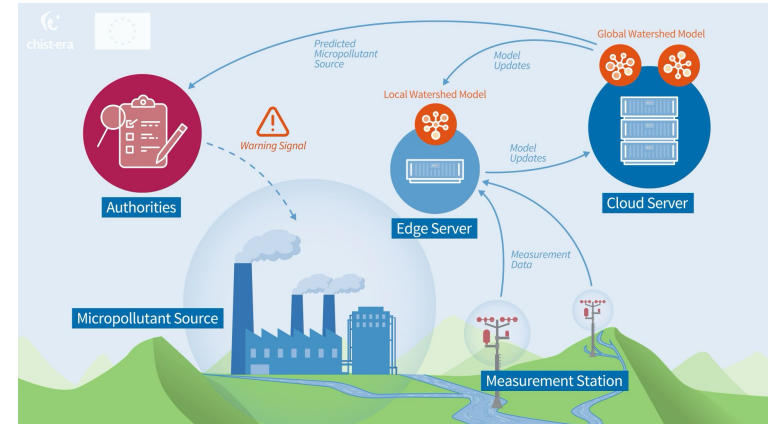
WATERLINE



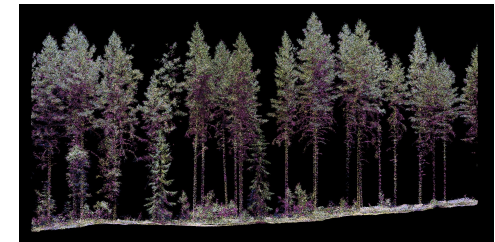
SEC-OREA



SWAIN



4Map4Health



VQ-840-G



MiniVUX-3UAV



VUZ-1HA

Major Achievements and Outputs

- ❖ Web based tools, models and open datasets for scientists, policy makers and wider public, e.g. downscaled soil moisture and precipitation datasets, micropollutant distribution in European rivers.
- ❖ Informing policy makers and regional authorities of persistent hydrological conditions that influence various sectors of economy and people's welfare
- ❖ Co-developing services and data sharing with various stakeholders
- ❖ Preparation of open data sets for various natural environments, including forests, rivers, ground water, etc.
- ❖ Development of framework for communication and cost effective sensor placement for monitoring remote areas.
- ❖ Use the LiDAR radiometric features (i.e., intensities) for estimate how long the dead tree is stand.
- ❖ Maps of different degree of bark beetle infestation using features from multispectral LiDAR data
- ❖ Development of Local Energy Community (LEC) business model assessment framework.
- ❖ Capacity building: postdoctoral researchers, PhDs in progress, strengthening ties with widening access countries

Upcoming Challenges and Needs

- ❖ For Waterline project Integrate all apps in a useful application with various modules
- ❖ Integrate hydrological and hydrogeological models
- ❖ Integrate expert-driven methods with data-driven methods
- ❖ Test the efficiency of AI models
- ❖ Developing water forecasting model and building anomaly detection system for detecting micropollutants.
- ❖ Calibrate the LiDAR intensities to obtain values with physical meaning
- ❖ **Long term vision:**
 - ✓ Predicting various environmental disasters, including forest fires and pests, draught, floods, and water contamination
- ❖ For SECOREA: recruitment given cost of living increases



Possible Roadmap

- ❖ Work focusing on collaborative issues will result in integration of various output in a way easily accessible by various stakeholders
- ❖ The expected impact can be increased by publications in scientific journals, by informing the scientific community of the project outputs through workshops and conference presentations, by communicating project results to the wider community through article publications and social media
- ❖ Open datasets are available in open repositories, codes are published in open access journals and repositories like GitHub, so everyone may use them.
- ❖ Developing a forecasting model based on graph neural networks (GNNs) modelling geographical characteristic such as tributaries as graph nodes.
- ❖ Potential users include national and international environmental agencies such as ministries and NGOs.

Role of the CHIST-ERA Support

- ❖ CHISTERA had a fundamental role in the achievements, especially through the coordination of numerous funding agencies and by organizing the annual seminars
- ❖ CHISTERA provides added value by promoting open science principles and by encouraging cooperation between projects of similar topic
- ❖ The international implementation worked well for most projects, while problems were found in some national funding agencies
- ❖ Harmonization of national funding rules is needed

Complementarity with Horizon Europe

- ❖ Institutional contribution within CHIST-ERA is 30% in our case, what is usually lower in case of Horizon Europe
- ❖ Another challenge is the distribution of money through national agencies what can cause an issue on the begging where partners are not starting at the same time.
- ❖ A bottom-up approach for the definition of topic each year

- ❖ **Open Science:** All project follow open science practices (see next slide)
- ❖ **Public Engagement:** SEC-OREA stakeholder workshops
- ❖ **Ethics:** Ecological footprint of the sensor networks (which are prevalent in almost all projects) has to be taken into consideration
- ❖ **Gender** issues are difficult to tackle, especially in projects related to natural sciences and technological problems.



Practices

- ❖ Open access venues are preferred for publications when available
- ❖ Preprints are shared in institutional website / project website
- ❖ Data repositories are made public
 - ✓ TODO: examples

Challenges

- ❖ Cost of open access publication
 - ✓ FWF's model for extra budget for OS can be followed by other countries
- ❖ Difficulty of data anonymization to avoid privacy and commercial issues
 - ✓ An example is the electricity load in the SECOREA use case



Technology Transfer

- ❖ Expected embracement of the technology by the practitioners for acquisition of new information about forest health
- ❖ It is challenging to keep balance between open data and IPR. Many institutes in EU have different rules related to IPR.
- ❖ EIC Transition Challenge: “Environmental Intelligence” can be relevant for the projects in this topic toward exploitation.



Questions ?