ENVIRO AN INNOVATIVE WEB MAPPING TOOL TO MONITOR AND FORECAST PLANT AND PESTS DYNAMICS BASED ON CLIMATE DATA

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Scientists and policy makers from the agricultural, environmental and socio economical sector need new Information and Communication Technologies (ICT) tools to study and understand the influences of climate and meteorology on the dynamics of agriculture systems. With this goal, we developed ENVIRO, an innovative WebGIS platform which integrates weather-driven, Ecosystem Modeling (EM) to monitor the effects of climate and study the impacts of climate change on Trentino's major agricultural systems. Researchers and stakeholders can apply ENVIRO to map and overlay environmental, agricultural and socio-economic data. The platform is modular and it is designed to support the entire pipeline of implementation, validation of experimental models, based on high resolution climate data.

The backbone of ENVIRO system is *enviDB*, a spatial temporal database for vector and raster data which addresses the main objective of the system: i.e, to harmonize and to provide access to regional time series of weather-climate data, climate change scenarios, land use geodata and general administrative statistical data. The core of the system is a web geoprocessing engine where a library of models (*Vitis Vinifera, Botrytis Cinerea, Lobesia Botrana, Erwinia Amylovora, Malus Domestica, Blumeria Graminis, Peronospora Farinose*) is accessible to simulate and map the influences of weather and climate and to forecast the impact of future climate change scenarios on plant-pathology systems. *EnviGrid* is the a spatial temporal user panel to access the climate databases at different aggregation scales in time and space. Two web mapping interfaces complete the system: *enviMapper*, the interface for decision makers, a web client to monitor the influences of climate and the vulnerability to climate change on agricultural systems, and *enviModel*, the interface for researchers that provides tools for real time processing and models sharing.

All modules and technical components are Open Source and they build on software endorsed by the Open Source Geospatial Foundation (OSGeo). The implementation follows the international Open Geospatial Consortium (OGC) standards for geodata transmission and geoprocesses to ensure a complete interoperability with existing spatial data infrastructures (SDIs). Researchers can add the implementation of new models, as well as simulate in quasi real time life cycles of plants and pathogens and their interaction using the implemented models via web geoprocessing technologies. The platform includes also a rich metadata catalog to provide clear indications on quality and provenance of data. To sustain the requests for on line geoprocessing of large environmental models on climatic data, the ENVIRO scientific computing environment is based on high performance computing methods (GPGPU and Cloud Computing). In summary, ENVIRO is a state of the art ICT platforms for applied climate and climate change studies with a focus on modeling effects on agriculture at high resolution, in space and time. The system was developed within the ENVIROCHANGE project funded by the Autonomus Province of Trento.