



P R O J E C T S

Climate-Smart Agriculture (CSA)

Project information

Project title: Climate-Smart Agriculture

Duration: 12 months, from November 2022 to October 2023

Project No. EUREKA SA: E! 13459

Project No. FFG: 900216



Description and mission

The project consists of five main objectives.

The identification of locations in the Western Cape where the establishment of additional weather stations will have the largest positive impact on climate surface accuracies (**Objective 1**), will involve a multicriteria evaluation of the existing weather station network to identify gaps (e.g. areas with unique topographic and climatic characteristics that are not represented by the existing weather station network).

The identified gaps will be prioritized in terms of their potential impact and accessibility to come up with a set of 250 potential locations. These locations will be provided to METOS SA to negotiate and arrange installation with landowners, while PESSL will provide cost-effective weather station hardware and software. While the weather stations are being established (**Objective 2**), TerraClim, will experiment with a range of geostatistical, machine learning, and satellite remote sensing techniques to improve the accuracy and resolution of climate surfaces, while reducing the computational requirements (**Objective 3**).

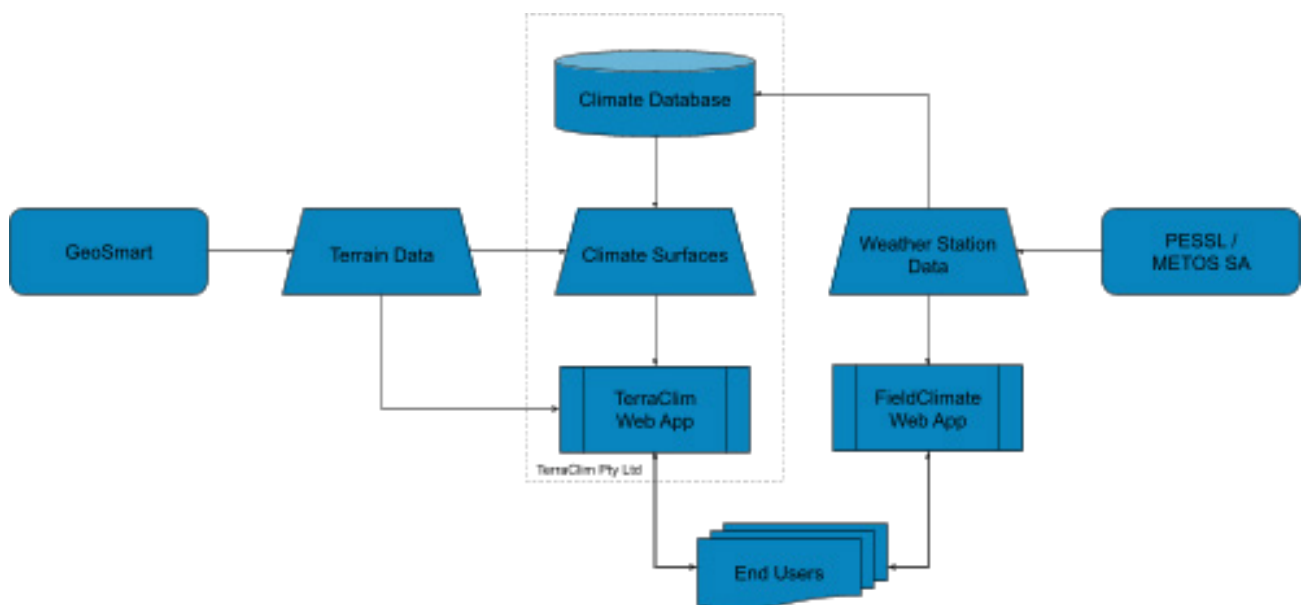
TerraClim will develop software routines to interrogate the PESSL application programming interface (API) at an hourly interval and automatically ingest the latest measurements into the TerraClim climate database. The software will also be developed to automatically identify data gaps and errors and, where feasible, replace the gaps/errors using advanced statistical, machine learning, and geospatial analysis techniques. Once the data is prepared and ready for analysis, it will be used to automatically generate high-resolution climatic surfaces. The surfaces will be used to calculate important biophysical indices (e.g. growing degree days, cold units, evapotranspiration).

The functional expansion of the TerraClim web app (**Objective 4**) will be done throughout the course of the project and will include the development of a reporting system (customizable report per production unit), spatial queries (e.g. find areas with specific climatic characteristics), and crop suitability analysis. On the other front, all data collected by the weather stations are stored on PESSL servers and available on ng.fieldclimate.com. The FieldClimate displays agro-meteorological data of weather stations installed all over the world since 2005. With a WS the final user not only the meteorological data collected but also a forecast for his/her field by using real-time local measurements to post-correct modelled forecast output, eliminating model bias and updating the forecast frequently with the latest data from your station, satellite, and radar.

The development of a push report and notification system to service Agriculture Advisors and end-users (producers) is one of the objectives of this project (**Objective 5**). These reports will

focus on delivering only key information on problem areas in the field or farm that can be addressed and allow stakeholders to make more informed decisions. The result will be a better use of natural resources such as water and more sustainable farming practices such as lower pesticide usage due to disease forecast models.

The figure below explains the flow of data, from its collection, the value added to be able to generate the push report and notification system, and the high-resolution biophysical indices, spatial queries, and crop suitability analysis report to the end-users.



What is the market envisaged?

Although the IoT market is growing globally, the adoption rate of precision agriculture in South Africa has been slow, although larger growers seem to understand the benefit. This can primarily be attributed to the lack of training and in-field support. Start-up businesses in precision agriculture do not have long-standing relationships with their potential customers and therefore need to work on the relationship before they can do business. One great testimony to this is the quick adoption rate growers have shown to software systems such as those created by John Deere (e.g. MyJohnDeere).

Weather data and predictive models are becoming increasingly important, but big data collection in most cases results in more confusion to the customer, resulting in them reverting to old habits (e.g. making decisions based on past experience). The purpose of push reporting is to disrupt the status quo of how precision agriculture is communicated by only providing relevant information and suggesting actions that are informed by accurate data. Examples of information that will have a disruptive impact include:

- Disease forecasting, resulting in fewer chemicals being applied to the agriculture fields;
- Improved water scheduling, resulting in more efficient use of limited water resources;
- and Early warnings for extreme weather events such as drought, frost, hail, and flooding.

This proposal combines the scientific expertise of TerraClim/Geosmart (SA) and PESSL (Austria), with the commercial know-how and experience of METOS SA / Villa. This unique partnership will provide a solution for the successful rollout and commercialization of the products and services.

At present, there is no push reporting system to notify producers or field agents of potential risk. South Africa has more than 900 registered field agents and many more agriculture advisors / technical professionals that service the Agriculture sector. By having in-time notification systems on pest detection, extreme weather warnings, water scheduling this project will be able to service all size farming operations including small-scale farmers and large organizations.

About the funding agencies and EUREKA initiative

EUREKA is an intergovernmental organization for market-driven industrial research and development (R&D). It is a decentralized network facilitating the coordination of national funding on R&D and Innovation (R&D&I), aiming to boost the productivity and competitiveness of industries. Following a bottom-up approach, with an emphasis on projects in technological areas with a civilian purpose, EUREKA has been the driving force of innovation in Europe for over 30 years.

Within the EUREKA initiative, this call was based on mutual consent between the participating national funding bodies (NFBs), namely: the Department of Science and Innovation¹ (DSI) (South Africa); The Austrian Research Promotion Agency (FFG).

Partners

Pessl Instruments GmbH
METOS SA Pty. Ltd. (Villa Crop Protection)
TerraClim/Geosmart