Development of agroclimatic indicators and services over Europe in the framework of the STARGATE project

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INTRODUCTION

STARGATE identifies vulnerabilities of current farming systems related to climate change. Based on the requirements' analysis, STARGATE develops the data framework and the **climate smart decision support tools used by farmers and policymakers**, to manage local and regional microclimate more efficiently.

In the STARGATE project we:

- Contribute to the STARGATE operational Weather Prediction System **by providing** 5x5 Km **operational weather forecasts** over central-east Europe.
- **Calculate different agroclimatic indicators** and their trends over different biogeoregions using the EURO-CORDEX ensemble (1986 -2055) for different scenarios.
- Provide **future climate risk assessments**.
- **Examine effects of agricultural practices** (irrigation, tillage) **on regional climate** with the use of the WRF regional climate model, configured over selected pilot regions in a very high-resolution configuration (1 Km).

All project results will be presented in the project platform (due 09/2024).

WEATHER FORECASTS

The operational Weather Prediction System of STARGATE is provided by three project partners (AUTH, AGROAPPS, METEOBLUE). It covers Europe (11-15 Km) and selected pilot regions in high resolution (2-5 Km) (Fig. 1).

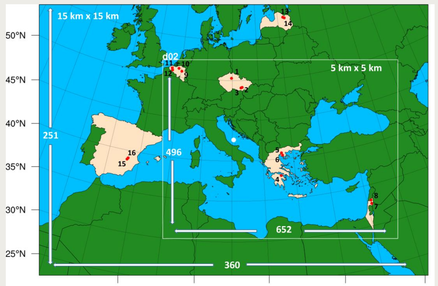

Figure 1. Domain configuration of the AUTH operational weather forecasts. Indicated are pilot countries/locations.

AGROCLIMATIC INDICATORS

Sixteen agroclimatic indicators have been calculated based on EURO-CORDEX data, **temperature/precipitation/drought/animal-comfort** related. The data used, cover the historical period (1986-2005) and a future projection (2006-2055), for two different scenarios (RCP4.5, RCP8.5). Figure 2 displays the GDD index with related statistics.

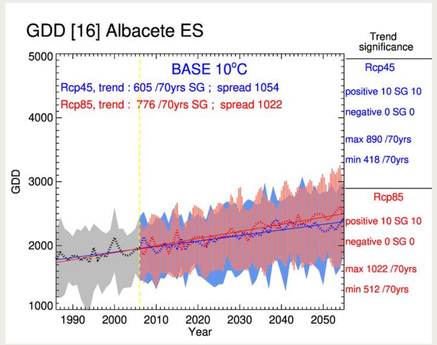

Figure 2. Growing Degree Days per year for RCP45 and RCP85. Temperature base of 10°C – Pilot: Albacete, ES.

IMPACTS OF FARMING PRACTICES ON CLIMATE

The WRF model have been used to investigate the impact of two farming practices (**irrigation and tillage**) on regional climate during extended heat waves. Figure 3 shows the impact of irrigation on surface temperature due to changes in albedo, radiation and heat fluxes. The impact on surface temperature Ts and 2m temperature T2m, is also shown.

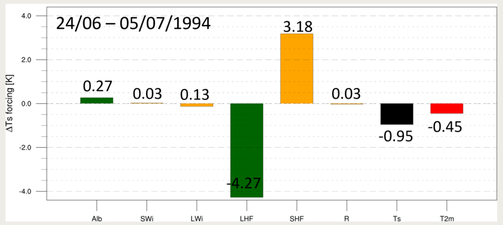

Figure 3. Surface temperature changes (K) due to irrigation over Albacete, ES during a heat wave event. Alb denoting the change in Ts due to modified albedo, SWi incoming SW@surf, LWi incoming LW@surface, LHF latent heat fluxes, SHF sensible heat fluxes and R other. Surface temperature (Ts) and temperature at 2 m (T2m).

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STARGATE

https://www.stargate-h2020.eu/

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