**Use case 2: What kind of yields might we expect this season in Ethiopia?**

A domain modeler, Aldous, wants to use DSSAT-pythia to forecast yields for the current growing season in Ethiopia. This requires that weather data are available up through yesterday. Aldous runs a script to update the weather data inputs for Ethiopia up through yesterday’s weather. He then selects the forecast of with the DSSAT-pythia model container in SuperMaaS. For this option, he must select the crop (maize), area of interest (Ethiopia), and beginning date of forecast (today’s date, or the day after the last available weather data). (Do we need a smart way to figure out that the current season is meher or belg? Or possibly we should run both because in different regions, they may be concurrent.)

Aldous understands that the forecast will use pre-set crop management data for baseline conditions over Ethiopia. Actual weather data for the current season will be used up until the last available date, then an ensemble of weather for the remainder of the season are obtained from available historical weather data. (Even better would be to splice in a 7- to 10-day short term weather forecast data, but we will ignore that for this use case.) If there are 30 years of historical weather data, then 30 weather ensembles are created for each pixel.

Simulations are done using baseline conditions, but with the ensemble of forecast weather data. The DSSAT-pythia outputs in csv format are stored in a data cube (with the baseline outputs) and are ready for analysis. (Alternate ending: outputs are provided as mean yield difference maps and the increase or decrease in total mean production by Region. Uncertainty can be expressed in terms of the standard deviation of yields and production.)

**Processing workflow**

* 1. **SuperMaas pre-processor:** Updateweather data, by modifying the pythia config file to use the forecast plugin, for the selected crop, and selected start date.
  2. **DSSAT-pythia container:** Run the model using modified pythia config file
  3. **SuperMaaS post-processor:**

SuperMaaS must provide some post-processing of outputs outside the DSSAT-pythia container because some of the analysis may include previously archived simulated outputs. Some post-processing will be specific to the DSSAT-pythia output formats and structure (e.g., aggregation over the 4 SPAM management regimens), but some methods may be common with other models.

Post-processer outputs for this use case:

* 1. DSSAT-pythia per pixel outputs – no post-processing
  2. Average yield diff maps for the area of interest. Each pixel shows mean difference in yield over all weather years.
  3. Production diff maps for the area of interest.
  4. Increase (or decrease) in aggregated total production for the area of interest under each scenario. This is either a single number (i.e., mean value) per fertilizer scenario, or could be presented as statistical summaries (e.g., percentiles).
  5. Increase (or decrease) in yields for the area of interest. As with production, these could be expressed as averages or as statistical distribution.