

## Generating bespoke forecasts with the TAMSAT-ALERT Python Tool

In this activity, you will use the TAMSAT-ALERT Python tool to generate your own bespoke forecasts for a region and period of interest. The process of running the tool will be the same as when reproducing test-cases: there is no need to edit the underlying Python script and you will not need to re-install the packages, you will simply be adjusting the single line of code used to run the forecasts. Once you are ready to get started generating your bespoke forecasts, follow the steps below.

### 1) Specify your 'region of interest':

The TAMSAT-ALERT tool uses data developed for all of Africa. Your region of interest can therefore include any part of the continent. This could be a region (e.g. West Africa), country (e.g. Ghana) or sub-national designation (e.g. the Ashanti region of central Ghana). When choosing your region, bear in mind that the larger the region, the longer it will take for the code to run and the bigger the outputs data files (.nc) will be. We recommend starting with a country or sub-national designation.

Once you have decided on your region of interest, you need to identify the bounding longitudes and latitudes. If you don't know what these coordinates are, you can use Google Maps to locate the region of interest. Right click on the map and choose 'What's here?' to display the longitude and latitude of a point.

If your longitudes are west of the Prime Meridian (0° longitude) or your latitudes are south of the Equator (0° latitude) you will need to include a minus sign (-) before the number.

You now have the **lon\_min**, **lon\_max**, **lat\_min** and **lat\_max** variables for your Python call (see below).

### 2) Specifying a 'period of interest':

A period of interest is often a season or month of importance to agricultural production, typically a rainy season. To specify the period of interest, you will need both a start and end date. For example, if your period of interest is Kenya's 2021 March-April-May long rains, your period of interest start date would be 1<sup>st</sup> March 2021 and you end date would be 31<sup>st</sup> May 2021.

Bear in mind that TAMSAT-ALERT forecasts run for 150 days ahead. This means that your period of interest cannot extend beyond 150 days from the forecast date (see below). If it does, you will get an error message and the Python tool will not run.

You should format your period of interest start and end dates as follows:

Date	Format (YYYYMMDD)
e.g. 23 <sup>rd</sup> April 2021	20210423
e.g. 12 <sup>th</sup> January 2021	20210121

You now have the **poi\_start** and **poi\_end** variables for your Python call (see below).

### 3) Specifying a forecast date:

The default forecast date for operational production of TAMSAT-ALERT forecasts should always be today's date. TAMSAT-ALERT forecast files are not issued everyday (more like every 5 days), but the Python tool will find the most recent forecast file and run your forecast from this date. Your output files will be labelled with the date that the forecast file was issued, not the forecast date you specified.

You should format your forecast date in the same way as your period of interest start and end dates (YYYYMMDD).

You now have the **forecast\_date** variable for your Python call (see below).

#### 4) Incorporating meteorological forecast information:

The TAMSAT-ALERT tool uses a tercile rainfall forecast to weight the soil moisture ensemble forecast. You can obtain a tercile rainfall forecast from any source that is relevant to your region and period of interest. For example, if interested in Kenya's 2021 March-April-May rainy season you could use ICPAC's GHACOF rainfall forecasts, Kenya Meteorological Department's seasonal rainfall outlook or another relevant product.

Weights should be proportional and should add up to 1.0. If the tercile rainfall forecast you are using instead adds up to 100, simply divided each value by 100.

You now have the **weight\_up**, **weight\_mid** and **weight\_low** variables for your Python call (see below).

If you cannot find a relevant tercile rainfall forecast or do not want to weight your soil moisture ensemble, then you should use an even weighting of 0.33, 0.34, 0.33 for weight\_up, weight\_mid and weight\_low.

#### 5) Inputting variables into the Python call:

You now have all the information you require to run your own bespoke TAMSAT-ALERT forecast. Below is a reminder of the format of the Python call. To run the TAMSAT-ALERT Python Tool you need only type a single line of code into the 'Anaconda Prompt' window. The format of that line of code is as follows:

**python filepath forecast\_date poi\_start poi\_end weight\_up weight\_mid, weight\_low roi lon\_min lon\_max lat\_min lat\_max**

This will take a short while to run (10-20 minutes depending on the size of the region you have chosen) and once finished, you should see some new files created in the 'outputs' folder.

**Output file naming conventions:** <filename>\_<poi>\_<forecastdate>\_<region>.<filetype>

The <filename> and <filetype> labels give the name and type of the output file. Refer to the table on the "Reproducing test cases" worksheet for a description of each file.

The <poi> labels refers to the period of interest (poi\_start, poi\_end) you specified in the Python call. This takes the format of <poi\_months><poi\_year>. For Kenya's 2021 March-April-May season, the <poi> label will therefore be 'MAM2021' (the first letter of each month is given to indicate the season).

The <forecastdate> label refers to the forecast date from which the forecast was run in the YYYYMMDD format. This may be different from the forecast\_date you specified in the Python call as the TAMSAT-ALERT tool will find the most recent forecast file and reset the forecast\_date to the date it was issued.

The <region> label gives the bounding coordinates of your region of interest, as specified in your Python call.

#### **You have successfully generated your own TAMSAT-ALERT forecasts!**

The output files are available for you to use as you wish. The netCDF (.nc) files contain the forecast data. You may wish to use the files to generate your own plots or figures.

The database of historic and forecast data is being regularly updated. Therefore, if you wish to begin producing TAMSAT-ALERT forecasts operationally for your region of interest, you can run the TAMSAT-ALERT Python Tool at regular intervals (e.g. weekly or monthly) to receive an updated soil moisture forecast.

The TAMSAT team will continue to be on-hand to answer any emerging questions you may have or to troubleshoot any problems. Contact Vicky at the email address below. We also love to hear your experiences with using TAMSAT-ALERT data in your own activities – keep in touch!

**Vicky Boulton:** [v.l.boulton@reading.ac.uk](mailto:v.l.boulton@reading.ac.uk)