Web-based access, aggregation, and visualization of future climate projections with emphasis on agricultural assesments. User's Manual

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How to use the Climate Scenario Aggregator (CSA) tool

The Climate Scenario Aggregator (CSA) tool is fully documented in Villoria et al. (2016). Users are encouraged to read the main article and the citations therein before using the data delivered by this tool. This tool is freely available at `https://mygeohub.org/tools/climatetool`. Before launching the tool, users need to register and then sign up for a free account. (In order to access HUBZero's workspace, some users have reported the need to install a Java plug-in and/or adjust the Java security settings; the alternative is to use HTML5, which do not require Java.) After clicking on "Launch Tool", the CSA tool should appear in the Hub workspace.

Downloading CSA Gridded Outputs

The Download tab (figure 1)allows for selecting the following from the gridded archive: a weather variable (temperature or precipitation), a general circulation model, and a representative concentration pathway. Clicking on "Fetch Data" connects the tool in GEOSHARE's HUBzero with Globus Online and transfers the selected files to the workspace. The selections in the graphical user interface follow the filename conventions adopted by the ISI-MIP project (Warszawski et al., 2014), for instance:

```
tas_bced_1960_1999_noresm1-m_rcp2p6_2006-2010.mm.nc
tas_bced_1960_1999_noresm1-m_rcp2p6_2011-2020.mm.nc
                    .
                    .
                    .
tas_bced_1960_1999_noresm1-m_rcp2p6_2091-2099.mm.nc
```

are global grids of monthly air surface temperature means (one grid for each year in the period 2006-2099), projected by NorESM1-M (Bentsen et al., 2013), under representative concentration pathway RCP2.6 (Moss et al., 2010). Notice that for each unique combination of variable, scenario and model there may be many files storing different years. Because of this, the tool will download all the files in the CSA archive whose

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name matches the options selected by the user. In general, this is a time consuming operation. The lower panel of the tool shows the operations being performed and allows the user monitoring the progress of the download.

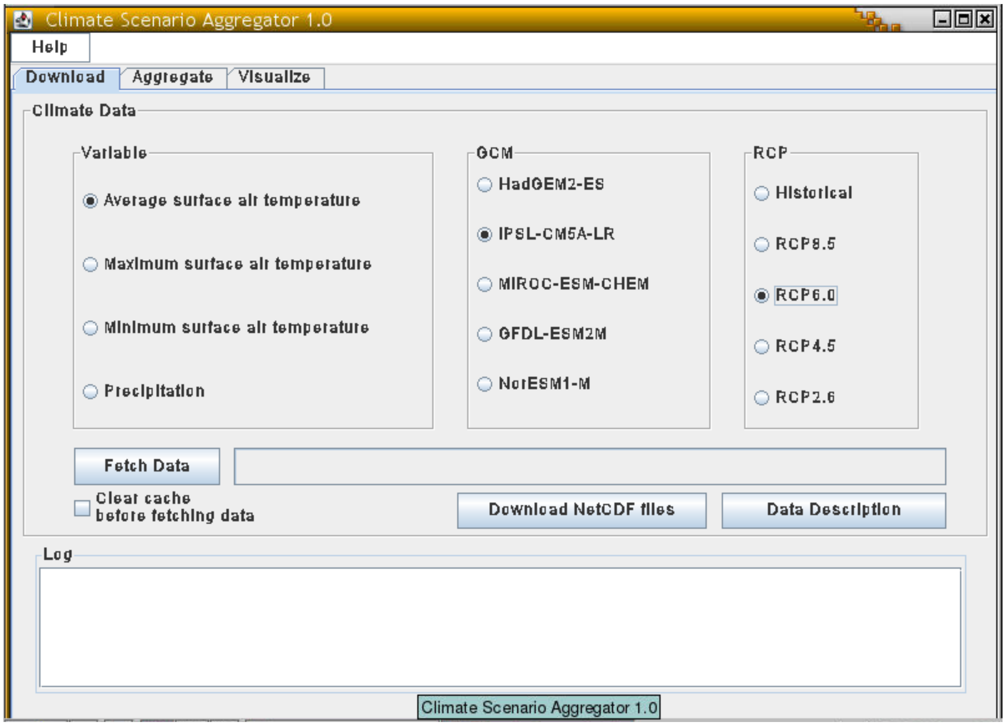

Figure 1: Climate Scenario Aggregator tool download tab. Interface for data selection and retrieval including climate model, variable, and RCP.

In order to facilitate documentation, the tool writes down a small text file with the basic information of the data (Variable, GCM, etc). This information can be accessed by clicking on the "Data Documentation" button. The climate files can be directly downloaded by clicking onf the "Download NetCDF files", which produces a zip file with all the files for the variable, GCM, and RCP selection. Alternatively, the data can be browsed and selected for aggregation as explained below.

Aggregation

The second tab offers aggregation options (see figure 2). As defaults, we provide a mapping from XY coordinates to ISO codes (file named WorldId.csv.) This mapping suits the needs of users wanting to aggregate to the country level. We also offer a mapping from XY coordinates to 18 national agroecological zones (Ctry18AezId.csv,) a format that should be handy for users of the GTAP-AEZ framework. Beyond these aggregation schemes, users can upload their own (using the upload button.) All that is required is a .csv file with four columns labeled "","lon","lat","id" where the first column (empty label) is just a column of row numbers, the second and third columns are longitudes and latitudes, and the fourth is the unit to which "lon" and "lat" are aggregated. For instance:

```
       lon , lat ,  id
1, -179.75, 65.25, RUS14
2, -179.75, 65.75, RUS14
3, -179.75, 66.25, RUS13
4, -179.75, 66.75, RUS13
```

```
5, -179.75, 67.25, RUS13
6, -179.75, 67.75, RUS13
7, -179.75, 68.25, RUS13
8, -179.75, 68.75, RUS13
```

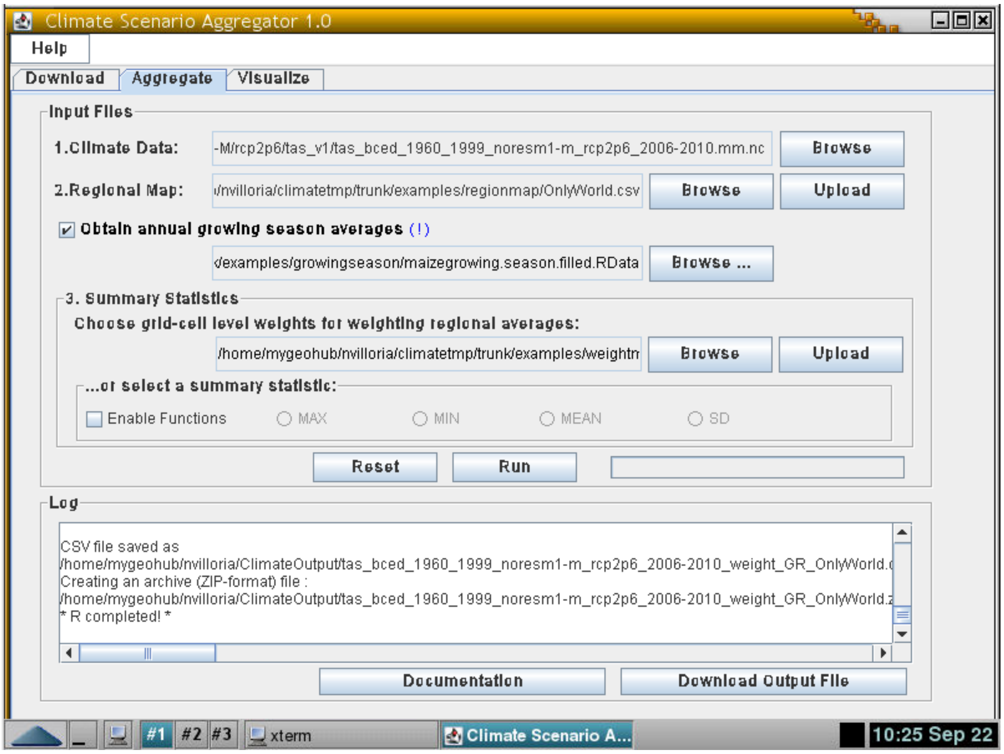

Figure 2: Climate Scenario Aggregator tool aggregation tab.

The "aggregation" tab also allows for either selecting or uploading a weighting map to create a weighted average yield, or if the user prefers, a summary statistic (mean, standard deviation, max and min). For convenience, we have provided grid-cell level yields and harvested area from Monfreda, Ramankutty, and Foley (2008), but the user could upload alternative weighting schemes (e.g., gridded population.) As before, these files should be in plain, standard comma separated value format, with the following labels "","lon","lat","weight", where the first column (empty label) is just a column of row names. Once these options are selected, the user can run the underlying aggregating R script and either download the data, or proceed to the visualization tab (only functional for country level aggregations.)

Self Documentation, Attributions, and Visualization

The aggregation tab also includes the option to download the suggested citation along with the reference used in the process (figure 3). To visualize a given file, "Browse" the directory to select the source file (extension should be csv) and click on "Create". Wait until the message "Map Generated!" appears. The slider on the right allows moving across the years in the csv file.

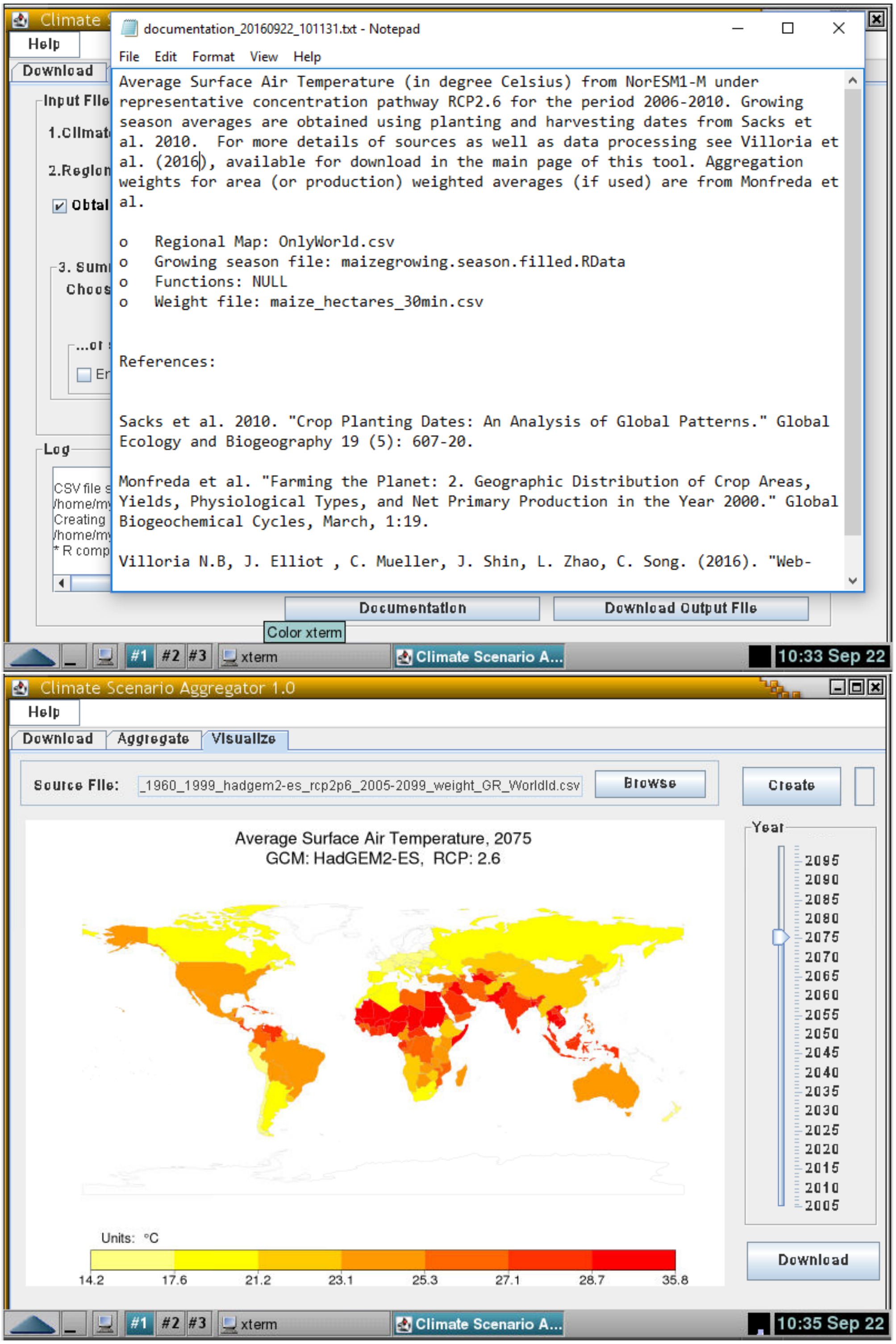

Figure 3: Climate Scenario Aggregator tool visualization, self-documentation and metadata.

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