The AgMIP Tool @ GEOSHARE: A GEOSHARE Tool for Aggregating Outputs from the AgMIP's Global Gridded Crop Modeling Initiative (Ag-GRID)
User's Manual

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Users of the Ag-GRID data obtained through this GEOSHARE tool should cite this work as: Villoria N.B, J. Elliot , C. Müller, J. Shin, L. Zhao, C. Song. (2014). Rapid aggregation of globally gridded crop model outputs to facilitate cross-disciplinary analysis of climate change impacts in agriculture. *Under Review.* Data tool accessible at url: `https://mygeohub.org/tools/agmip/`.

How to use the AgMIP tool

This tool is freely available at geoshareproject.org. Users need to register and then sign up for a free account. To access the tool, click on Resources | Tools. Then select "AgMIP Tool: A tool for aggregating..." | Launch Tool. (In order to access the GEOSHARE workspace, some users have reported the need to install a Java plug-in and/or adjust the Java security settings.) After clicking on "Launch Tool", the AgMIP tool should appear in the Hub workspace (see figure 1.)

Downloading AgMIP Gridded Outputs

The graphical user interface in figure 1 allows for selecting the following from the gridded archive the crop model, climate model, representative concentration pathway, socioeconomic pathways, whether the models include CO_2 fertilization and or irrigation, and finally the crop. Clicking on download connects the tool in GEOSHARE's HUBzero with Globus Online and transfers the selected archive to the workspace.

For each unique combination of scenarios and models there may be many files storing different years. Because of this, the tool will download all the files in the AgMIP archive whose name matches the options selected by the user. For instance, selecting pDSSAT | NorESM1-M | rcp2p6 | ssp2 | co2 | firr | rice, will download 10 files starting with the output for 2006-2010 until 2091-2099. The first of these would be named:

```
pdssat_noresm1-m_rcp2p6_ssp2_co2_firr_yield_ric_annual_2006_2010.nc4
pdssat_noresm1-m_rcp2p6_ssp2_co2_firr_yield_ric_annual_2011_ ...
```

and so forth. The downloaded files are stored in a string of subdirectories below "upload_area," which in turn are named after these options:

```
\pdssat\noresm1-m\rcp2p6\ssp2\co2\firr\rice\
```

These files can be browsed and selected for aggregation as explained below.

Aggregation

The second tab (figure 2) offers aggregation options. 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
```

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 and Attributions

The aggregation tab also includes the option to download the suggested citation along with the reference used in the process. For instance, for an aggregation that obtains the minimum values of simulated historical (1951-1960) minimum yields using the pDSSAT model, the tool self documents the different choices, producing the the following text:

```
Maize yields for the period 1951-1960 generated by the pDSSAT crop
model using climate data from the Hadgem2-es GCM under
representative concentration pathway hist (scenario SSP2) without
irrigation and with CO2 fertilization as documented in
\citet{Rosenzweig2014}, \citet{Elliott2014}, \citet{Nelson2014}, and
\citet{Muller2014}; These yields are country level weighted averages
values using as weights harvested area from \citet{Monfreda2008}
aggregated by the AgMIP Tool \citep{Villoria2014},
```

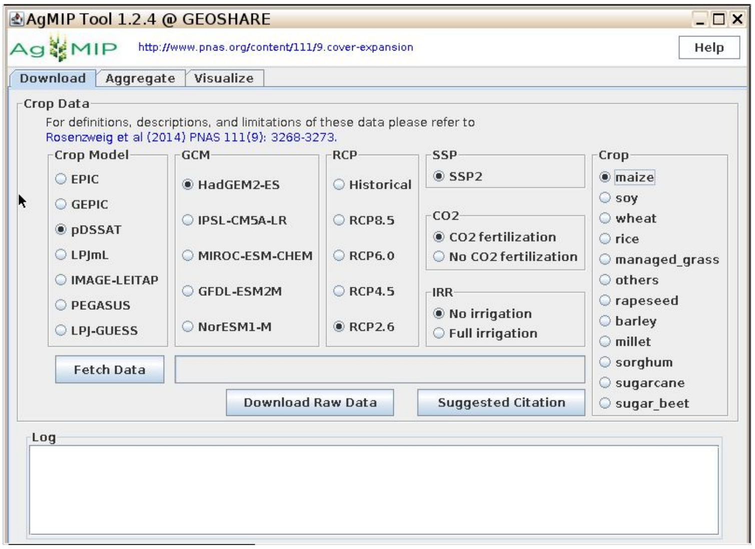
which is followed by a list of the references mentioned.

Visualization

Figure 3 shows the visualization tab, which at this point is only available for country level aggregations. 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.

References

Monfreda, C., N. Ramankutty, and J.A. Foley. 2008. “Farming the Planet: 2. Geographic Distribution of Crop Areas, Yields, Physiological Types, and Net Primary Production in the Year 2000.” *Global Biogeochemical Cycles*, Mar., pp. 1:19.



http://www.pnas.org/content/111/9.cover-expansion

Crop Data

For definitions, descriptions, and limitations of these data please refer to
Rosenzweig et al (2014) PNAS 111(9): 3268-3273.

Crop Model
- ○ EPIC
- ○ GEPIC
- ● pDSSAT
- ○ LPJmL
- ○ IMAGE-LEITAP
- ○ PEGASUS
- ○ LPJ-GUESS

GCM
- ● HadGEM2-ES
- ○ IPSL-CM5A-LR
- ○ MIROC-ESM-CHEM
- ○ GFDL-ESM2M
- ○ NorESM1-M

RCP
- ○ Historical
- ○ RCP8.5
- ○ RCP6.0
- ○ RCP4.5
- ● RCP2.6

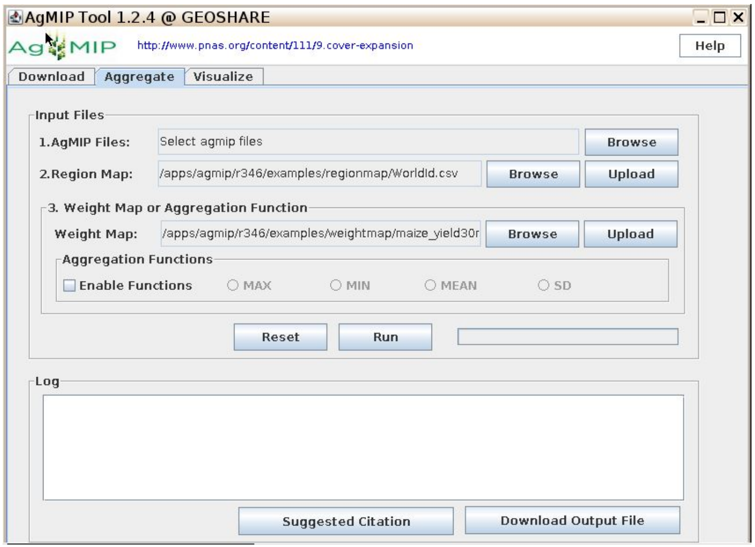
SSP
- ● SSP2

CO2
- ● CO2 fertilization
- ○ No CO2 fertilization

IRR
- ● No irrigation
- ○ Full irrigation

Crop
- ● maize
- ○ soy
- ○ wheat
- ○ rice
- ○ managed_grass
- ○ others
- ○ rapeseed
- ○ barley
- ○ millet
- ○ sorghum
- ○ sugarcane
- ○ sugar_beet

Figure 1: Graphical user Interface of the AgMIP Tool: Output Selection



http://www.pnas.org/content/111/9.cover-expansion

Input Files

1.AgMIP Files: Select agmip files

2.Region Map: /apps/agmip/r346/examples/regionmap/Worldid.csv

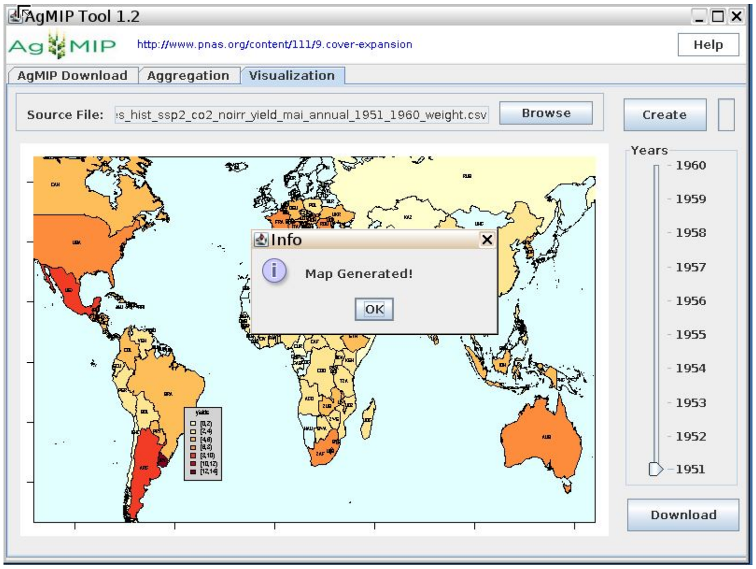
3. Weight Map or Aggregation Function

Weight Map: /apps/agmip/r346/examples/weightmap/maize_yield30r

Aggregation Functions

☐ Enable Functions ○ MAX ○ MIN ○ MEAN ○ SD

Figure 2: Graphical user Interface of the AgMIP Tool: Aggregation Options


AgMIP Tool 1.2

http://www.pnas.org/content/111/9.cover-expansion

Source File: :s_hist_ssp2_co2_noirr_yield_mai_annual_1951_1960_weight.csv

Info

Map Generated!

Figure 3: Graphical user Interface of the AgMIP Tool: Visualization Options