A global SWAT-LTE (Lite) model

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TAMUS, Purdue, USDA-ARS, EAWAG, Baylor

Global SWAT-LTE Setup

Using readily available data such as:

- ✓ Subbasins 10km X 10km gridded
- ✓ 30 – arcsecond DEM (1km)
- ✓ Landsat global landuse data at (1km) (http://data.ess.tsinghua.edu.cn/)
- ✓ Global soils data (FAO-Karim) (1:1M)
- ✓ Global weather generator data (CFSR, swat.tamu.edu) (177,000)
- ✓ SWAT-LTE model

SWAT-LTE
(new name?)

SWAT-LTE (new modular code)

Includes 2 spatial objects:

* HRU – LTE - EZ
* CHANNEL

SWAT-LTE HRU

<u>HRU</u>

- Simple water balance uses curve number approach
- Hargreaves and Priestley Taylor ET
- Includes basic plant growth using plants.plt database
- Auto Irrigation
- MUSLE to estimate sediment yield
- All the data is on one line in a file for each HRU

SWAT-LTE CHANNEL

<u>CHANNEL</u>

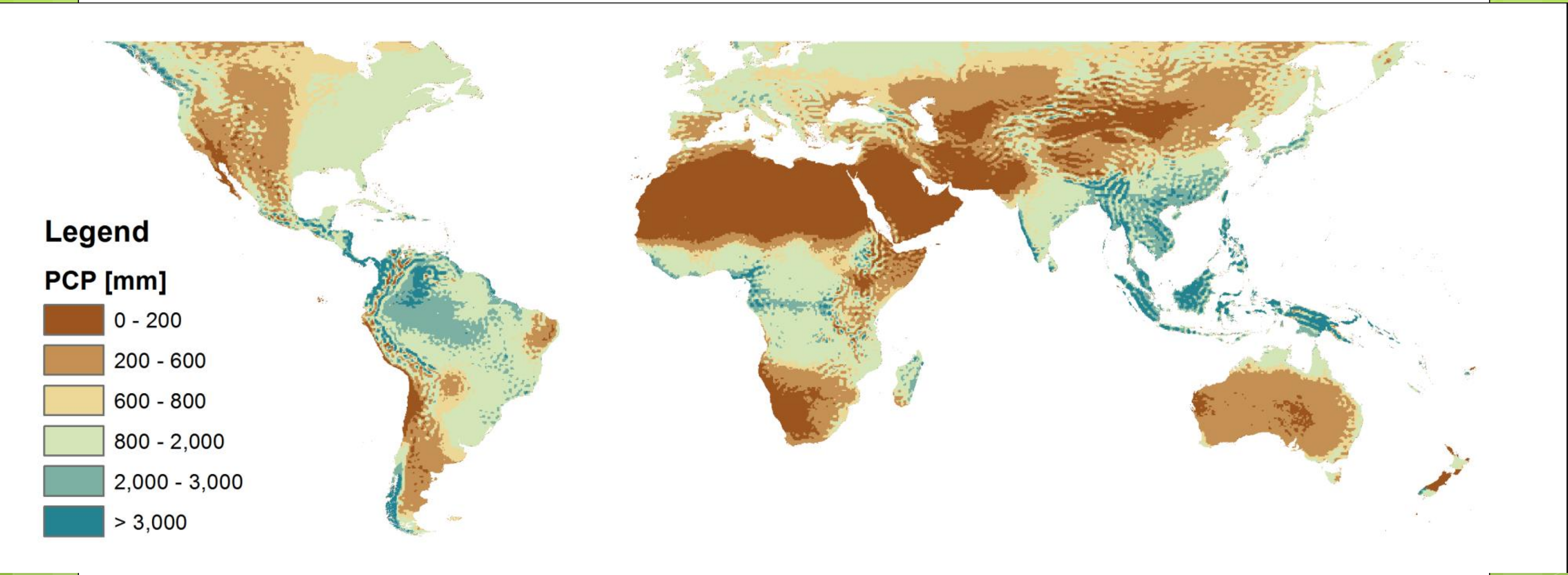
- Channel morphology
- Down cutting and widening
- Gully component with head cut

The plan is to use SWAT-LTE channel for gullies and first-order streams and use current channel for larger floodplains

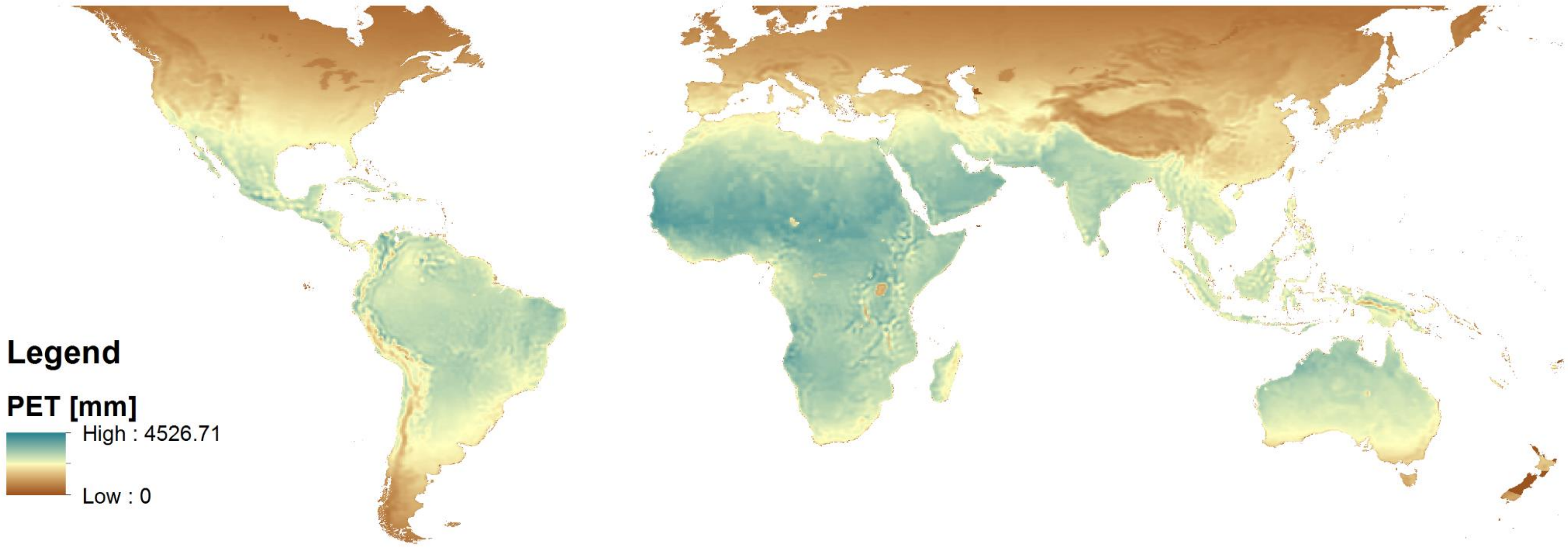
Global Model Subbasins (10km vs 1km)

Continent	Number of grid cells (10 km resolution) [*1,000]	Number of grid cells (1 km resolution) [*1,000,000]
Africa	367	37
Asia	463	46
Australia	103	10
Central America	33	3
Europe	233	23
North America	238	24
South America	223	22
Total	**1,661**	**166**

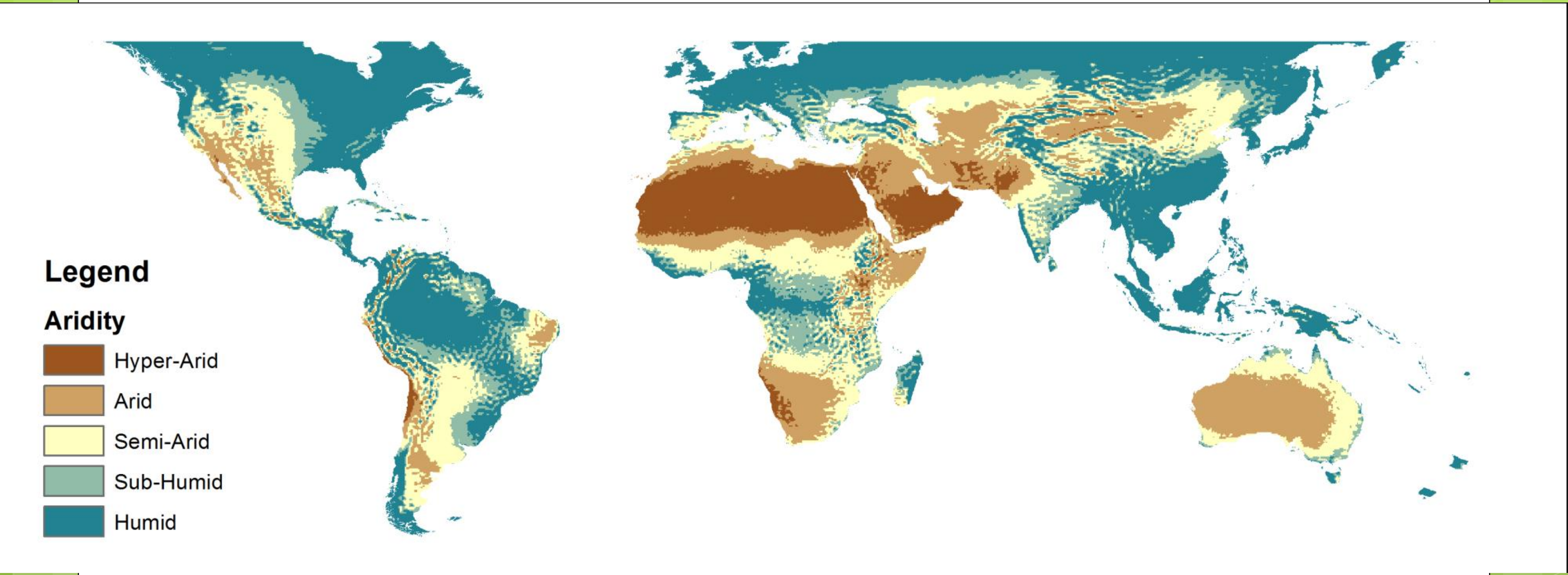
Average Annual Precipitation



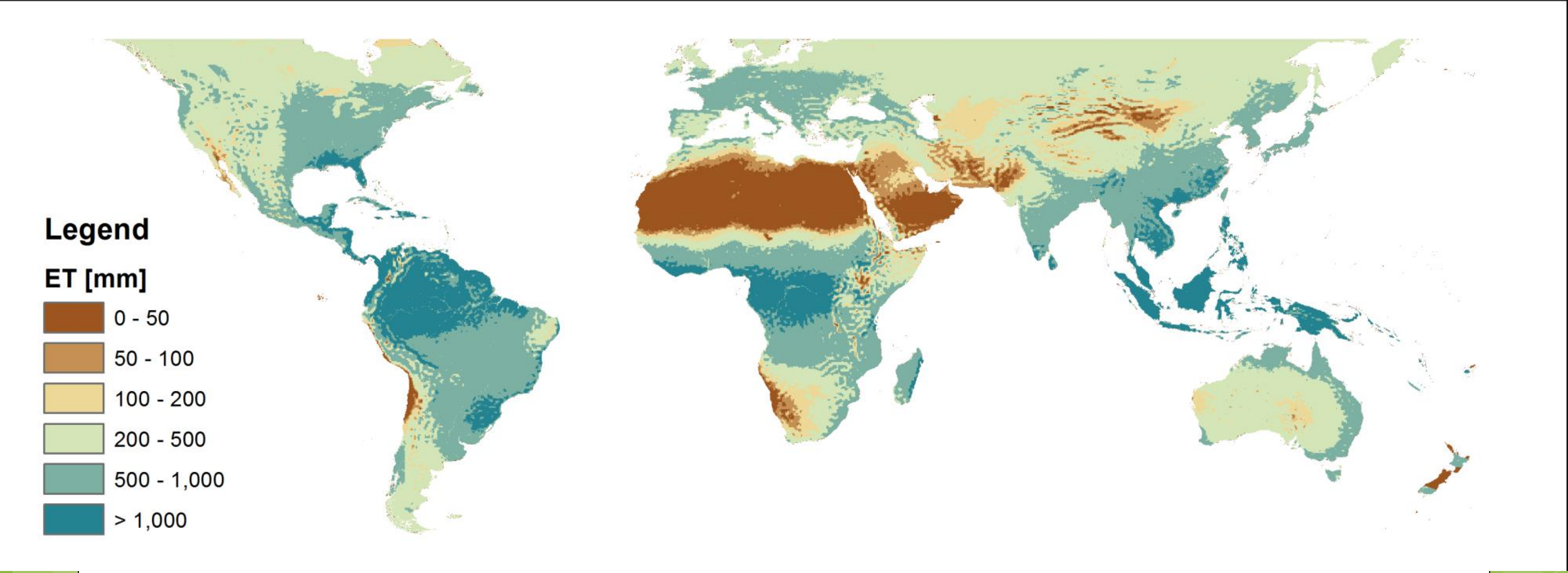
Potential Evapotranspiration



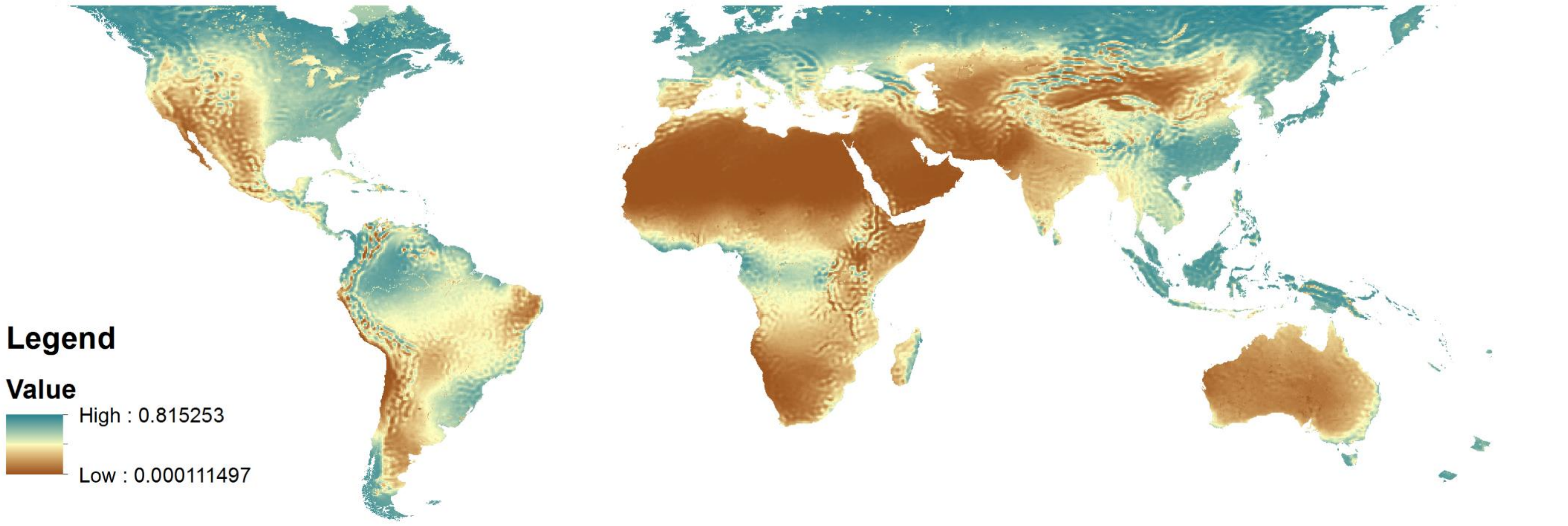
Aridity Index (Precipitation/PET)



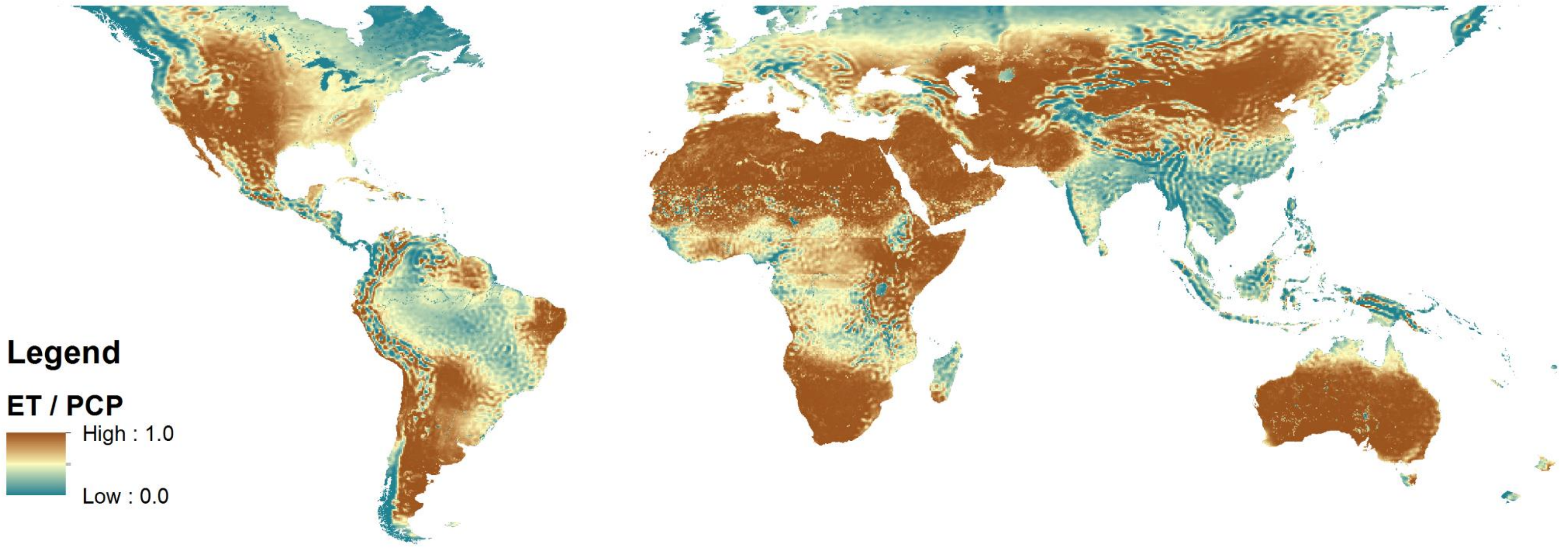
Evapotranspiration (Green Water Flow)



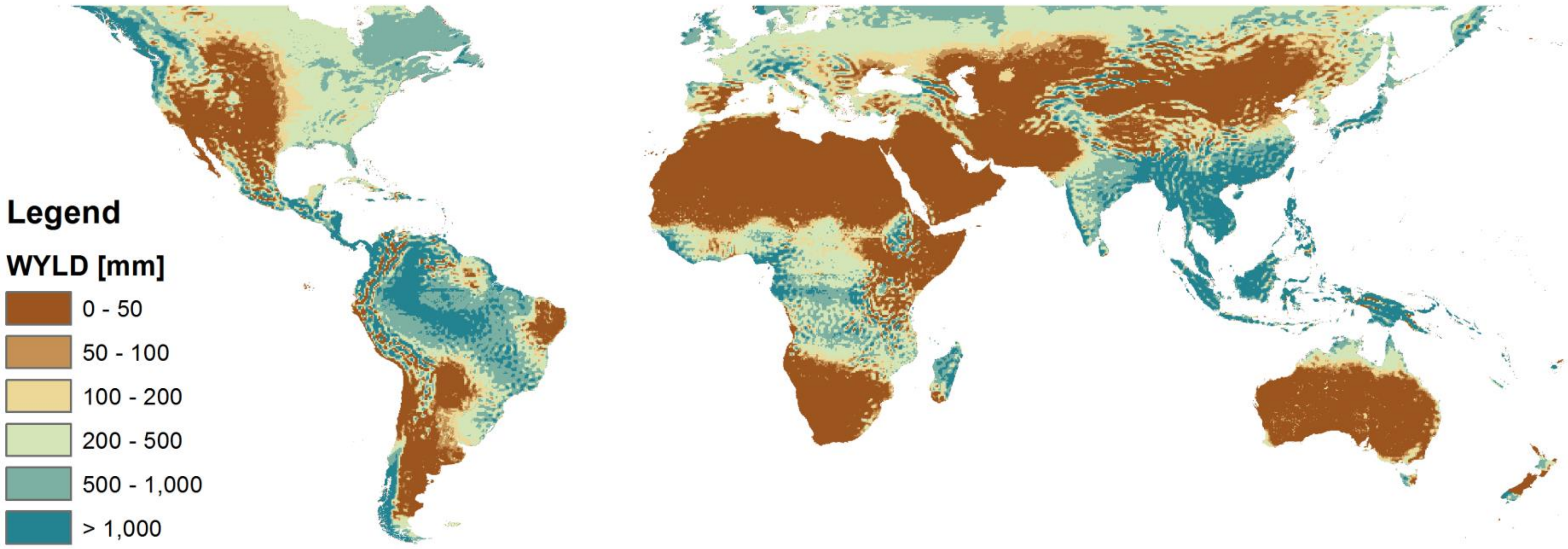
Ratio of ET/PET



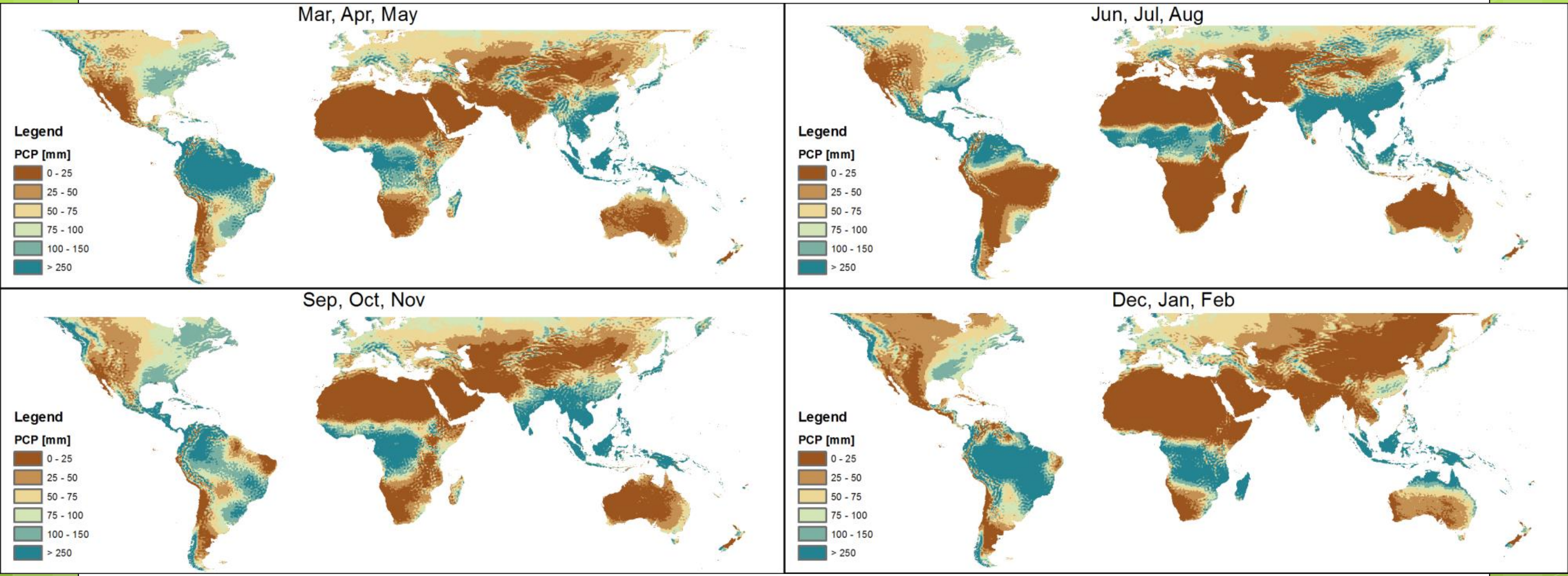
Ratio of ET/Precipitation



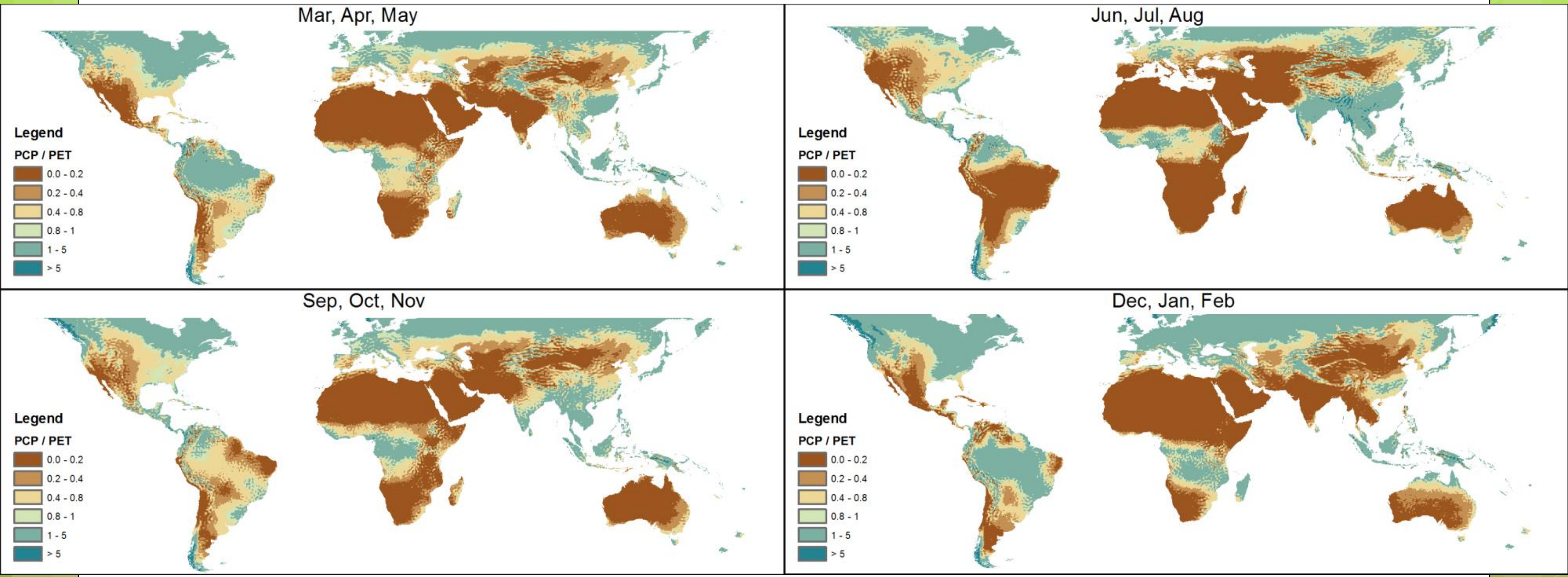
Water Yield (Blue Water)



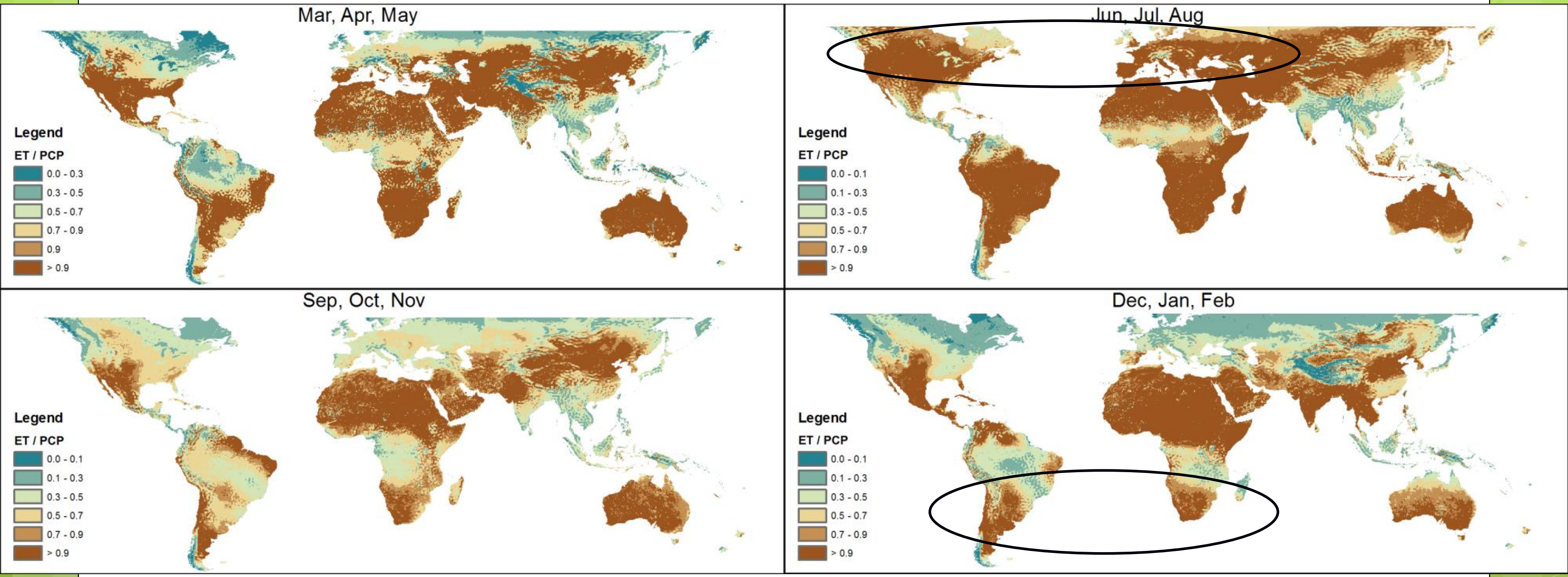
Seasonal Precipitation



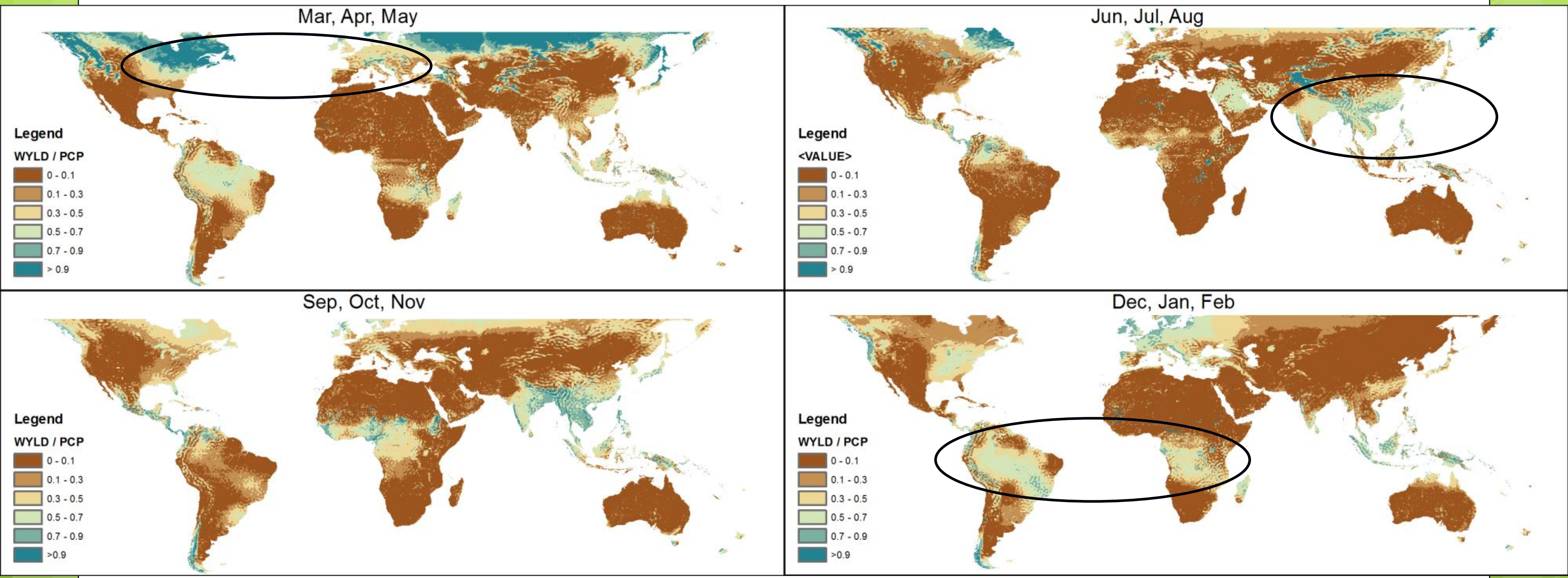
Seasonal Aridity Index (Precipitation/PET)



Seasonal ET/Precipitation



Seasonal WYLD/Precipitation



Preliminary Results

Results need to be calibrated and Validated:

- ✓ Will setup SWAT-LTE-CUP and use WaterGap and/or FAO estimate for calibration (Karim)
- ✓ Develop new applications for simple and regional/continental/global application on water appropriation/allocation/ distribution (landuse change, climate change, population demand, food, water and energy security, virtual water trade)
- ✓ Develop Webbased application and allow users to download any parts of the world to model with more detailed datasets/refined inputs and compare with refined observed data
- ✓ Develop 1km resolutoin country level data and global model and serve through web-services (need lot of help from all of you)
- ✓ Global weather data (CFSR, swat.tamu.edu) (177,000)
- ✓ SWAT-LTE model (vegetation, sediment outputs)

Ideas for calibration/validation

- ✓ Will setup SWAT-LTE-CUP for calibration
- ✓ Use MODIS and other available remote sensing products to guide to calibrate ET and LAI if possible at long term average and monthly averages of available data
- ✓ use WaterGap and/or FAO estimate for checking blue water availability(Karim)
- ✓ Develop 1km resolutoin country level data and global model and serve through web-services (need lot of help from all of you)
- ✓ Global weather data (CFSR, swat.tamu.edu) (177,000)
- ✓ Other global weather data could be explored also (Michael Strauch)
- ✓ High resolution (1KM) harmonized soils database could be used to setup the global model (Balaji Narashimhan)
- ✓ SWAT-LTE model (vegetation, sediment outputs)