Workflows to accelerate preparing data for input to hydrologic models – DataNet Federation Consortium (DFC)

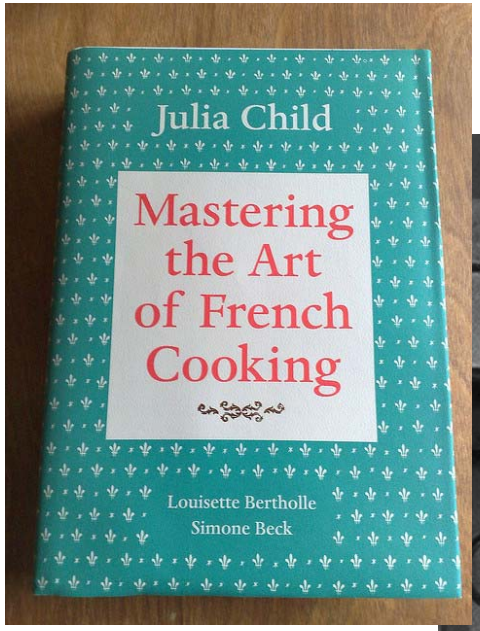
W. Christopher Lenhardt

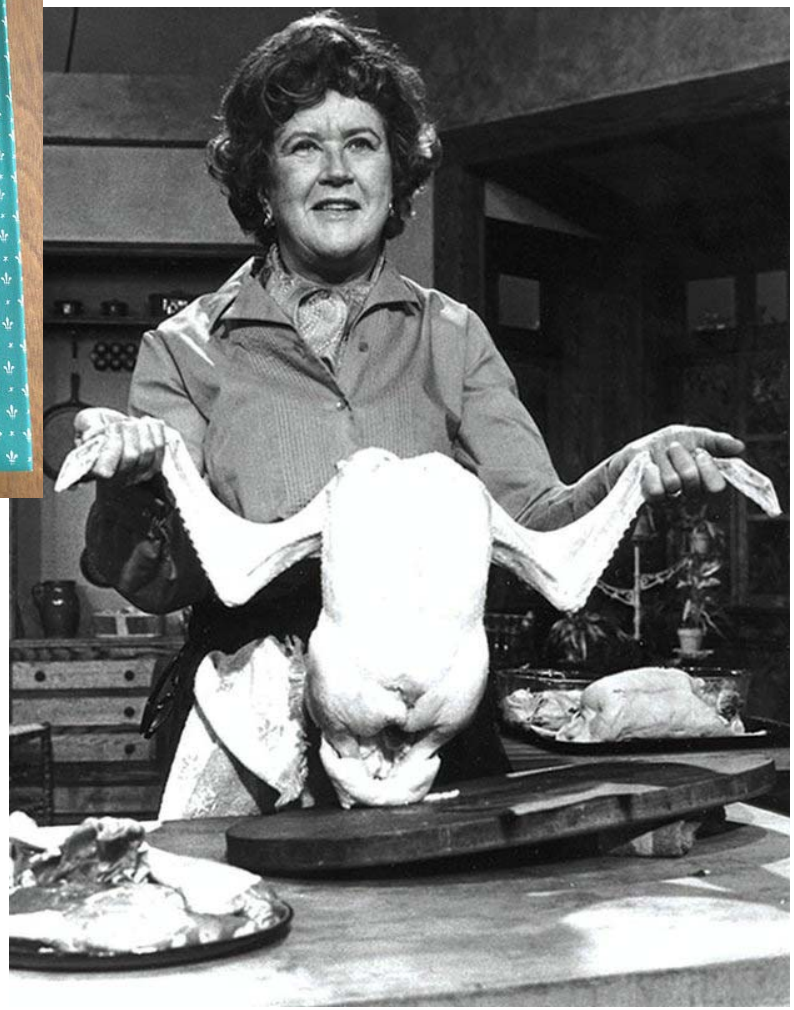
RENCI

BronyCon

Spaghetti

Julia Child





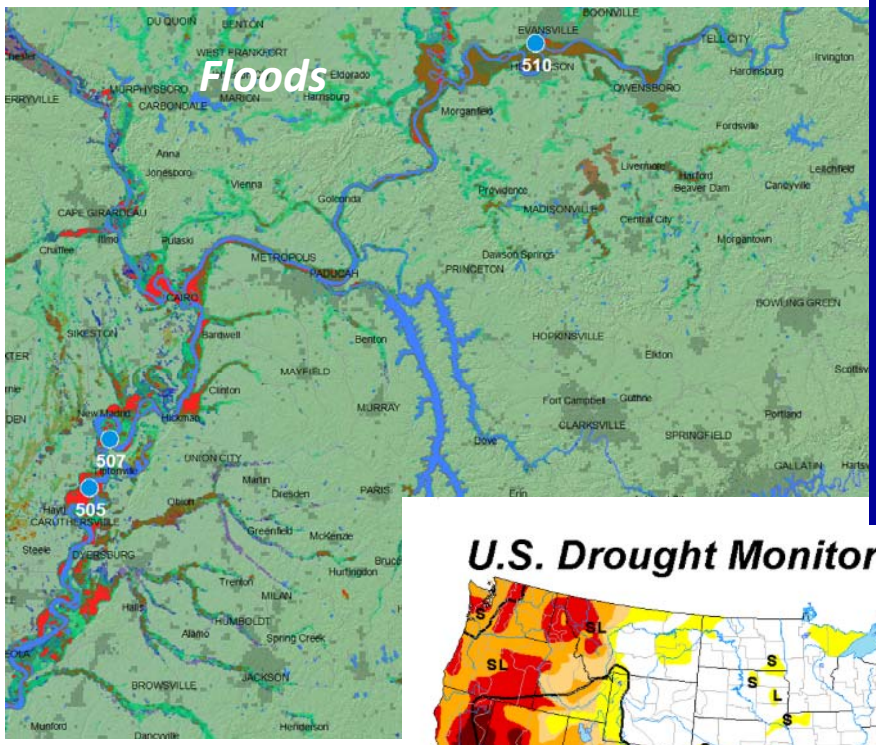
"Anyone can cook in the French manner anywhere, with the right instruction….Although you will perform with different ingredients for different dishes, the same general processes are repeated over and over again….As you enlarge your repertoire, you will find that the seemingly endless babble of recipes begins to fall rather neatly into groups of theme and variations." Forward, p xxiv, 2001 edition.

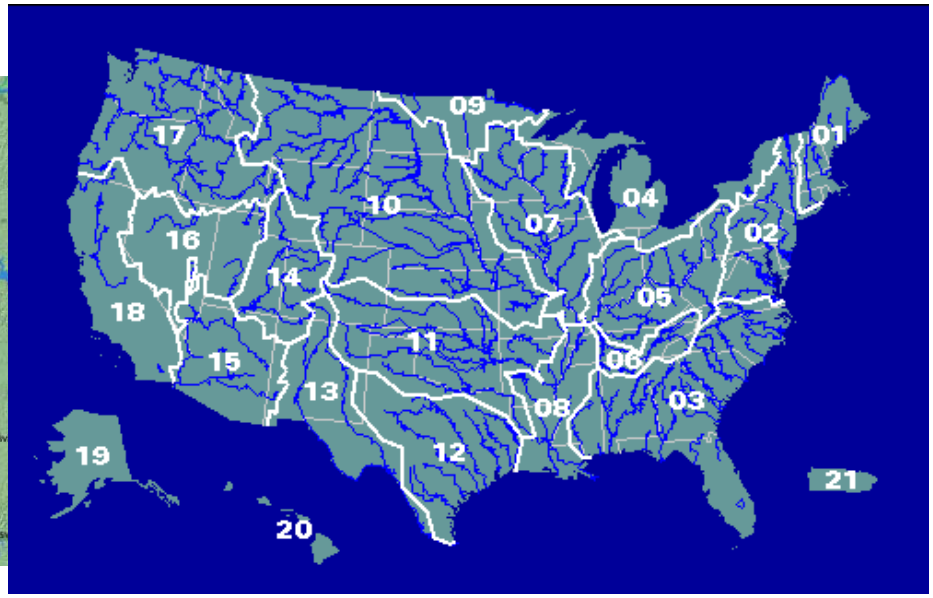
https://kpbs.media.clients.ellingtoncms.com/img/photos/2012/08/08/julia_turkey_tx800.jpg?aae402d4163f394116c3dd6e602f75682c526327

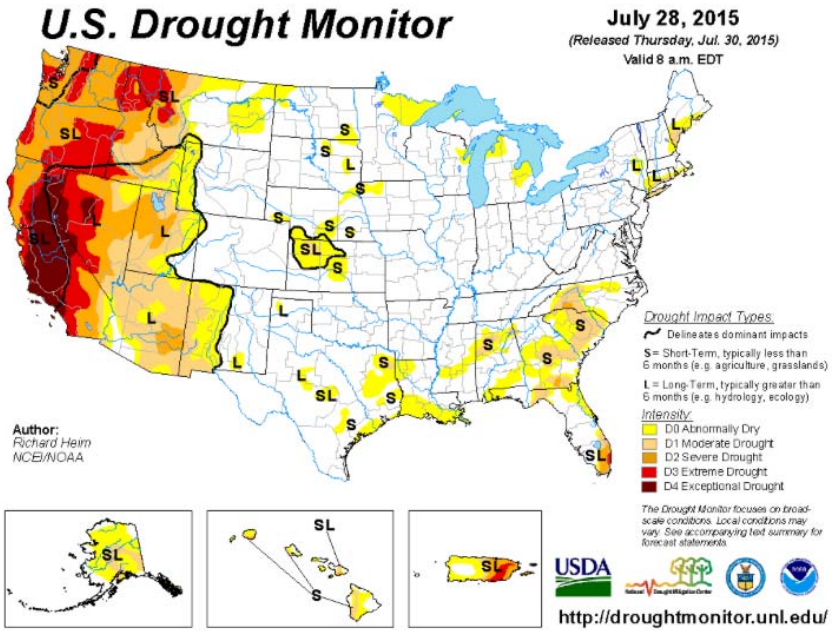
Did you know - Julia Child was a spy?

Office of Strategic Services

Mis en place

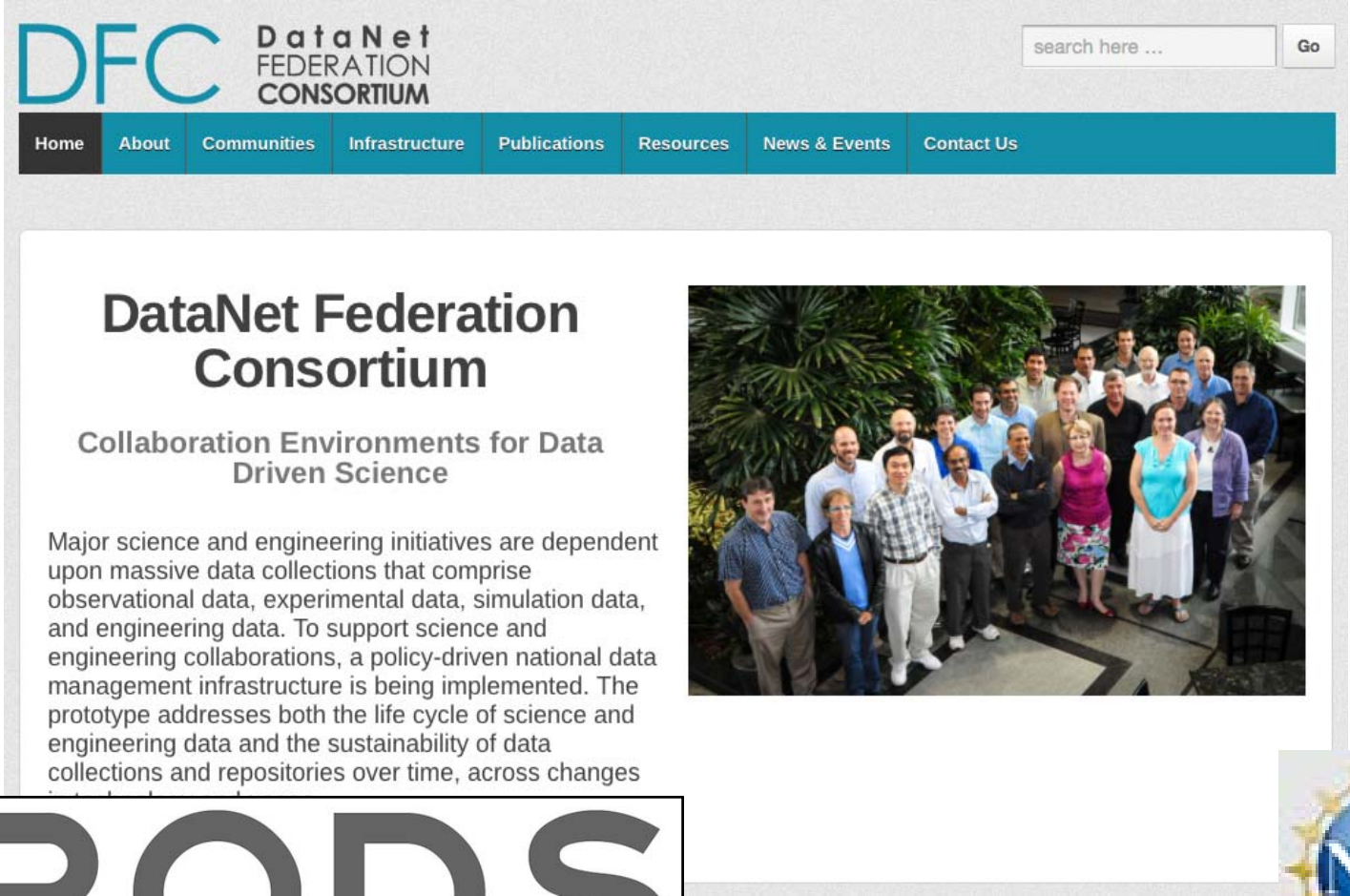






NOTE: To view regional drought conditions, click on map above. State maps can be accessed from regional maps.

DataNet Federation Consortium (DFC)



iRODS

NSF

NSF Grant Number OCI 0940841

DFC Partners

HydroShare

HYDROSHARE

Scientific Observatory Network

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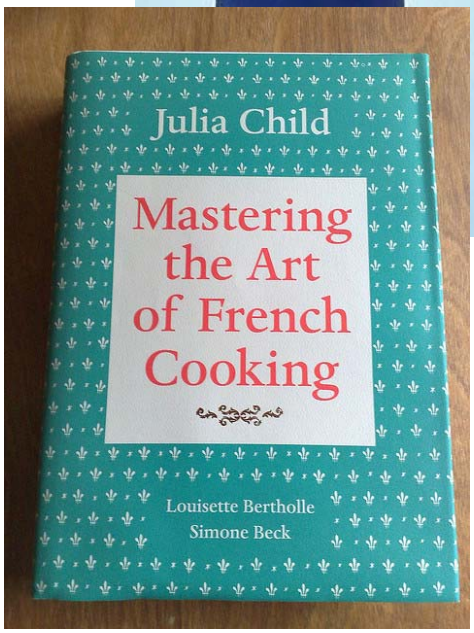
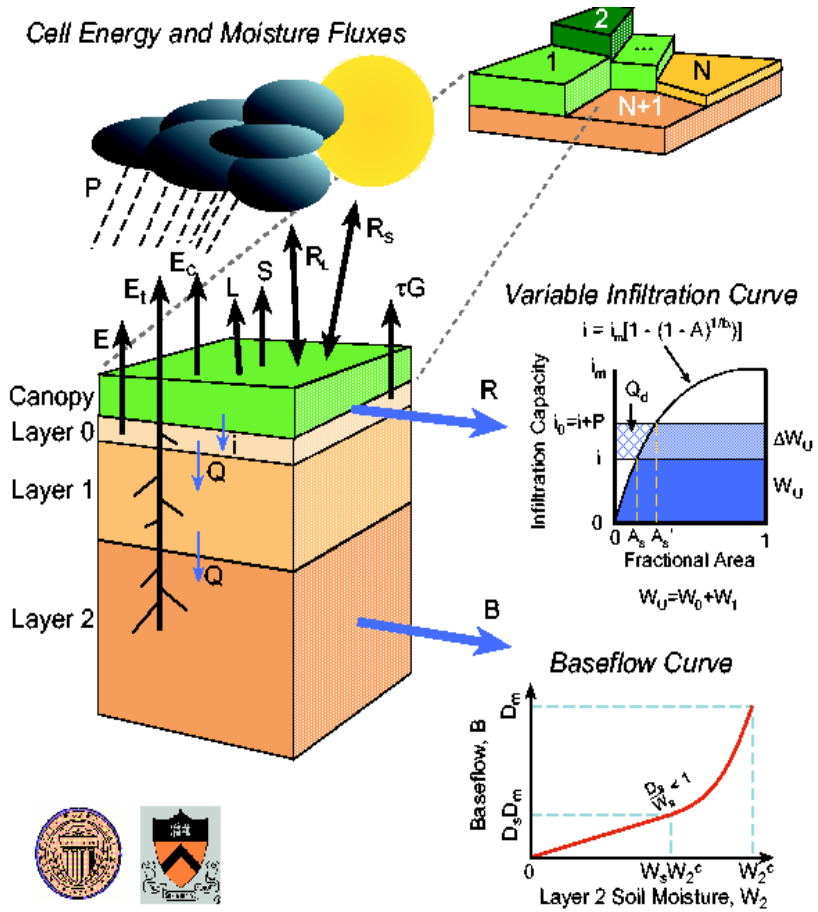


Collaboration environments for data driven science.

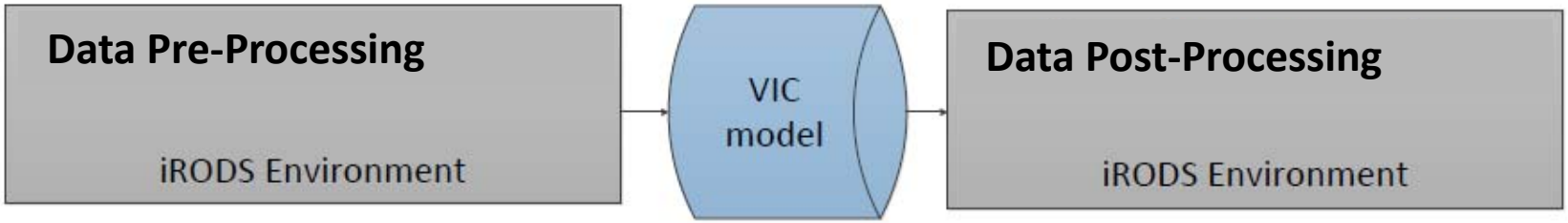
VIC Hydrologic Model

- Variable Infiltration Capacity (VIC) Model
- Developed at University of Washington/Princeton University
- Widely used for macro-scale hydrologic modeling



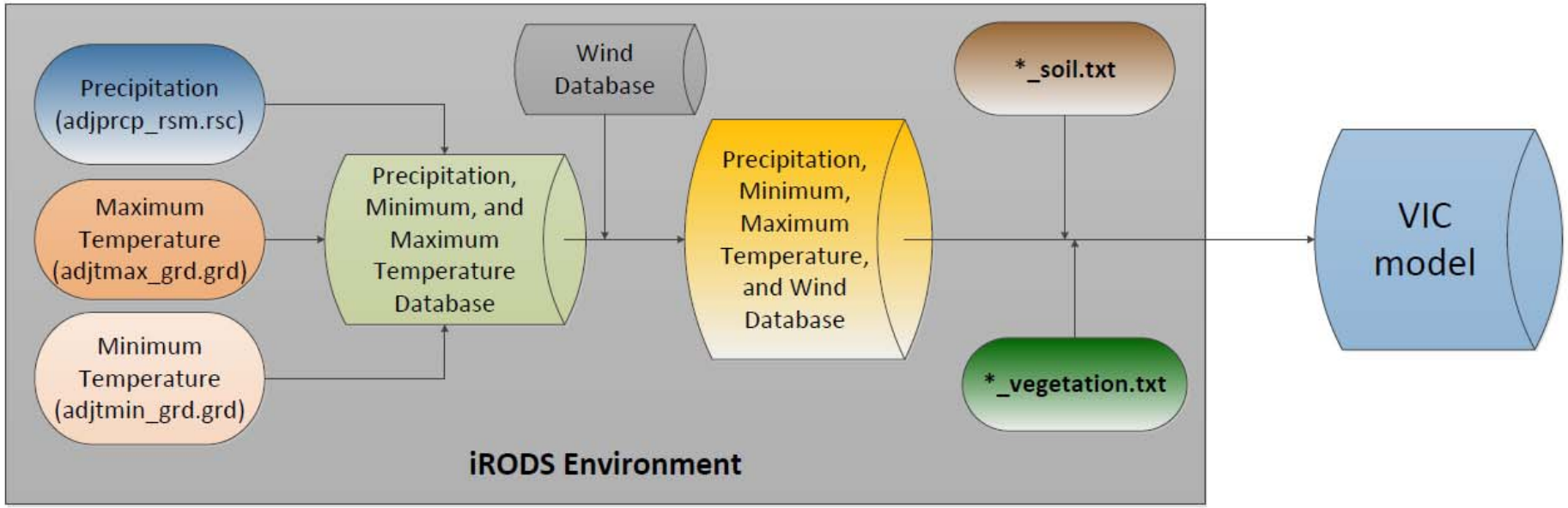
Source : Gao et al. (2009)

Precipitation data processing



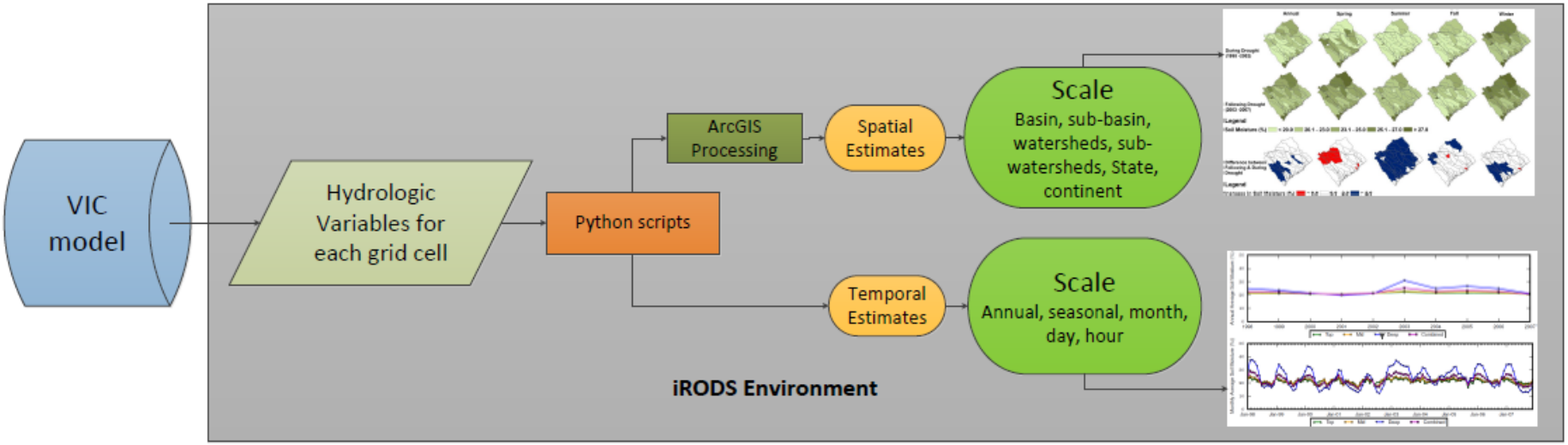
- Pre-processing data
  - Gridding, rescaling, etc.
- Run VIC model simulation
- Post processing of data
  - Summarize model output; create maps, figures, etc.

Data Pre-Processing for VIC



- Meteorological data are processed and combined into one dataset for each grid cell
- Soil and vegetation data are processed for each grid cell

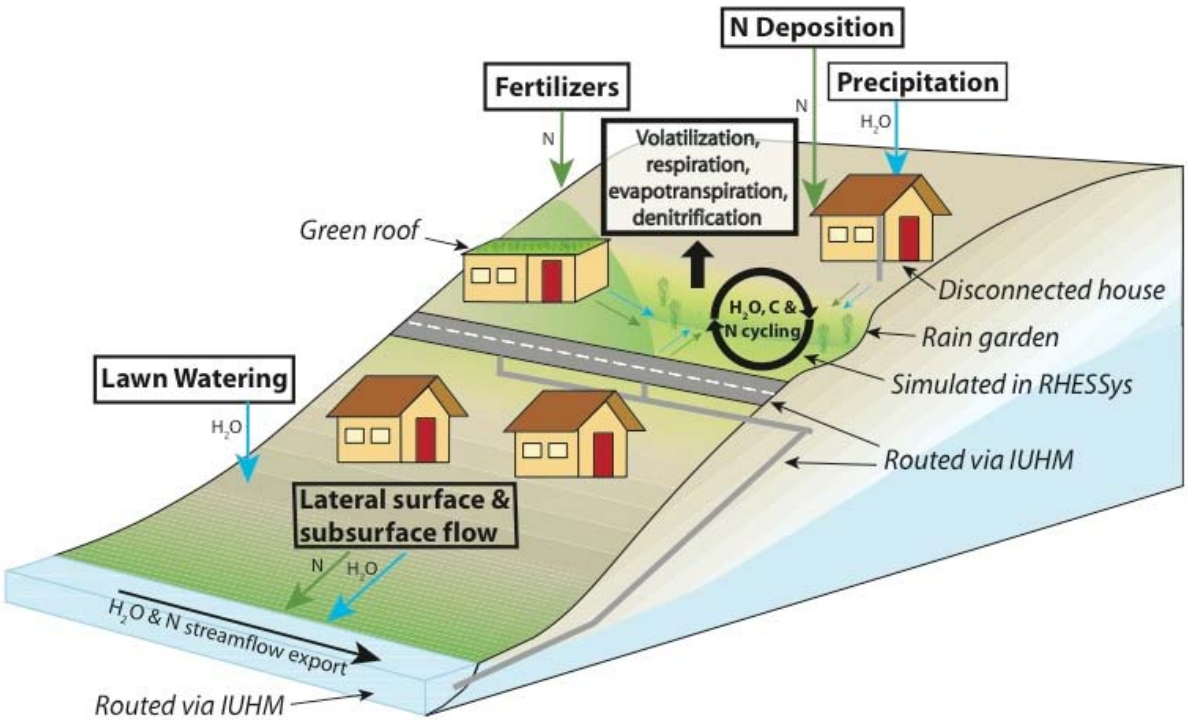
Data post-processing for VIC



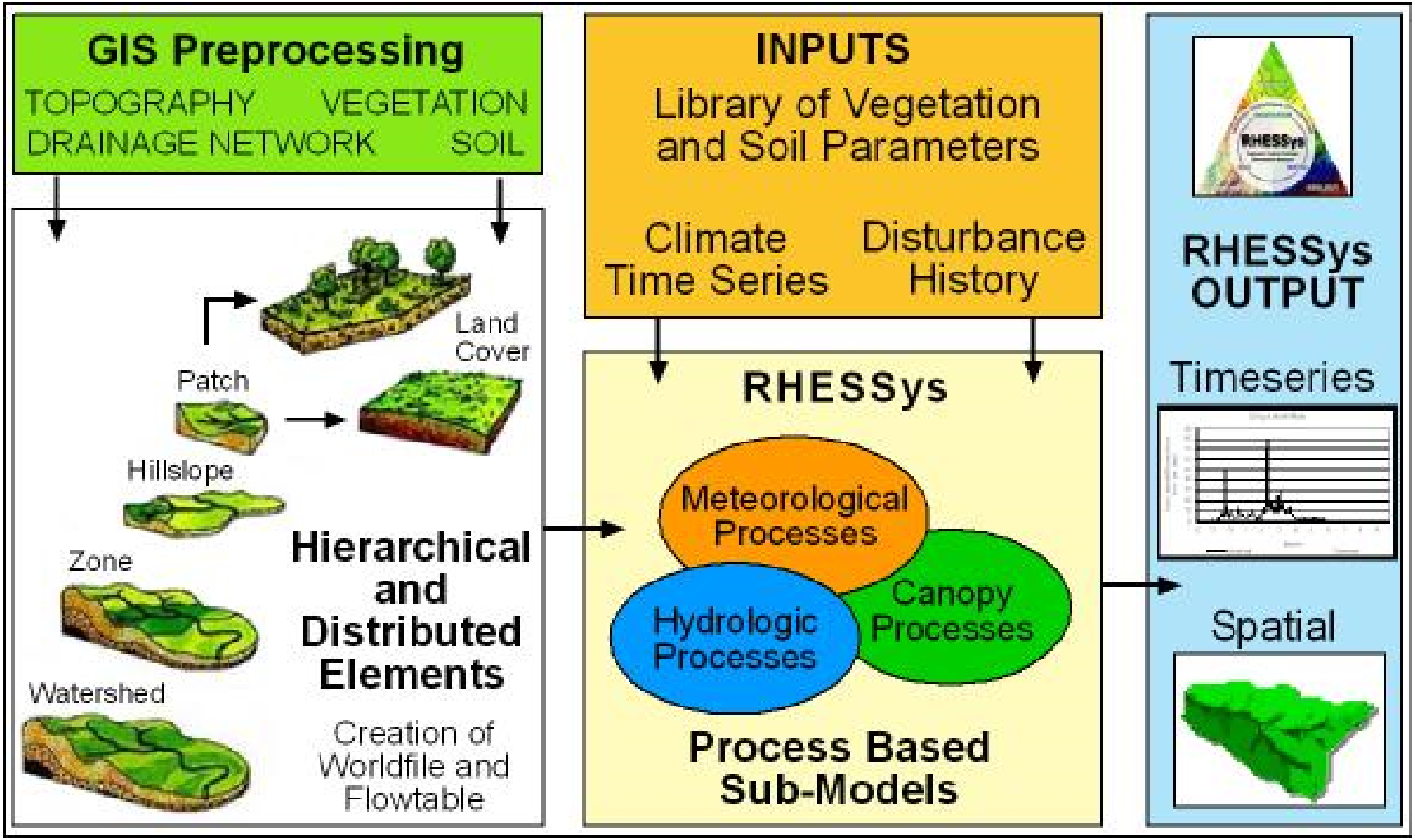
- Model output is analyzed through data processing scripts that generate visualizations and publication ready figures.

Hydrologic Science Goals: RHESSys (Regional Hydro-Ecological Simulation System)

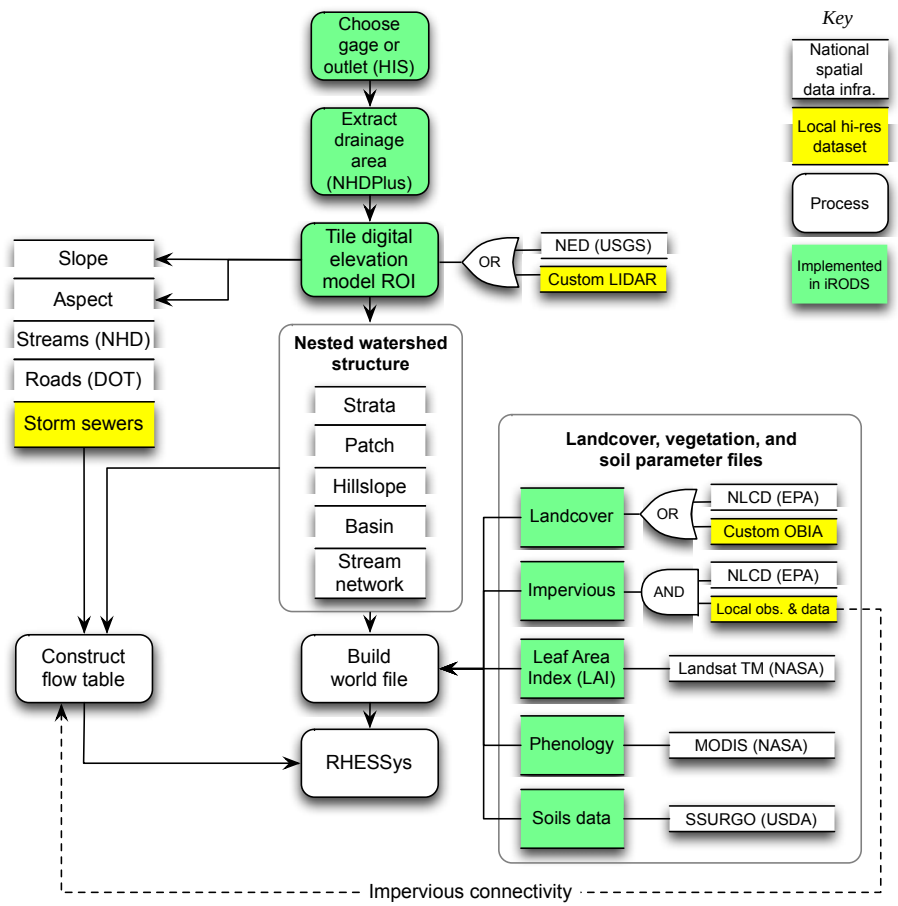
- Model water, carbon, and nutrient cycling in headwater catchments
  - Forested
  - Urban



RHESSys Hydrologic Model

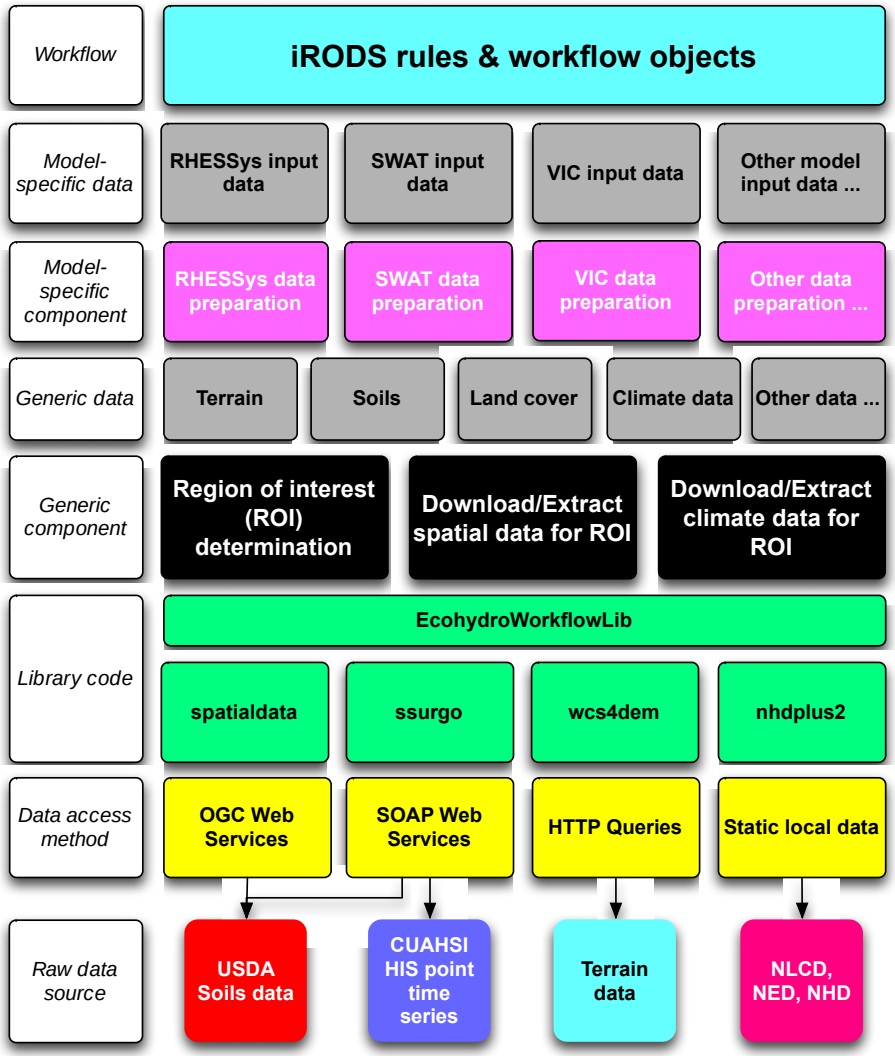


RHESSys data preparation: present and future



Manual workflows → Workflow framework

Ecohydrology data preparation software architecture



Bon apetit!

Thanks to Reagan Moore, Jon Goodall (co-PI), Mirza Billah (GRA), Larry Band (collaborator) & Brian Miles (GRA), and others for some of the material in this presentation.

Image Sources

- Slide #2
  - Julia Child (https://upload.wikimedia.org/wikipedia/commons/5/5c/Julia_Child.jpg)
  - Spaghetti (https://upload.wikimedia.org/wikipedia/commons/thumb/2/20/John%27s_Inc_Pizza_Spaghetti.jpg/800px-John%27s_Inc_Pizza_Spaghetti.jpg)
- Slide Julia Child (https://kpbs.media.clients.ellingtoncms.com/img/photos/2012/08/08/julia_turkey_tx800.jpg?aae402d4163f394116c3dd6e602f75682c526327)
- Shark (http://www.thestandarddaily.com/wp-content/uploads/2015/07/Shark.jpg)
- Mis en place (https://upload.wikimedia.org/wikipedia/commons/thumb/f/fa/Mise_en_place_for_hot_station.jpg/800px-Mise_en_place_for_hot_station.jpg)
- Spaghetti (https://pixabay.com/static/uploads/photo/2014/04/05/11/20/spaghetti-315189_640.jpg)
- Hydrology
  - HUC ("Huc region-edit" by USGS - Image: http://pubs.usgs.gov/wri/wri934076/usimage/huc_region.gif Website: http://pubs.usgs.gov/wri/wri934076/. Licensed under Public Domain via Wikimedia Commons - https://commons.wikimedia.org/wiki/File:Huc_region-edit.png#/media/File:Huc_region-edit.png)
  - Drought (http://droughtmonitor.unl.edu)
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