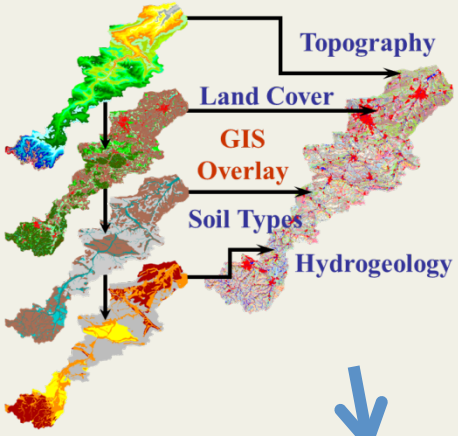
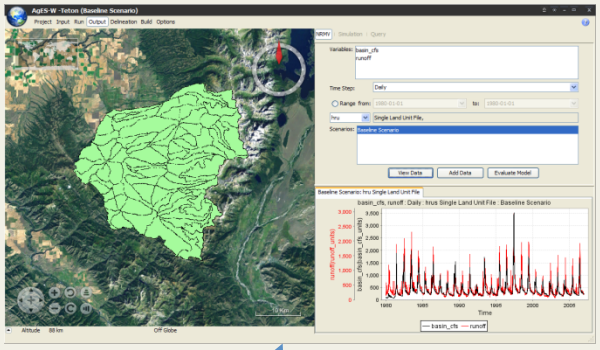
NWCC Forecast Modeling Toolbox

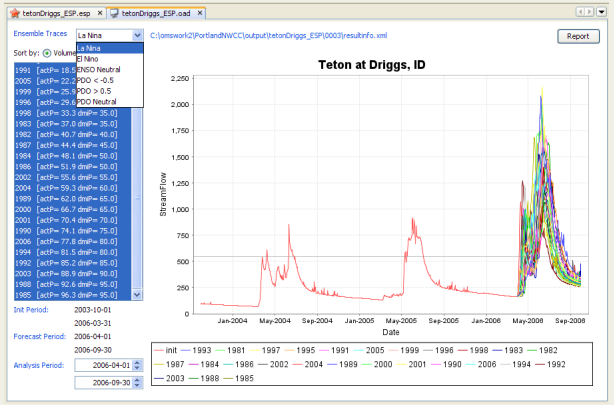
BAGIS H&P



Model Calibration & Analysis



ESP Raw Forecasts



Create & Update Data/Parameter Files

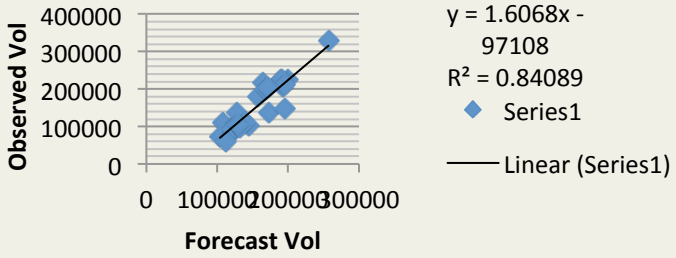
+

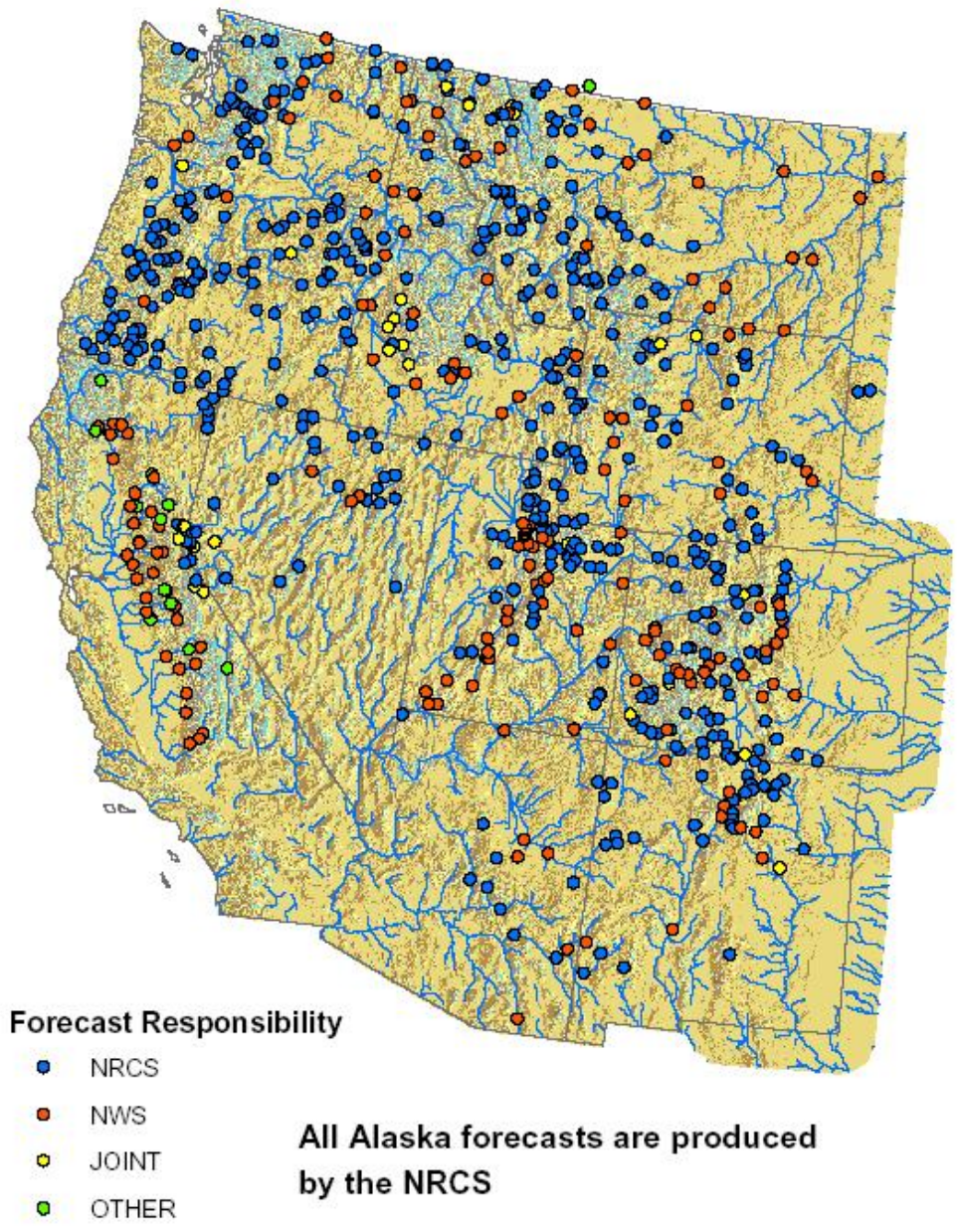
Climate Data
- ACIS
- SNOTEL

Streamflow Data
- USGS
- NWCC adjusted

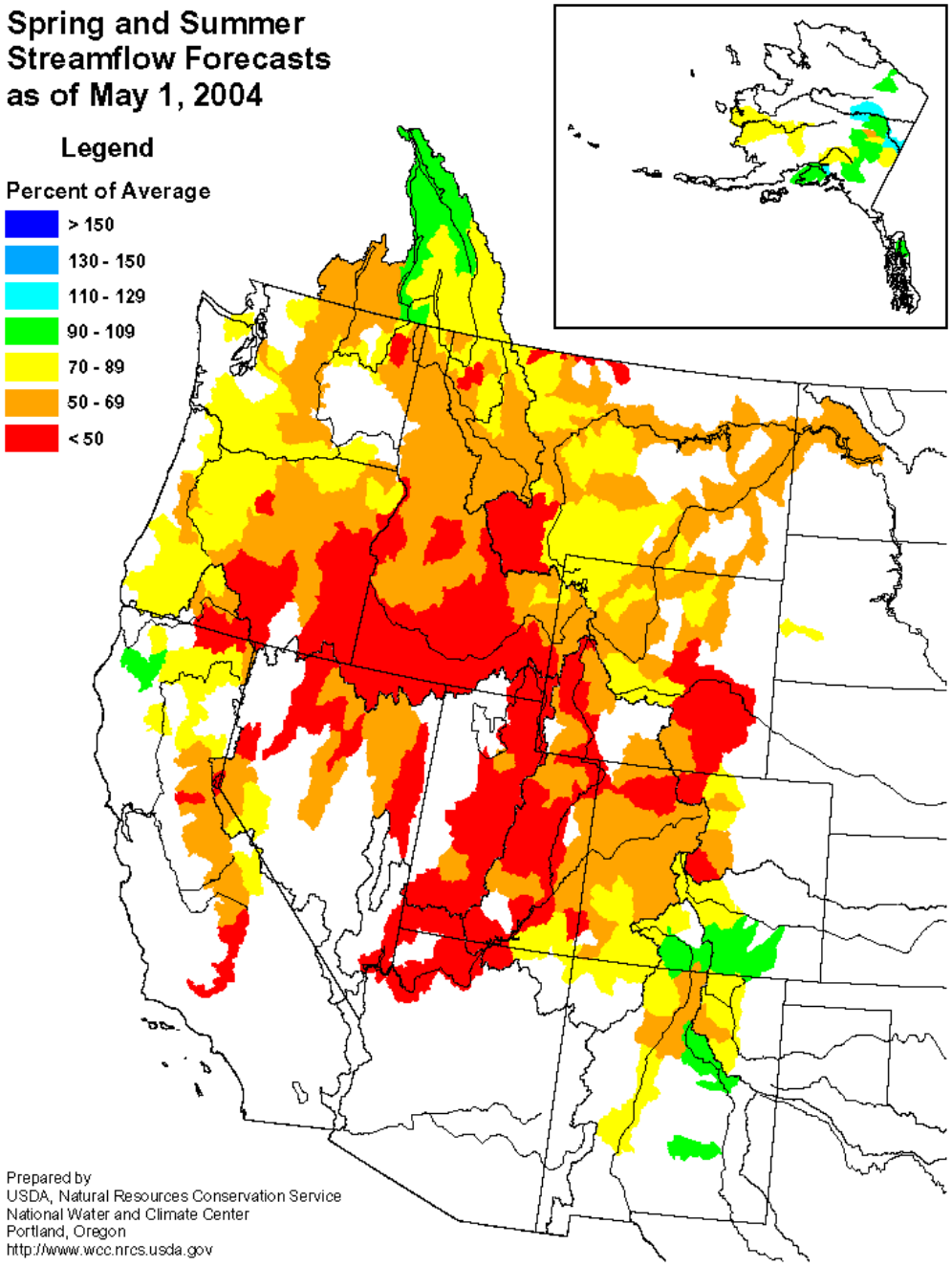
Debiased ESP Forecasts

Median Fcst vs Obs 1981 - 2010





Working with the Natural Resources Conservation Service (NRCS) to develop a streamflow forecasting toolbox using OMS and PRMS

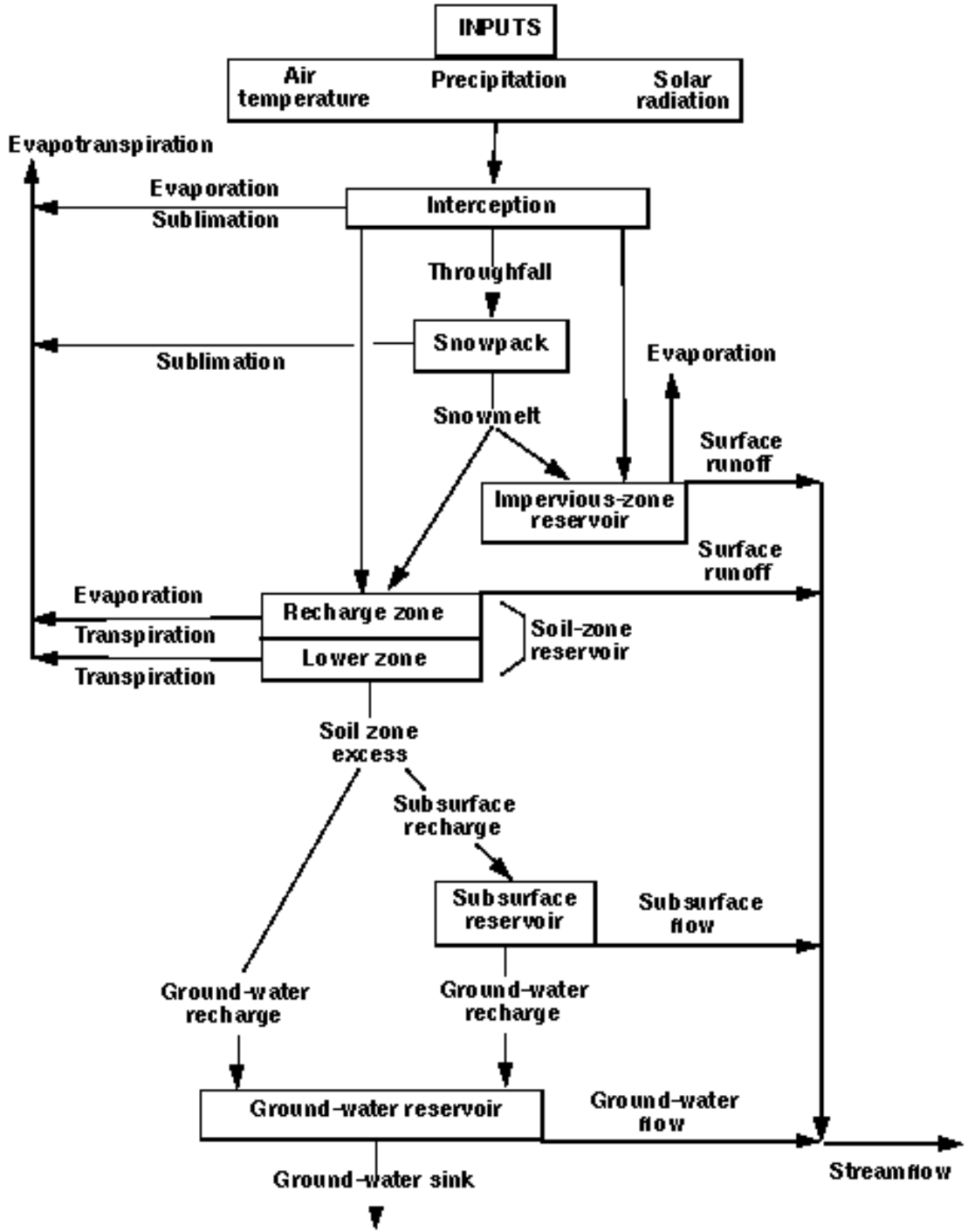


Water Supply Forecasts

Distributed by the Natural Resources Conservation Service (NRCS)

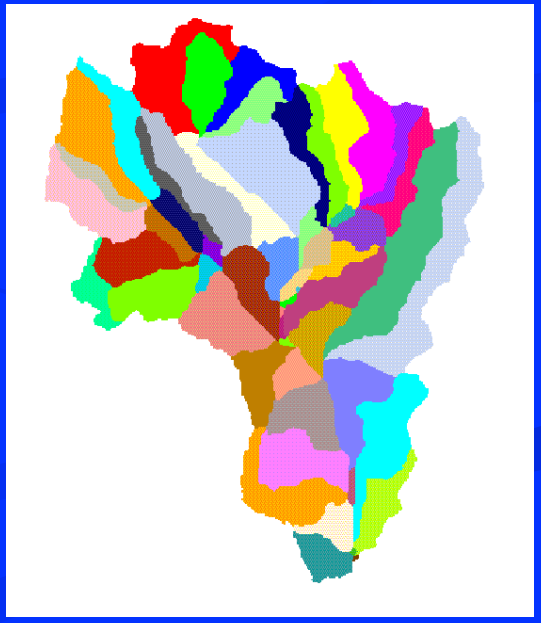
http://www.wcc.nrcs.usda.gov/wsf

Combined product of NRCS and National Weather Service Forecasts

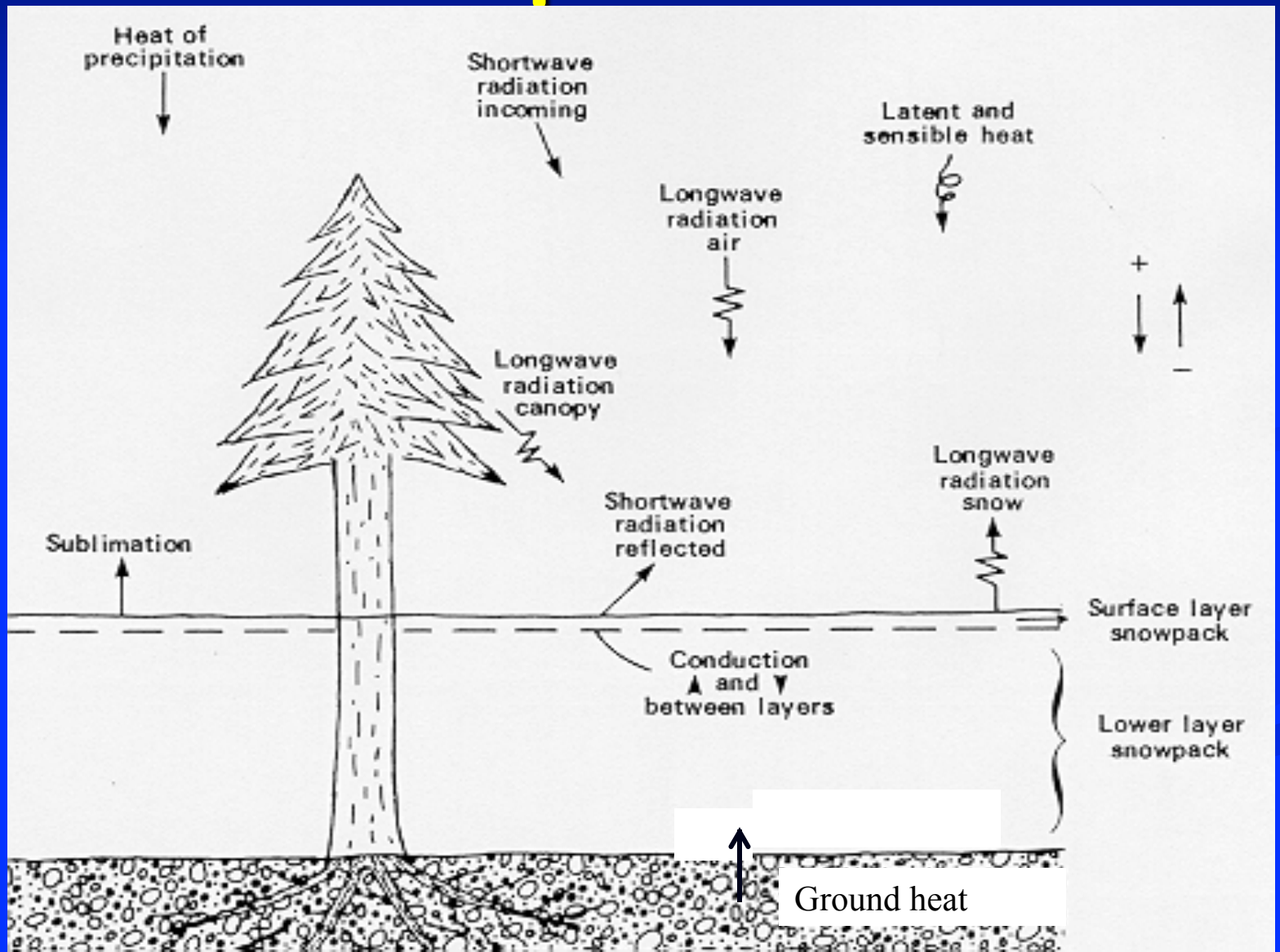


Selected Watershed Model

PRMS



Snowpack Energy Balance Components



PRMS SNOW MODEL

Energy Balance Formulation

$$Hm = Hsn + Hln + Hc + He + Hg + Hp + Hq$$

Model Formulation (on each HRU)

$Hsn = swrad * (1. - albedo) * rad\_trncf$

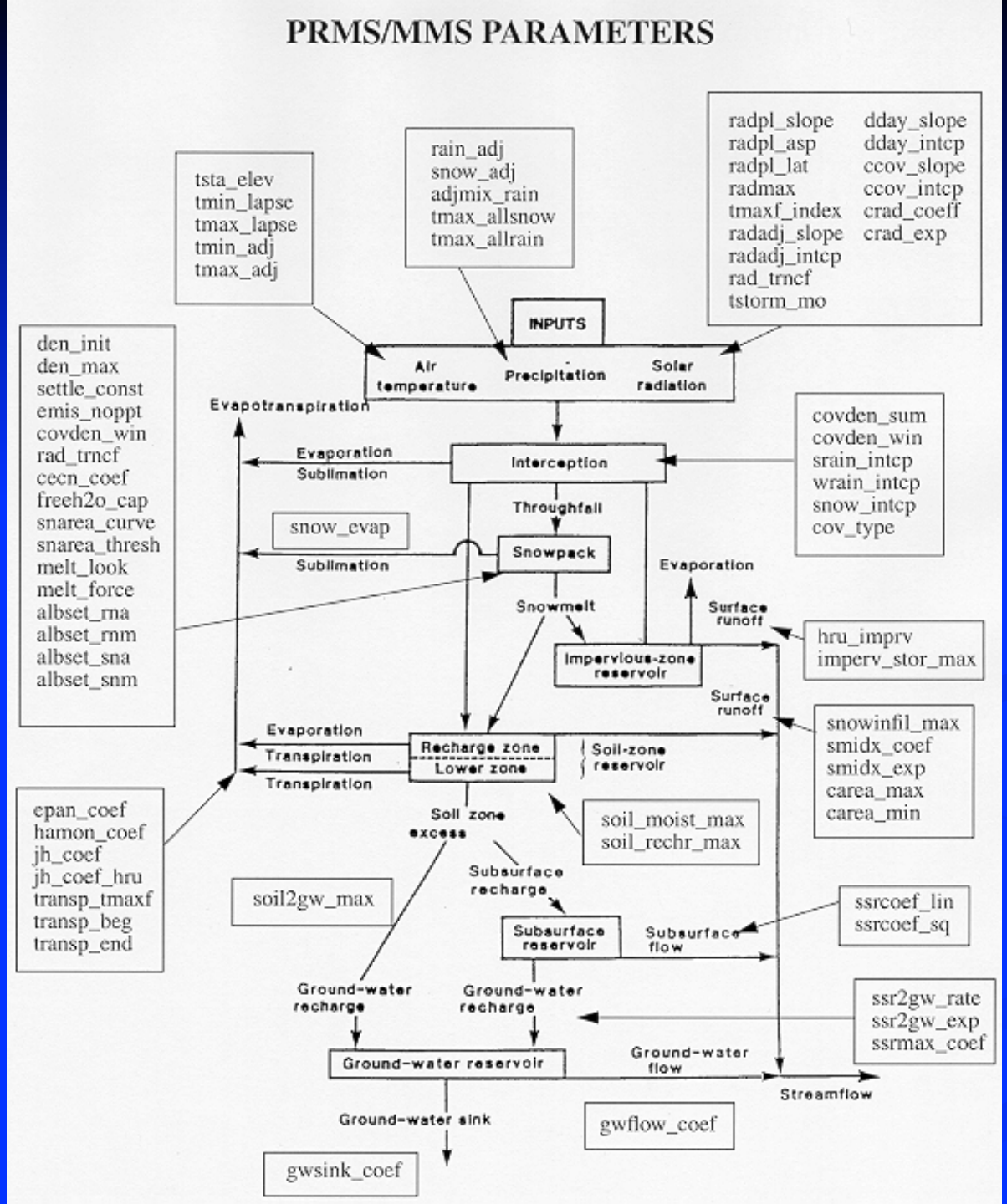
$Hln = emis * sb\_const * tavg^4$ $\quad (\varepsilon \sigma T^4)$

$Hc + He = cecn\_coef(mo) * tavg$ (ppt days)

$= 0$ (dry days)

$Hp = tavg * net\_precip$

$Hg = groundmelt$ Hq is computed



PRMS Parameters

MMS Version

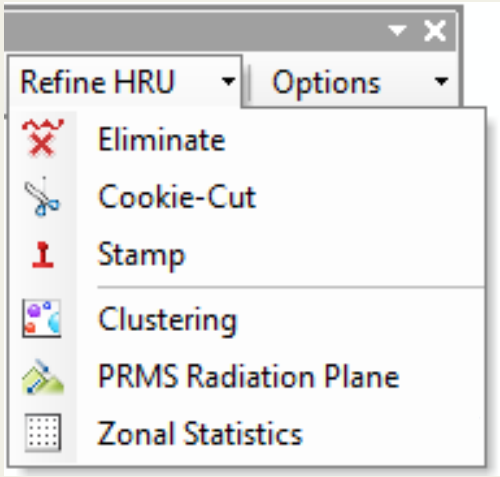
BAGIS-H Functions

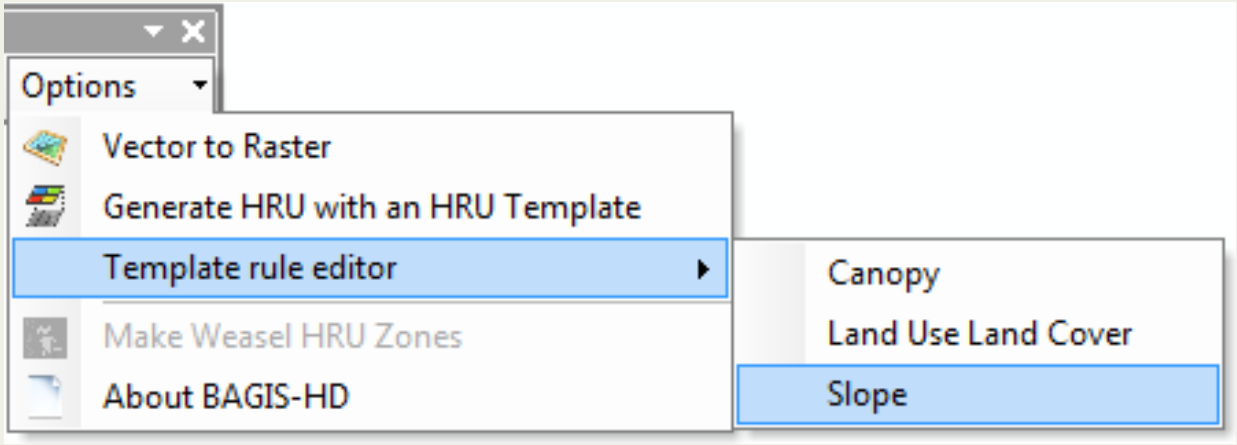
Set AOI Tool / AOI Layers Viewer

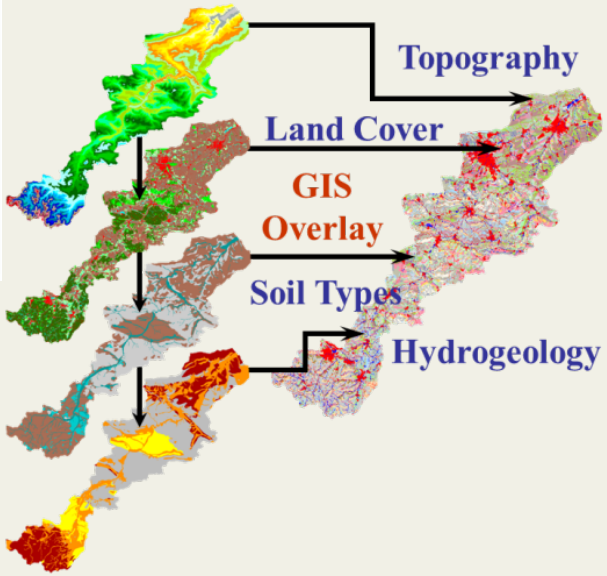
Define HRU Zones Tool

Refine HRU Toolset

Options / Utilities

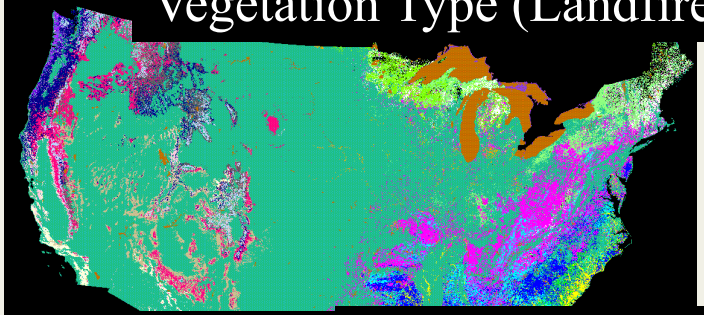






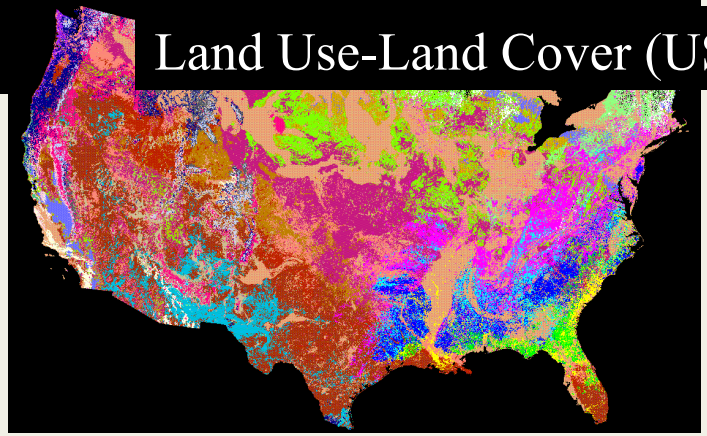
DIGITAL DATABASES

Vegetation Type (Landfire)



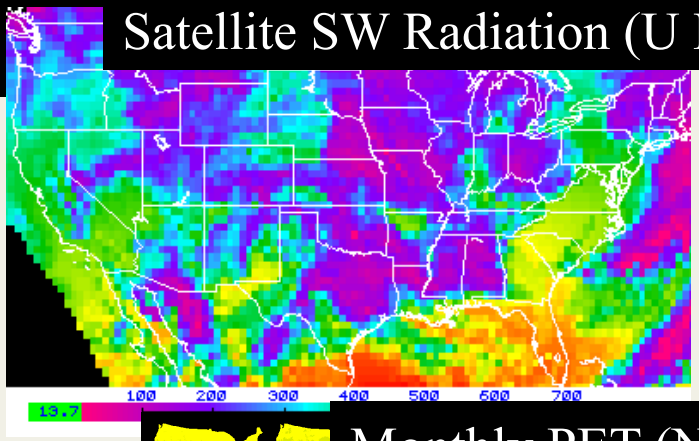
Vegetation Density
(Landfire + NLCD)

Land Use-Land Cover (USGS)

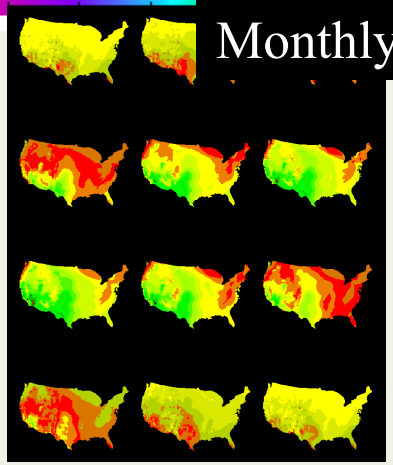


STATSGO Soils (USDA)

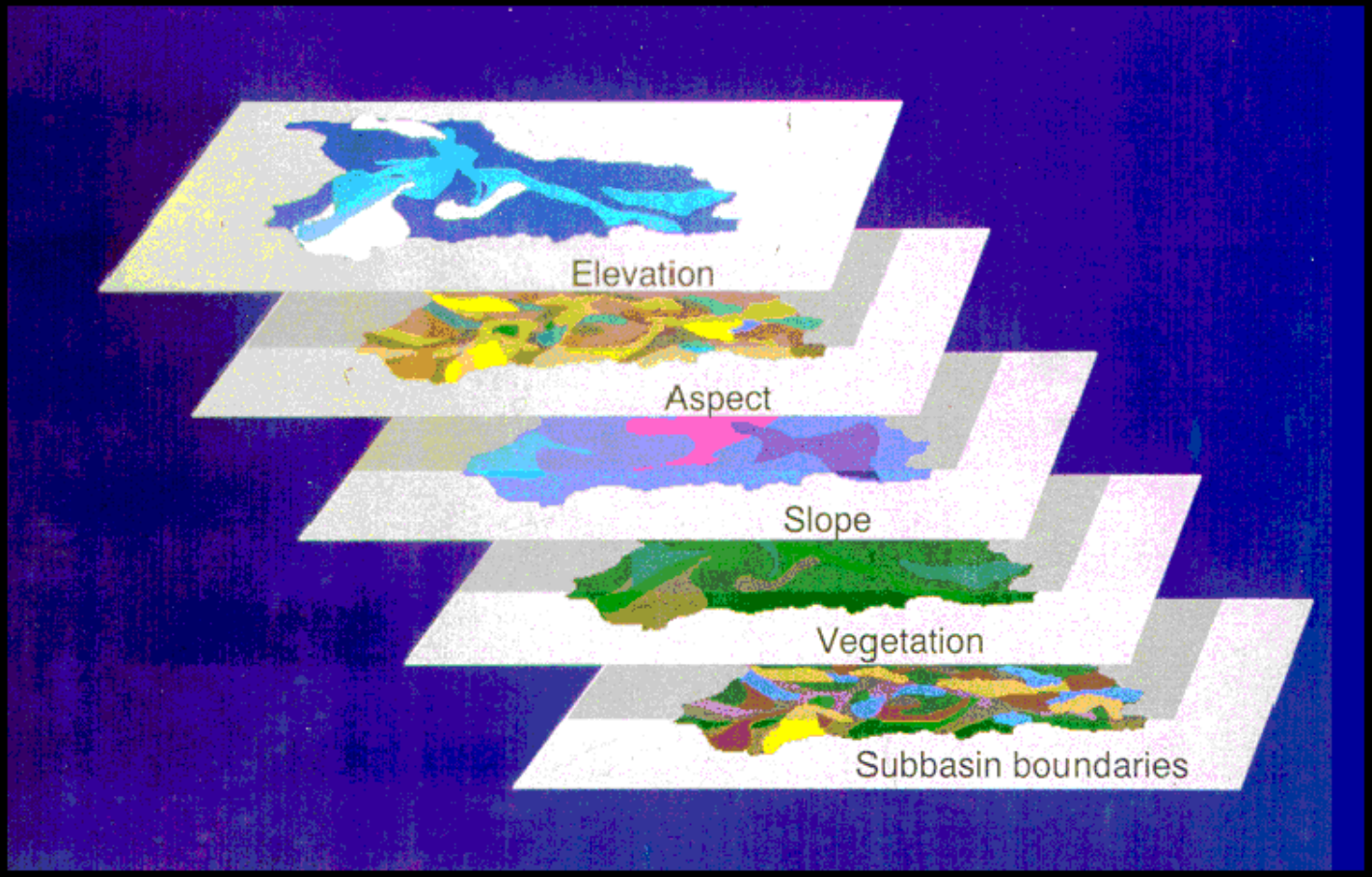
Satellite SW Radiation (U Md)



Monthly PET (NWS)



AUTOMATED PARAMETER ESTIMATION



BAGIS-P Parameter Database Manager

Set AOI | S:\GIS\basins\uco\test_aoi | **Parameter Viewer**

HRU Layers

HRU1
HRU2
Final_HRU
Other_HRUs

Profiles	Param
NWCC_Profile.xml	-
USGS_Profile.xml	-
My_Profile.xml	**Present**
Other_Profile.xml	**Present**

New | Delete | Import/Copy

Methods

Methods	Status
Aspect.xml	**Undefined**
Area.xml	**! Defined**
Elevation.xml	**Online**
VegCov_Density.xml	**Online**
SWE.xml	**Online**
Root-depth.xml	**Online**
Soilmoist.xml	**Online**

Select | New | Delete | Update Data

Current Profile: My_Profile | Make Public

Number of Methods: 7

Current Method: VegCov_Density

Output Name: Cov_Den

Equation:

Veg-cover.value / 100

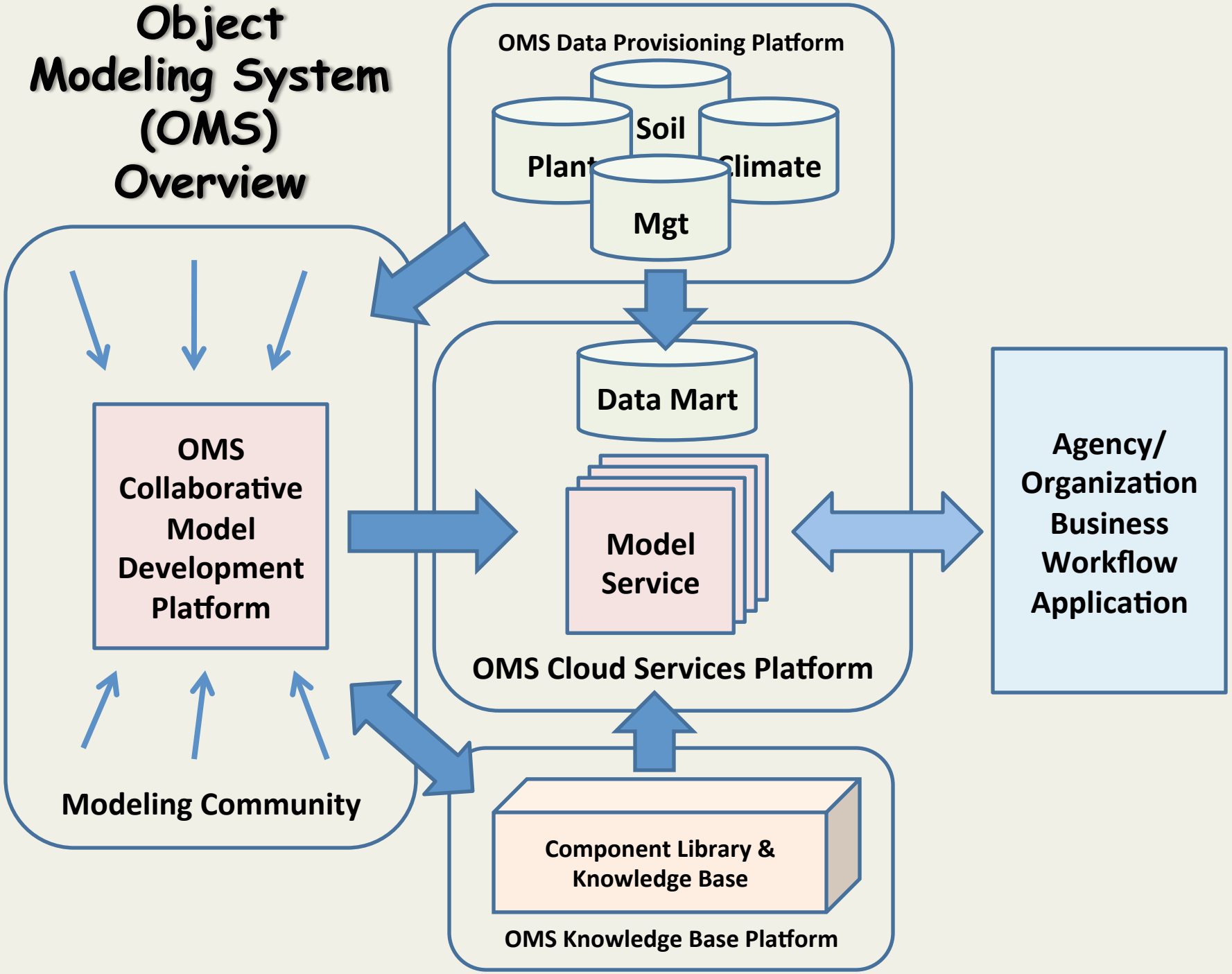
Edit Equation

(Re)Calculate Parameters

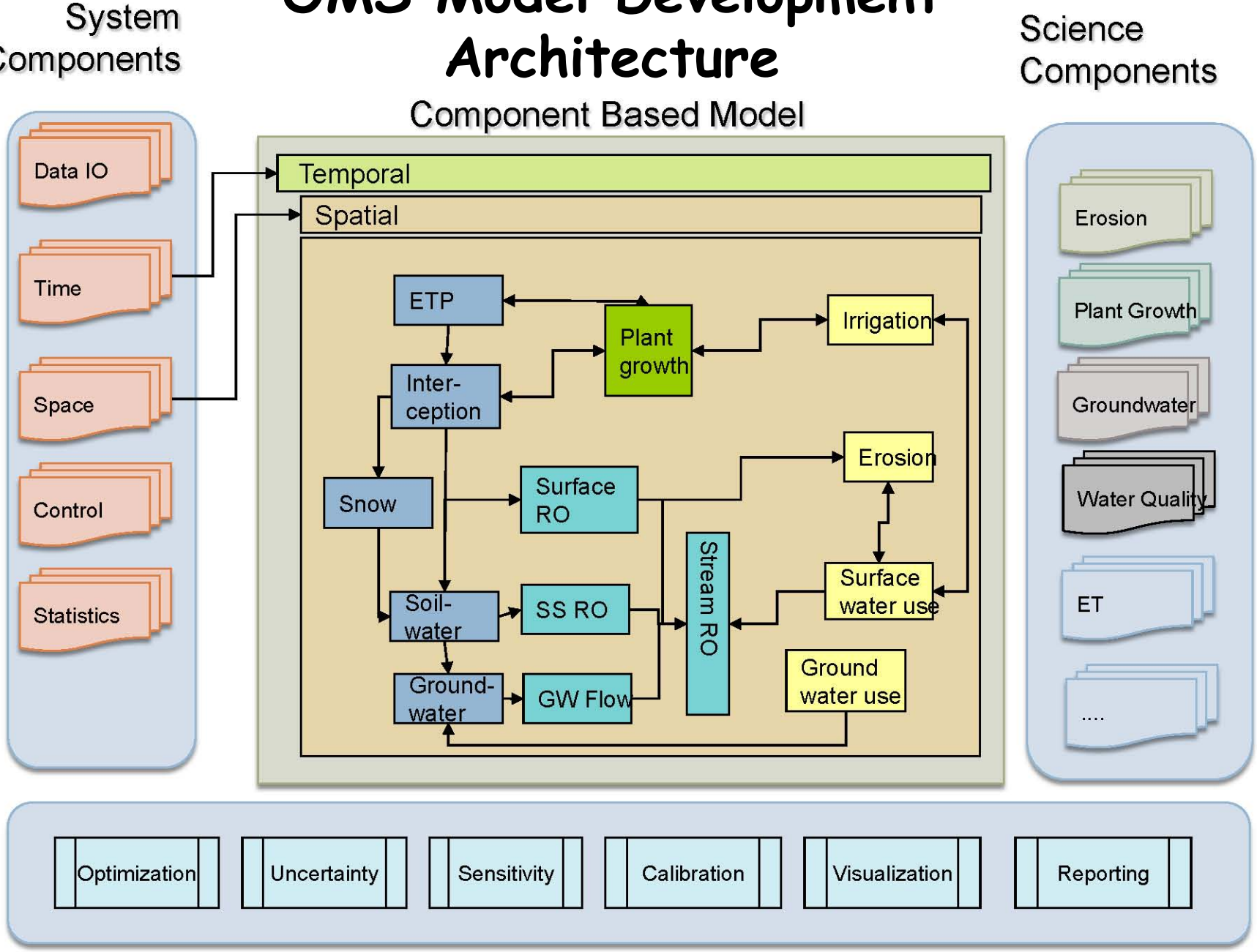
Model Component Framework

Object Modeling System (OMS)

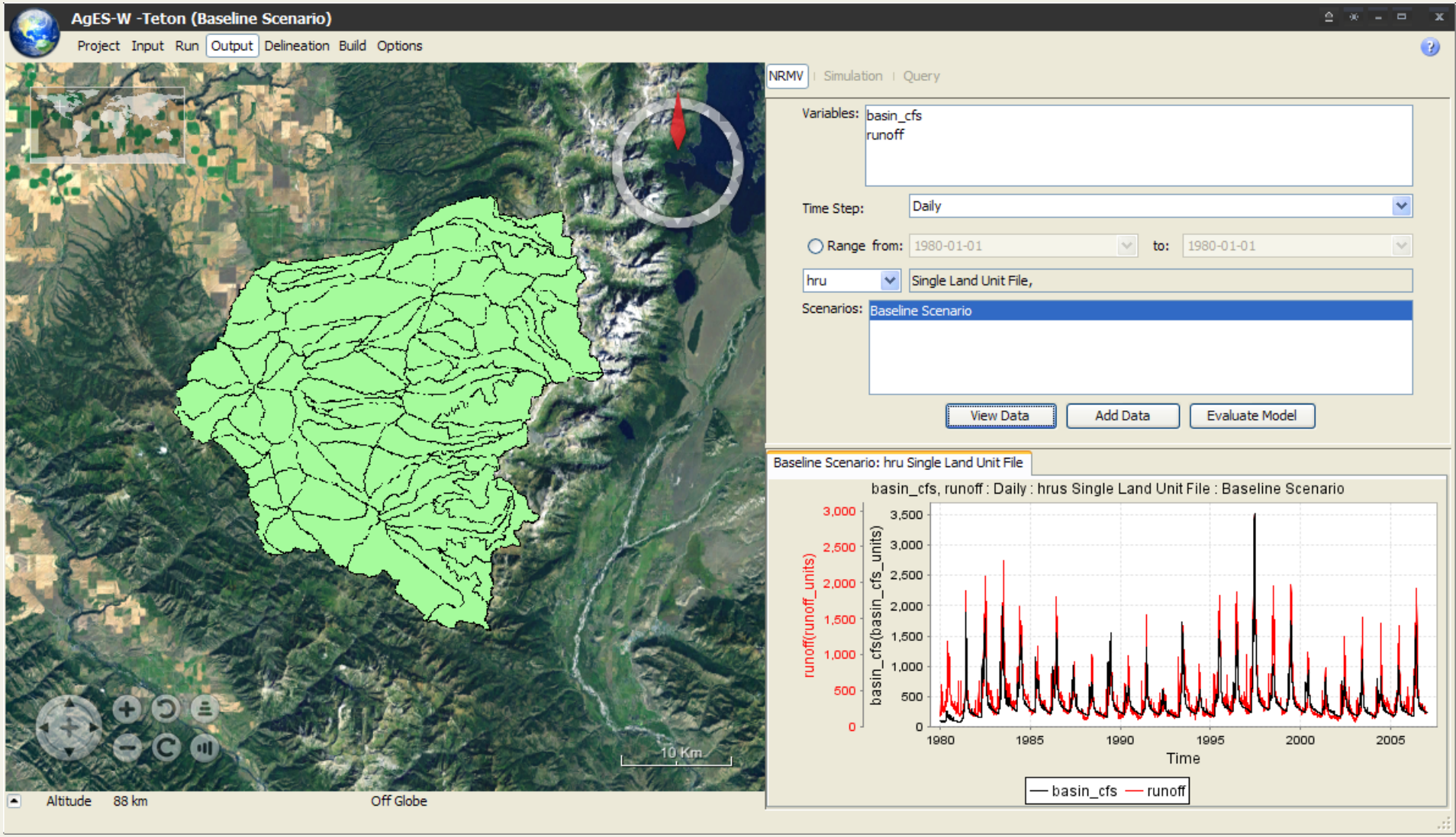
Framework for developing and deploying science models

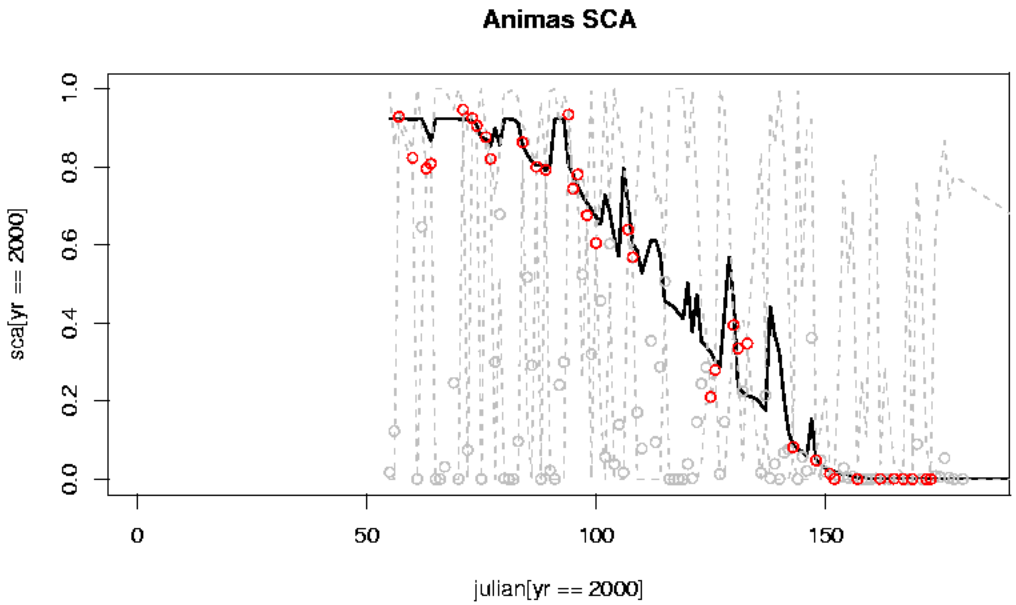

Object Modeling System (OMS) Overview
OMS Data Provisioning Platform
Soil
Plant
Climate
Mgt
Data Mart
OMS Collaborative Model Development Platform
Model Service
OMS Cloud Services Platform
Agency/ Organization Business Workflow Application
Modeling Community
Component Library & Knowledge Base
OMS Knowledge Base Platform

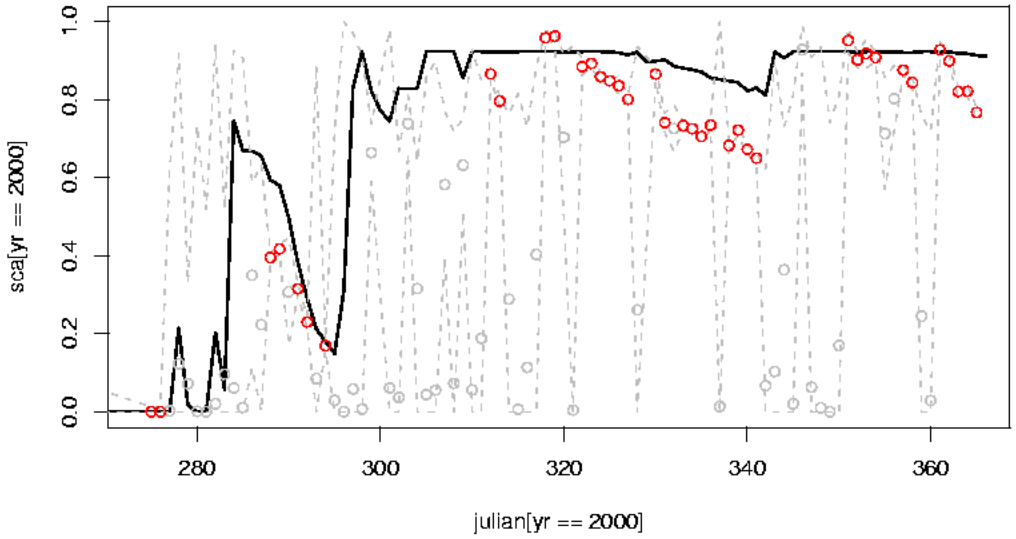
OMS Model Development Architecture



Visualization and Analysis Tools







Remotely-Sensed Data Integration

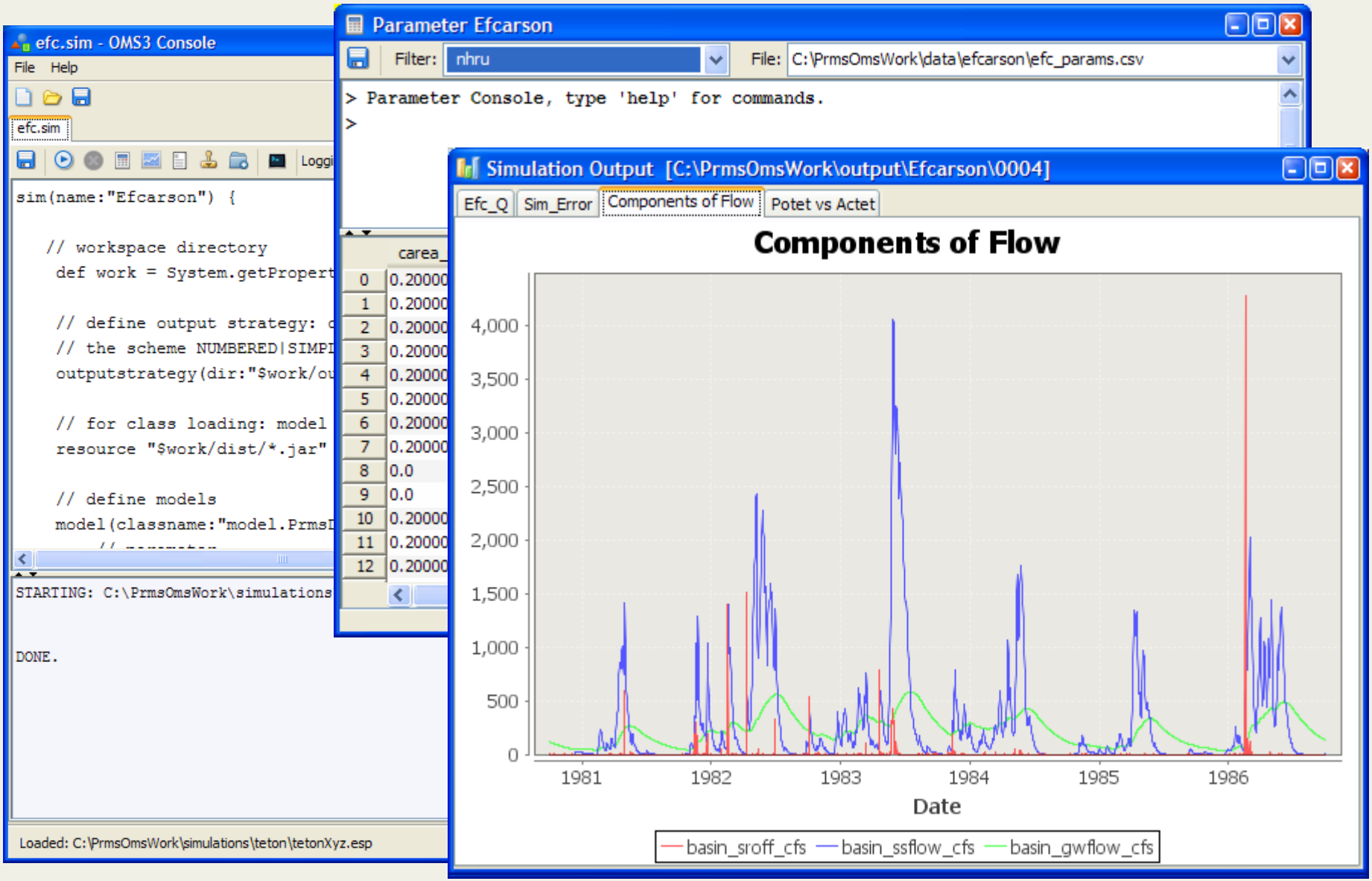
Animas Basin, CO Snow-covered Area Year 2000

Simulated —

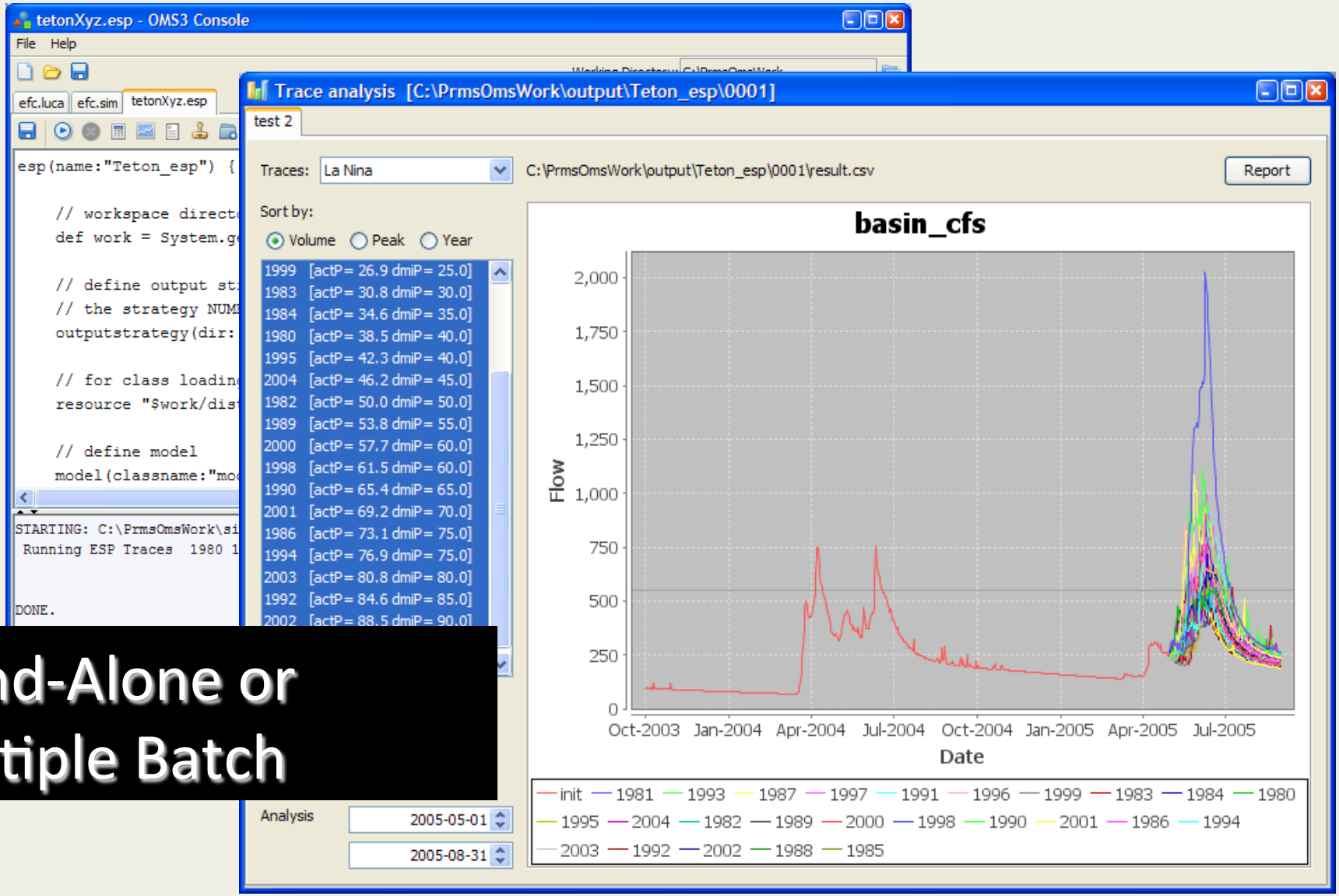
Measured (MODIS Satellite) ○

Error Range <= 0.1

OMS3 Console



ESP Trace Analysis



Stand-Alone or Multiple Batch

ESP Forecasting
(Raw and Debiased)

Run once a year

- Debias_ESP:
  - Develops linear regression coefficients to adjust raw ESP forecasts

Run for each forecast

- Batch ESP:
  - Runs ESP on multiple basins
  - Creates raw forecasts for selected probability of exceedance values
  - Uses regression coefficients from Debias_ESP to adjust raw forecast values

Debias ESP

Run ESP for each year in the historic data file (eg. 1981 -2010)

↓

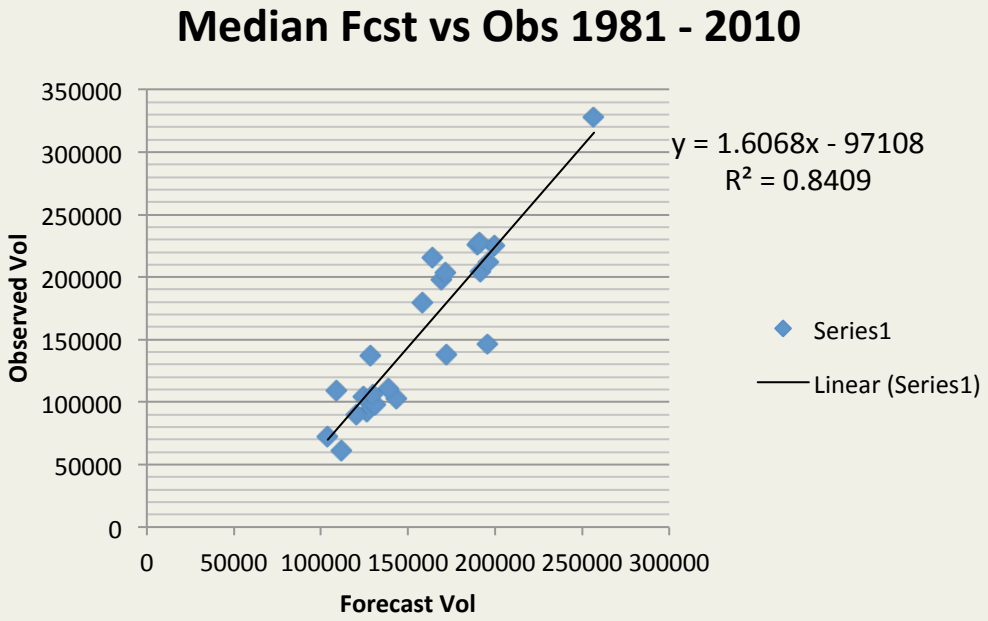
Sort traces for each forecast ensemble, excluding forecast year

↓

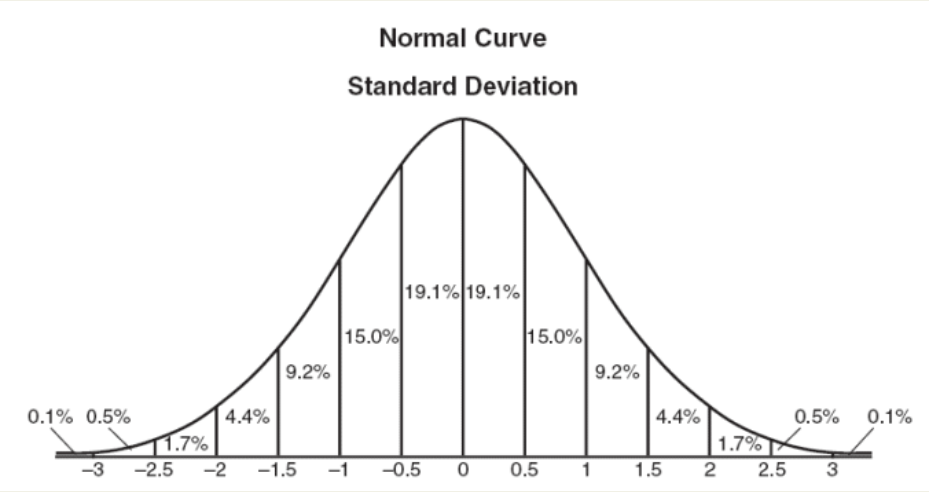
Plot median ensemble forecast volume against observed volume

↓

Run linear regression to get debias coefficients: slope, intercept, std error



Forecast Probabilities of Exceedance



5% - median vol + (1.64 * stderr)
10% - median vol + (1.28 * stderr)
30% - median vol + (.52 * stderr)
50% - median trace volume
70% - median vol - (.52 * stderr)
90% - median vol - (1.28 * stderr)
95% - median vol - (1.64 * stderr)

Forecast Types

Currently Available

- Volumes for multiple forecast periods

Future

- Peak flow
- Date flow goes below selected threshold