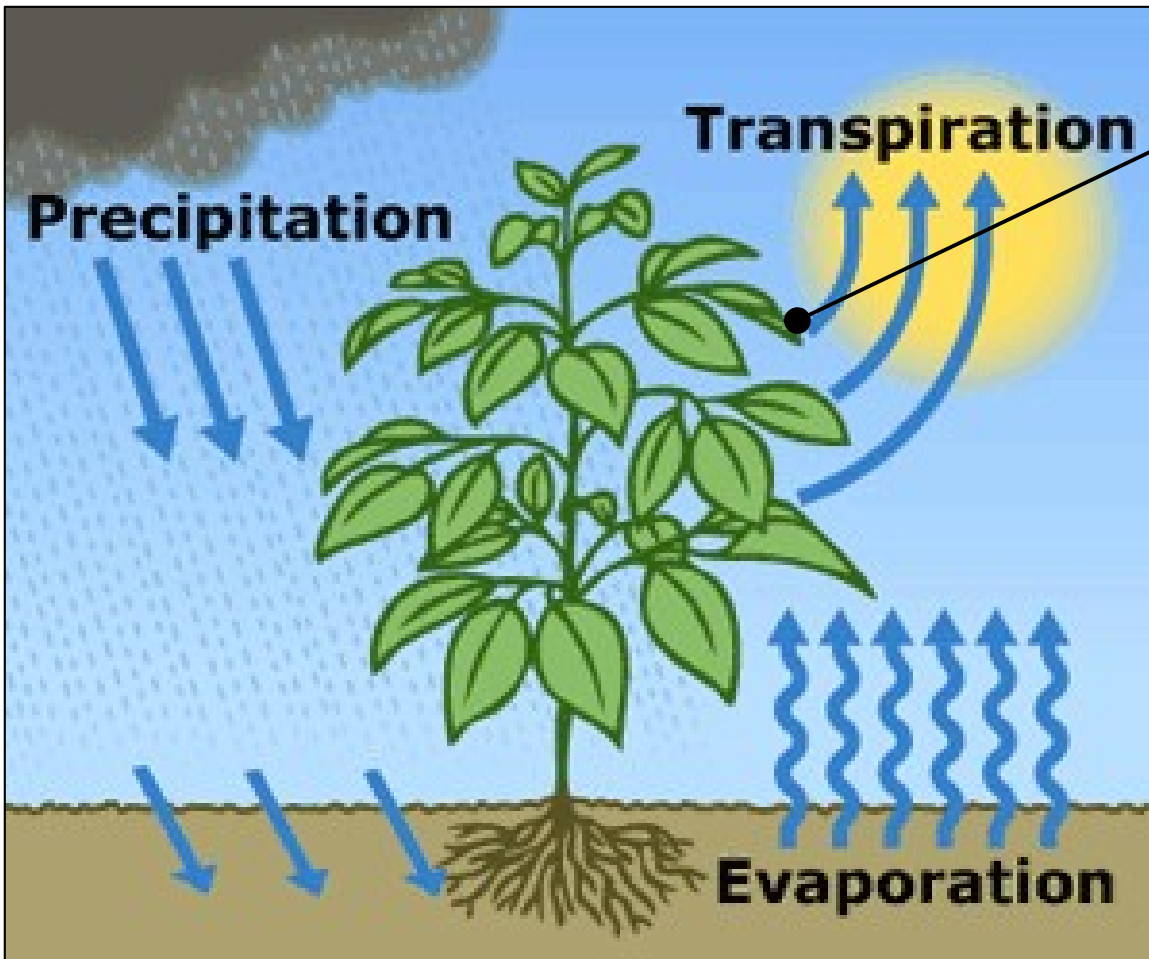


SOILWAT Ecohydrology Model

- **Why Use a Mechanistic Ecohydrology Model?**
- **How Does SOILWAT Work?**
- **Where Can I Get It?**

Why Use a Mechanistic Model to Describe Drought Affects?

Ecological Drought Response



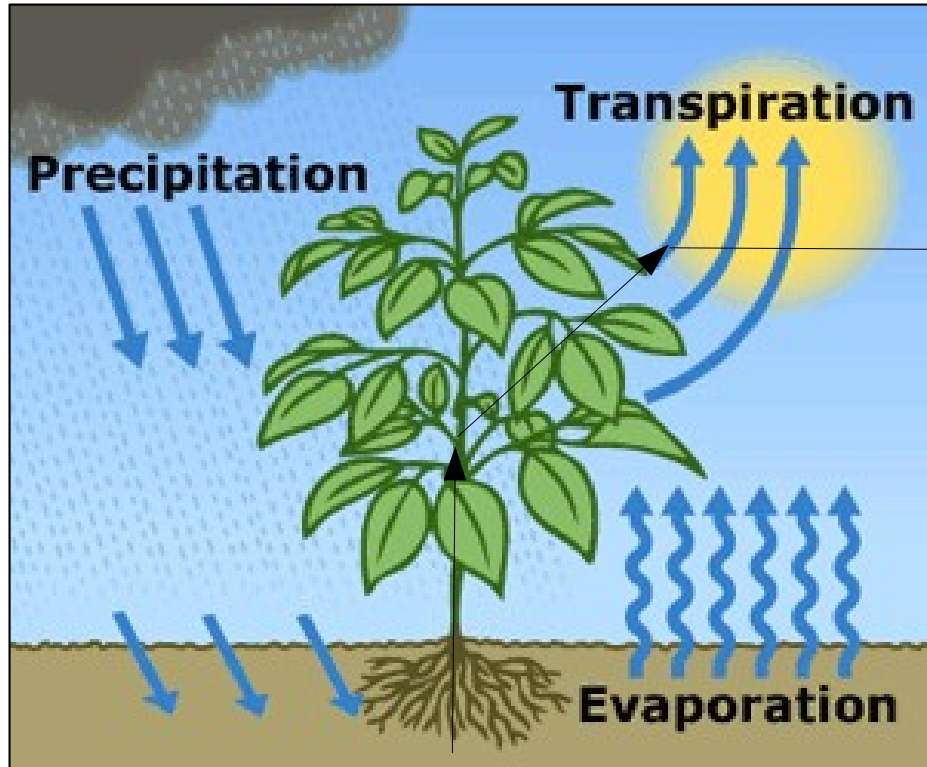
$$E_L = g_s (\Psi_L - \Psi_A \sim \text{VPD})$$

Physiological Control

When We Build SDM's That Include Drought As an Explanatory, We Make the Assumption that Suitability Predictions Reflect the Physiological Control component of species drought response.

(USGS Kids, 2014)

More on Physiological Response to Drought



$$E_p = g_s (\Psi_L - \Psi_A)$$

$$E_p = K_p (\Psi_s - \Psi_L)$$

$$E_p = g_s (\Psi_L - \Psi_A) = E_p = K_p (\Psi_s - \Psi_L)$$

$$g_s (\Psi_L - \Psi_A) = K_p (\Psi_s - \Psi_L)$$

$$g_s = K_p (\Psi_s - \Psi_L) / (\Psi_L - \Psi_A)$$

Plant Response to Drought is a Function of ...

Root/shoot conductance, soil water potential, leaf water potential, and atmospheric demand

How SOILWAT Works

File Project

NE Montana (Site 1)

Files & Model Site Params Soil Layers Plant Production Establishment Cloud Weather Setup SWC Setup Output Setup

Output Setup Settings for SOILWAT

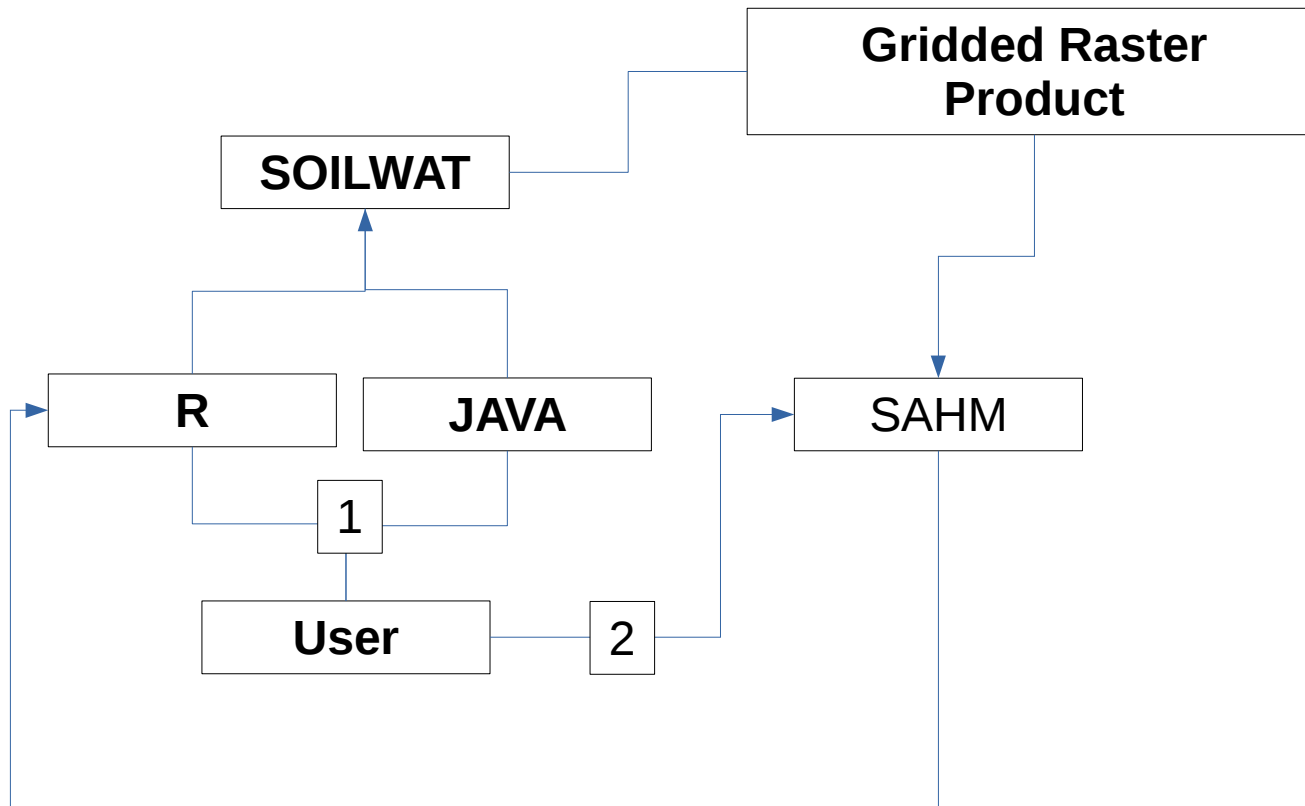
Tab Output File Separator

Time Periods for Each Key

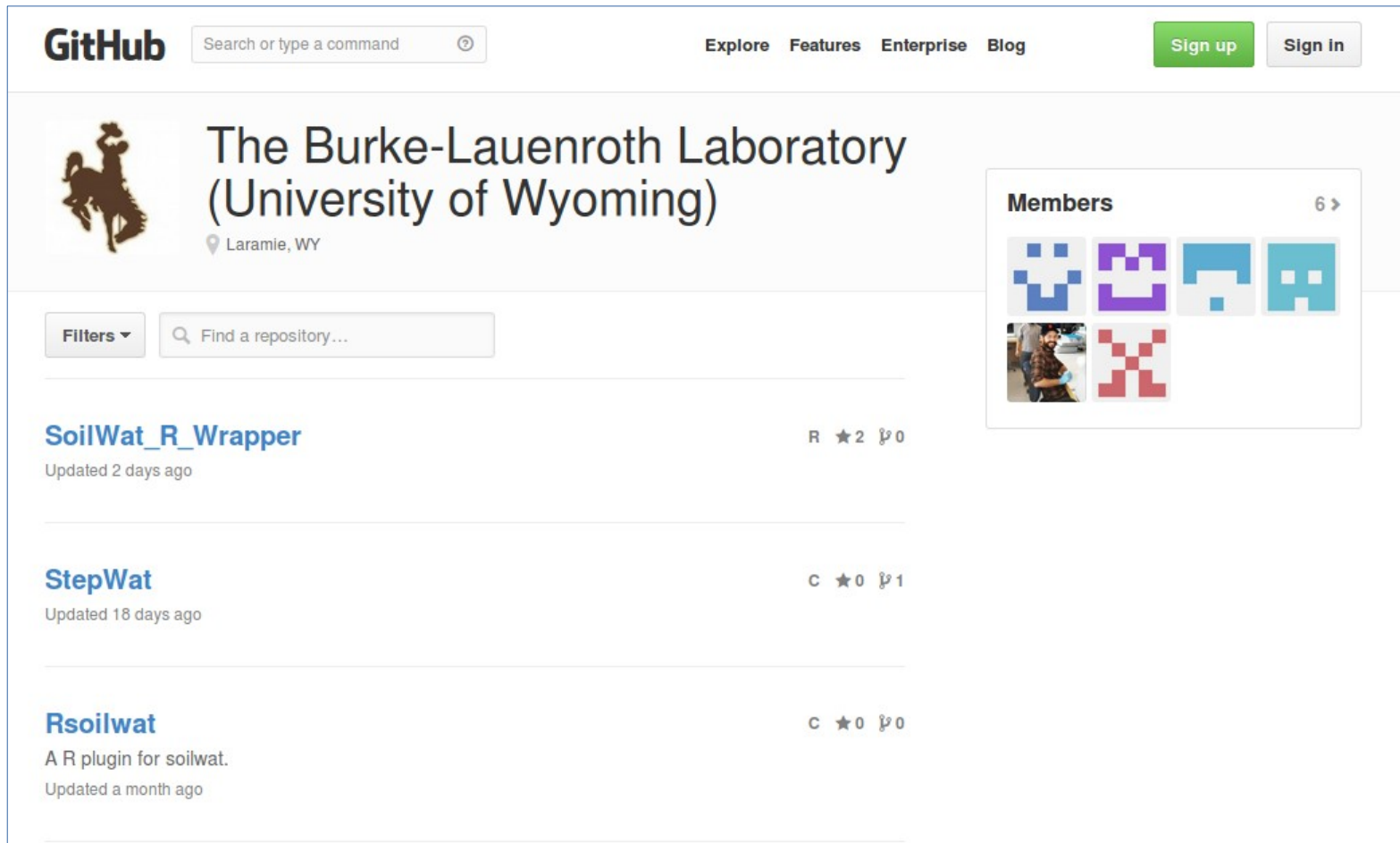
Day Week Month Year

Use	Key	Sum Type	Period	Start	End	Filename Prefix	
<input checked="" type="checkbox"/>	TEMP	AVG	WEEK	1	366	temp_air	/* max., min, average temperature (C) */
<input checked="" type="checkbox"/>	PRECIP	SUM	MONTH	1	366	precip	/* total precip = sum(rain, snow), rain, snow-fall, snowmelt, and snowloss (cm) */
<input checked="" type="checkbox"/>	SOILINFILT	SUM	YEAR	1	366	infiltration	/* water to infiltrate in top soil layer (cm), runoff (cm); (not-intercepted rain)+(snowmelt-runoff) */
<input checked="" type="checkbox"/>	RUNOFF	SUM	WEEK	1	366	runoff	/* runoff (cm): total runoff, runoff from ponded water, runoff from snowmelt */
<input checked="" type="checkbox"/>	VWCBULK	AVG	MONTH	1	366	vwc_bulk	/* bulk volumetric soilwater (cm / layer) */
<input checked="" type="checkbox"/>	VWCMATRIC	AVG	YEAR	1	366	vwc_matric	/* matric volumetric soilwater (cm / layer) */
<input checked="" type="checkbox"/>	SWCBULK	AVG	DAY	1	366	swc_bulk	/* bulk soilwater content (cm / cm layer); swc.l(today) = swc.l(yesterday)+inf_soil-lyrdrain.l1-transp.l1-evap_soil.l1
<input checked="" type="checkbox"/>	SWABULK	AVG	MONTH	1	366	swa_bulk	/* bulk available soil water (cm/layer) = swc - wilting point */
<input checked="" type="checkbox"/>	SWAMATRIC	AVG	YEAR	1	366	swa_matric	/* matric available soil water (cm/layer) = swc - wilting point */
<input checked="" type="checkbox"/>	SWPMATRIC	AVG	WEEK	1	366	swp_matric	/* matric soilwater potential (-bars) */
<input checked="" type="checkbox"/>	SURFACEWATER	AVG	DAY	1	366	surface_water	/* surface water (cm) */
<input checked="" type="checkbox"/>	TRANSP	SUM	YEAR	1	366	transp	/* transpiration from each soil layer (cm): total, trees, shrubs, forbs, grasses */
<input checked="" type="checkbox"/>	EVAPSOIL	SUM	DAY	1	366	evap_soil	/* bare-soil evaporation from each soil layer (cm) */
<input checked="" type="checkbox"/>	EVAPSURFACE	SUM	WEEK	1	366	evap_surface	/* evaporation (cm): total, trees, shrubs, forbs, grasses, litter, surface water */
<input checked="" type="checkbox"/>	INTERCEPTION	SUM	MONTH	1	366	interception	/* intercepted rain (cm): total, trees, shrubs, forbs, grasses, and litter (cm) */
<input checked="" type="checkbox"/>	LYRDRAIN	SUM	DAY	1	366	percolation	/* water percolated from each layer (cm) */
<input checked="" type="checkbox"/>	HYDRED	SUM	WEEK	1	366	hydred	/* hydraulic redistribution from each layer (cm): total, trees, shrubs, forbs, grasses */
<input checked="" type="checkbox"/>	AET	SUM	YEAR	1	366	aet	/* actual evapotr. (cm) */
<input checked="" type="checkbox"/>	PET	SUM	DAY	1	366	pet	/* potential evaptr (cm) */
<input checked="" type="checkbox"/>	WETDAY	SUM	DAY	1	366	wetdays	/* days above swc_wet */
<input checked="" type="checkbox"/>	SNOWPACK	AVG	WEEK	1	366	snowpack	/* snowpack water equivalent (cm), snowdepth (cm); since snowpack is already summed, use avg - sum sums the
<input checked="" type="checkbox"/>	DEEPSWC	SUM	MONTH	1	366	deep_drain	/* deep drainage into lowest layer (cm) */
<input checked="" type="checkbox"/>	SOILTEMP	AVG	MONTH	1	366	temp_soil	/* soil temperature from each soil layer (in celsius) */
<input checked="" type="checkbox"/>	ESTABL	OFF	YEAR	1	366	estab	/* yearly establishment results */

SAHM Integration




Where Can I Download SOILWAT?



GitHub Search or type a command

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 **The Burke-Lauenroth Laboratory**
(University of Wyoming)
Laramie, WY

Members 6 >

Filters Find a repository...

Repository Name	Language	Stars	Forks
SoilWat_R_Wrapper	R	2	0
StepWat	C	0	1
Rsoilwat	C	0	0

SoilWat_R_Wrapper
Updated 2 days ago

StepWat
Updated 18 days ago

Rsoilwat
A R plugin for soilwat.
Updated a month ago

GitHub Hosts Stable and Development Versions of SOILWAT :

<https://github.com/Burke-Lauenroth-Lab>