SWORD of Science (SoS) Results v0.0

The following details the structure (attributes, dimensions, groups, and variables) that make up the global SoS. Please see file labelled 'changelog.md' for a description of changes with each release of the SoS.

Data organization

The SoS is organized by continent following the conventions set in SWORD for the NetCDF file format.

Reach identifiers can be found in the "reaches" group and node identifiers can be found in the "nodes" group.

There are two types of the SoS, one for the WBM (unconstrained) data product and the other for GRADES and gauge (constrained) data product. The types are indicated by the directories they are nested in and are labelled 'constrained' and 'unconstrained'. The various versions of the SoS will be stored in either the 'constrained' or 'unconstrained' directories. Each run of Confluence produces a new version of the SoS which are numbered incrementally. The first version is labelled '0000' because it does not contain any result data.

This document describes the results files which are gathered from each stage and module in the Confluence workflow and stored in NetCDF groups.

Global Attributes

Name	Description	Value (if applicable)
name	Name of file (continent)	
version	Current version of the SoS	xxxx
production_date	Date the SoS file was created or modified	Date (Day-Month-Year) Time (HH:MM:SS)
run_type	Indication of constrained or unconstrained data product	"constrained" or "unconstrained"

Dimensions

Name	Description	Value (if applicable)
num_reaches	The number of reaches	
num_nodes	The number of nodes	

time_steps	The number of observations	

Variables

		time
	dimensions	time_steps
	type	int64

Groups

reaches		
nodes		
geobam	geobam/logQ geobam/logWc geobam/logQc geobam/logn_man geobam/logn_amhg	geobam/A0 geobam/b geobam/logr geobam/logWb geobam/logDB
momma		
hivdi		
metroman		
sad		
sic4dvar		
moi	moi/geobam moi/hivdi moi/metroman	moi/momma moi/sad moi/sic4dvar
postdiagnostics	postdiagnostics/basin	postdiagnostics/reach
offline		
validation		

reaches

		reach_id
	dimensions	num_reaches
	type	int64
	long_name	reach ID from prior river database
	comment	Unique reach identifier from the prior river database. The format of the identifier CBBBBBRRRRT where C = continent, B = basin, R = reach, and T = type).

nodes

		reach_id
	dimensions	None
	type	int64

	long_name	reach ID from prior river database
	comment	Unique reach identifier from the prior river database. The format of the identifier is CBBBBBRRRRT, where C=continent, B=basin, R=reach, T=type.

		node_id
	dimensions	nx
	type	int64
	long_name	node ID of the node in the prior river database
	comment	Unique node identifier from the prior river database. The format of the identifier is CBBBBBRRRRNNNT, where C=continent, B=basin, R=reach, N=node, T=type.

geobam

The geoBAM group is composed of subgroups that hold variables for each processing chain. There are three mean processing chain and three standard deviation processing chain variables per group.

The chains are labelled by numbers 1 though 3. For brevity, the three chain variables description are represented by one with an 'x' as a placeholder for the number identifier.

logQ

		mean_chainx
	dimensions	num_reaches, time_steps
	type	float
	fill_value	- 999999999999

		sd_chainx
	dimensions	num_reaches, time_steps
	type	float
	fill_value	- 999999999999

logWc

		mean_chainx
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		sd_chainx

	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

logQc

		mean_chainx
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		sd_chainx
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

logn_man

		mean_chainx
	dimensions	num_nodes
	type	float
	fill_value	- 999999999999

		sd_chainx
	dimensions	num_nodes
	type	float
	fill_value	- 999999999999

logn_amhg

		mean_chainx
	dimensions	num_nodes
	type	float
	fill_value	- 999999999999

		sd_chainx
	dimensions	num_nodes
	type	float

	fill_value	- 999999999999

A0

		mean_chainx
	dimensions	num_nodes
	type	float
	fill_value	- 999999999999

		sd_chainx
	dimensions	num_nodes
	type	float
	fill_value	- 999999999999

b

		mean_chainx
	dimensions	num_nodes
	type	float
	fill_value	- 999999999999

		sd_chainx
	dimensions	num_nodes
	type	float
	fill_value	- 999999999999

logr

		mean_chainx
	dimensions	num_nodes
	type	float
	fill_value	- 999999999999

		sd_chainx
	dimensions	num_nodes
	type	float
	fill_value	- 999999999999

logWb

		mean_chainx
	dimensions	num_nodes
	type	float
	fill_value	- 999999999999

		sd_chainx
	dimensions	num_nodes
	type	float
	fill_value	- 999999999999

logDb

		mean_chainx
	dimensions	num_nodes
	type	float
	fill_value	- 999999999999

		sd_chainx
	dimensions	num_nodes
	type	float
	fill_value	- 999999999999

momma

		stage
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		width
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		slope
	dimensions	num_reaches by time_steps
	type	float

	fill_value	- 999999999999

		Qgage
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		seg
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		n
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999
		Y
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		v
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		Q
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		Q_constrained
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

	gage_constrained

	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		input_MBL_prior
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		input_Qm_prior
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		input_Qb_prior
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		input_Yb_prior
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		input_known_ezf
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		input_known_bkfl_stage
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		input_known_nb_seg1
	dimensions	num_reaches
	type	float

	fill_value	- 999999999999

		input_known_x_seg1
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		Qgage_constrained_nb_seg1
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		Qgage_constrained_x_seg1
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		input_known_nb_seg2
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		input_known_x_seg2
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		Qgage_constrained_nb_seg2
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		Qgage_constrained_x_seg2
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		n_bkfl_QB_prior
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		n_bkfl_final_used
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		vel_bkfl_Qb_prior
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		vel_bkfl_diag_MBL
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		Froude_bkfl_diag_Smean
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		width_bkfl_empirical
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		width_bkfl_solved_obs
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		depth_bkfl_solved_obs
	dimensions	num_reaches

	type	float
	fill_value	- 999999999999

		depth_bkfl_diag_MBL
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		depth_bkfl_diag_Wb_Smean
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		zero_flow_stage
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		bankfull_stage
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		Qmean_prior
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		Qmean_momma
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		Qmean_momma.constrained
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

hivdi

		Q
	dimensions	num_reaches by num_timesteps
	type	float
	fill_value	- 999999999999

		A0
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		beta
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		alpha
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

metroman

		allq
	dimensions	num_reaches by num_timesteps
	type	float
	fill_value	- 999999999999

		A0hat
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		x1hat
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		q_u
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

moi

The moi group is made up of several subgroups (one for each reach-level FLPE algorithm).

geobam

		q
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		a0
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		n
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		qbar_reachScale
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		qbar_basinScale
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

hivdi

		q
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		Abar
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		alpha
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		beta
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		qbar_reachScale
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		qbar_basinScale
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

metroman

		q
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		Abar
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		na
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		x1
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		qbar_reachScale
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		qbar_basinScale
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

momma

		q
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		B
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		H
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		Save
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		qbar_reachScale
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		qbar_basinScale
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

sad

		q
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		a0
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		n
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		qbar_reachScale
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		qbar_basinScale
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

sic4dvar

		q
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		a0
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		n
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		qbar_reachScale
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

		qbar_basinScale
	dimensions	num_reaches
	type	float
	fill_value	- 999999999999

postdiagnostics

The postdiagnostics group is made up of two subgroups, one for reach-level diagnostic data and one for basin-level diagnostics data.

Dimensions

Name	Description	Value (if applicable)
num_algos	Number of algorithms postdiagnostics was run for	
nchar	Maximum length of algorithm name	

Variables

		num_algos
	dimensions	num_algos
	type	int

		algo_names
	dimensions	num_algos by nchar
	type	char

basin

		realism_flags
	dimensions	num_reaches by num_algos
	type	int
	fill_value	-999

		stability_flags
	dimensions	num_reaches by num_algos
	type	int
	fill_value	-999

		prepost_flags
	dimensions	num_reaches by num_algos
	type	int

	fill_value	-999

reach

		realism_flags
	dimensions	num_reaches by num_algos
	type	int
	fill_value	-999

		stability_flags
	dimensions	num_reaches by num_algos
	type	int
	fill_value	-999

offline

		d_x_area
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		d_x_area_u
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		metro_q_c
	dimensions	num_reaches by time_steps
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		bam_q_c
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		hivdi_q_c
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		momma_q_c
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		sads_q_c
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		consensus_q_c
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		metro_q_uc
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		bam_q_uc
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		hivdi_q_uc
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		momma_q_uc

	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		sads_q_uc
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

		consensus_q_uc
	dimensions	num_reaches by time_steps
	type	float
	fill_value	- 999999999999

validation

Dimensions

Name	Description	Value (if applicable)
num_algos	Number of algorithms validated	
nchar	Maximum length of algorithm name	

Variables

		algo_names
	dimensions	num_reaches, num_algos, nchar
	type	char

		has_validation
	dimensions	num_reaches
	type	int
	fill_value	-999

		nse
	dimensions	num_reaches, num_algos
	type	float
	fill_value	- 999999999999

		rsq
	dimensions	num_reaches, num_algos
	type	float
	fill_value	- 999999999999

		kge
	dimensions	num_reaches, num_algos
	type	float
	fill_value	- 999999999999

		rmse
	dimensions	num_reaches, num_algos
	type	float
	fill_value	- 999999999999

		testn
	dimensions	num_reaches, num_algos
	type	float
	fill_value	- 999999999999