SWORD of Science (SoS) Priors v1.0

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 gauged (constrained) data product. The types are indicated by the directories they are nested in and are labelled 'constrained' and 'unconstrained'.

Each run of Confluence produces a new version of the SoS which are numbered incrementally. The 'constrained' and 'unconstrained' directories will contain a directory for each version of the SoS. The first version is labelled '0000' because it does not contain any result data.

This document describes the priors files. Either WBM or GRADES can be found in the model group depending on which type of data product you are pulling data from. You can determine this programmatically by retrieving the 'run_type' global attribute.

The GRADES model group has additional subgroups of 'grdc' and 'usgs' for gauge data. To reduce file sizes, the GRDC and USGS data are only stored for the reach identifiers that gauge data is present for. You will need to index on either 'grdc_reach_id' or 'usgs_reach_id' to retrieve gauge data. Both variables reference the unique reach identifier from the prior river database (SWORD).

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	

Groups

reaches		
nodes		
model	model/grdc (GRADES model only)	model/usgs (GRADES model only)
gbpriors		

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.

model

The model group contains either WBM or GRADES data depending on whether you have selected to work with the constrained or unconstrained data product.

Dimensions

Name	Description	Value (if applicable)
num_months	Number of months	
probability	Number of probability values	

Variables

num_months		
	dimensions	num_months
	type	int
	units	month

probability		
	dimensions	scalar
	type	int
	long_name	flow_Duration_curve_probability
	units	percentage
	comment	probability values from the flow duration curve for this cell
	fill_value	- 999

flow_duration_q		
	dimensions	num_reaches by probability
	type	float
	long_name	flow_Duration_curve_discharge
	units	m^3/s
	comment	discharge values from the flow duration curve for this cell
	fill_value	- 999999999999

max_q		
	dimensions	num_reaches
	type	float
	long_name	maximum_discharge
	units	m^3/s
	comment	highest discharge value in this cell

	fill_value	- 999999999999

monthly_q		
	dimensions	num_reaches by num_months
	type	float
	long_name	mean_monthly_discharge
	units	m^3/s
	comment	monthly mean discharge time series in this cell
	fill_value	- 999999999999

mean_q		
	dimensions	num_reaches
	type	float
	long_name	mean_discharge
	units	m^3/s
	comment	mean discharge value in this cell
	fill_value	- 999999999999

min_q		
	dimensions	num_reaches
	type	float
	long_name	minimum_discharge
	units	m^3/s
	comment	lowest discharge value in this cell
	fill_value	- 999999999999

two_year_return_q		
	dimensions	num_reaches
	type	float
	long_name	two_Year_Return
	units	m^3/s
	comment	two-year return interval discharge value in this cell
	fill_value	- 999999999999

area_estimate_flag		
	dimensions	num_reaches
	type	int

	long_name	GRADES Area_Estimation_Flag
	flag_meanings	match no_match
	flag_values	0 1
	valid_min	0
	valid_max	1
	comment	This cell was not a good match. Data has been scaled by difference in flow accumulation area.

comid (GRADES ONLY)		
	dimensions	num_reaches
	type	int64
	long_name	COMID
	fill_value	-999

grdc (CONSTRAINED ONLY)

Nested under model group for GRADES (constrained) data product only.

Dimensions

Name	Description	Value (if applicable)
num_days	Number of days	
num_grdc_reaches	Number of reaches GRDC data is available for	

Variables

num_days		
	dimensions	num_days
	type	int
	units	day

grdc_reach_id		
	dimensions	num_grdc_reaches
	type	int64
	format	CBBBBBRRRRT

flow_duration_q		
	dimensions	num_grdc_reaches by probability
	type	float

	long_name	flow_Duration_curve_discharge
	units	m^3/s
	comment	discharge values from the flow duration curve for this cell
	fill_value	- 999999999999

max_q		
	dimensions	num_grdc_reaches
	type	float
	long_name	maximum_discharge
	units	m^3/s
	comment	highest discharge value in this cell
	fill_value	- 999999999999

monthly_q		
	dimensions	num_grdc_reaches by num_months
	type	float
	long_name	mean_monthly_discharge
	units	m^3/s
	comment	monthly mean discharge time series in this cell
	fill_value	- 999999999999

mean_q		
	dimensions	num_grdc_reaches
	type	float
	long_name	mean_discharge
	units	m^3/s
	comment	mean discharge value in this cell
	fill_value	- 999999999999

min_q		
	dimensions	num_grdc_reaches
	type	float
	long_name	minimum_discharge
	units	m^3/s
	comment	lowest discharge value in this cell
	fill_value	- 999999999999

two_year_return_q		
	dimensions	num_grdc_reaches
	type	float
	long_name	two_Year_Return
	units	m^3/s
	comment	two-year return interval discharge value in this cell
	fill_value	- 999999999999

grdc_id		
	dimensions	num_grdc_reaches
	type	int64
	long_name	GRDC_ID_number
	fill_value	- 999

grdc_q		
	dimensions	num_grdc_reaches by num_days
	type	float
	long_name	GRDC_discharge_time_series_(daily)
	units	m^3/s
	comment	Direct port from GRDC
	fill_value	- 999999999999

grdc_qt		
	dimensions	num_grdc_reaches by num_days
	type	float
	long_name	GRDC_discharge_time_series_(daily)
	units	day
	comment	Direct port from GRDC
	fill_value	- 999999999999

usgs (CONSTRAINED ONLY)

Nested under model group for GRADES (constrained) data product only.

Dimensions

Name	Description	Value (if applicable)
num_days	Number of days	
num_usgs_reaches	Number of reaches USGS data is available for	

Variables

num_days		
	dimensions	num_days
	type	int
	units	day

usgs_reach_ids		
	dimensions	num_usgs_reaches
	type	int64
	format	CBBBBBRRRRT

flow_duration_q		
	dimensions	num_usgs_reaches by probability
	type	float
	long_name	flow_Duration_curve_discharge
	units	m^3/s
	comment	discharge values from the flow duration curve for this cell
	fill_value	- 999999999999

max_q		
	dimensions	num_usgs_reaches
	type	float
	long_name	maximum_discharge
	units	m^3/s
	comment	highest discharge value in this cell
	fill_value	- 999999999999

monthly_q		
	dimensions	num_usgs_reaches by num_months
	type	float
	long_name	mean_monthly_discharge
	units	m^3/s
	comment	monthly mean discharge time series in this cell
	fill_value	- 999999999999

mean_q		
	dimensions	num_usgs_reaches
	type	float
	long_name	mean_discharge
	units	m^3/s
	comment	mean discharge value in this cell
	fill_value	- 999999999999

min_q		
	dimensions	num_usgs_reaches
	type	float
	long_name	minimum_discharge
	units	m^3/s
	comment	lowest discharge value in this cell
	fill_value	- 999999999999

two_year_return_q		
	dimensions	num_usgs_reaches
	type	float
	long_name	two_Year_Return
	units	m^3/s
	comment	two-year return interval discharge value in this cell
	fill_value	- 999999999999

usgs_id		
	dimensions	num_usgs_reaches
	type	int64
	long_name	USGS_ID_number
	fill_value	- 999

usgs_q		
	dimensions	num_usgs_reaches by num_days
	type	float
	long_name	USGS_discharge_time_series_(daily)
	units	m^3/s
	comment	Direct port from USGS
	fill_value	- 999999999999

usgs_qt		
	dimensions	num_usgs_reaches by num_days
	type	float
	long_name	USGS_discharge_time_series_(daily)
	units	days since Jan 1 Year 1
	comment	Direct port from USGS
	fill_value	- 999999999999

gbpriors

The gbpriors group contains priors generated from geoBAM operations. It consists of two subgroups, one for priors generated on the reach-level called 'reach' and one for priors generated on the node-level called 'node'.

reach

river_type		
	dimensions	num_reaches
	type	float
	long_name	Brinkerhoff_class_number
	units	NA
	fill_value	-999

lowerbound_A0		
	dimensions	num_reaches
	type	float
	long_name	Median_area_min
	units	m^2
	fill_value	-999999999999

upperbound_A0		
	dimensions	num_reaches
	type	float
	long_name	Median_area_max
	units	m^2
	fill_value	-999999999999

lowerbound_logn		
	dimensions	num_reaches
	type	float

	long_name	Mannings_n_min
	units	NA
	fill_value	-999999999999

upperbound_logn		
	dimensions	num_reaches
	type	float
	long_name	Mannings_n_max
	units	NA
	fill_value	-999999999999

lowerbound_b		
	dimensions	num_reaches
	type	float
	long_name	AHG_b_min
	units	NA
	fill_value	-999999999999

upperbound_b		
	dimensions	num_reaches
	type	float
	long_name	AHG_b_max
	units	NA
	fill_value	-999999999999

lowerbound_logWb		
	dimensions	num_reaches
	type	float
	long_name	Bankfull_width_min
	units	m
	fill_value	-999999999999

upperbound_logWb		
	dimensions	num_reaches
	type	float
	long_name	Bankfull_width_max
	units	m

	fill_value	-999999999999

lowerbound_logDb		
	dimensions	num_reaches
	type	float
	long_name	Bankfull_depth_min
	units	m
	fill_value	-999999999999

upperbound_logDb		
	dimensions	num_reaches
	type	float
	long_name	Bankfull_depth_max
	units	m
	fill_value	-999999999999

lowerbound_logr		
	dimensions	num_reaches
	type	float
	long_name	Dingman_shape_min
	units	NA
	fill_value	-999999999999

upperbound_logr		
	dimensions	num_reaches
	type	float
	long_name	Dingman_shape_max
	units	NA
	fill_value	-999999999999

logA0_hat		
	dimensions	num_reaches
	type	float
	long_name	Median_area_mean
	units	m^2
	fill_value	-999999999999

logn_hat		
	dimensions	num_reaches
	type	float
	long_name	Mannings_n_mean
	units	NA
	fill_value	-999999999999

b_hat		
	dimensions	num_reaches
	type	float
	long_name	AHG_b_mean
	units	NA
	fill_value	-999999999999

logWb_hat		
	dimensions	num_reaches
	type	float
	long_name	Bankfull_width_mean
	units	m
	fill_value	-999999999999

logDb_hat		
	dimensions	num_reaches
	type	float
	long_name	Bankfull_depth_mean
	units	m
	fill_value	-999999999999

logr_hat		
	dimensions	num_reaches
	type	float
	long_name	Dingman_shape_mean
	units	NA
	fill_value	-999999999999

logA0_sd

	dimensions	num_reaches
	type	float
	long_name	Median_area_sd
	units	m^2
	fill_value	-999999999999

logn_sd		
	dimensions	num_reaches
	type	float
	long_name	Mannings_n_sd
	units	NA
	fill_value	-999999999999

b_sd		
	dimensions	num_reaches
	type	float
	long_name	AHG_b_sd
	units	NA
	fill_value	-999999999999

logWb_sd		
	dimensions	num_reaches
	type	float
	long_name	Bankfull_width_sd
	units	m
	fill_value	-999999999999

logDb_sd		
	dimensions	num_reaches
	type	float
	long_name	Bankfull_depth_sd
	units	m
	fill_value	-999999999999

logr_sd		
	dimensions	num_reaches
	type	float

	long_name	Dingman_shape_sd
	units	NA
	fill_value	-999999999999

lowerbound_logQ		
	dimensions	num_reaches
	type	float
	long_name	Discharge_min
	units	m^3/s
	fill_value	-999999999999

upperbound_logQ		
	dimensions	num_reaches
	type	float
	long_name	Discharge_max
	units	m^3/s
	fill_value	-999999999999

lowerbound_logWc		
	dimensions	num_reaches
	type	float
	long_name	AMHG_wc_min
	units	m
	fill_value	-999999999999

upperbound_logWc		
	dimensions	num_reaches
	type	float
	long_name	AMHG_wc_min
	units	m
	fill_value	-999999999999

lowerbound_logQc		
	dimensions	num_reaches
	type	float
	long_name	AMHG_Qc_min

	units	m^3/s
	fill_value	-999999999999

upperbound_logQc		
	dimensions	num_reaches
	type	float
	long_name	AMHG_Qc_max
	units	m^3/s
	fill_value	-999999999999

logWc_hat		
	dimensions	num_reaches
	type	float
	long_name	AMHG_wc_mean
	units	m
	fill_value	-999999999999

logQc_hat		
	dimensions	num_reaches
	type	float
	long_name	AMHG_Qc_mean
	units	m^3/s
	fill_value	-999999999999

logQ_sd		
	dimensions	num_reaches
	type	float
	long_name	Discharge_sd
	units	m^3/s
	fill_value	-999999999999

logWc_sd		
	dimensions	num_reaches
	type	float
	long_name	AMHG_wc_sd
	units	m
	fill_value	-999999999999

logQc_sd		
	dimensions	num_reaches
	type	float
	long_name	AMHG_qc_min
	units	m^3/s
	fill_value	-999999999999

Werr_sd		
	dimensions	num_reaches
	type	float
	long_name	Width_measurement_error
	units	m
	fill_value	-999999999999

Serr_sd		
	dimensions	num_reaches
	type	float
	long_name	Slope_measurement_error
	units	m/m
	fill_value	-999999999999

dAerr_sd		
	dimensions	num_reaches
	type	float
	long_name	d_Area_measurement_error
	units	m
	fill_value	-999999999999

sigma_man		
	dimensions	num_reaches
	type	float
	long_name	Manning_structural_error
	units	NA
	fill_value	-999999999999

sigma_amhg		
	dimensions	num_reaches

	type	float
	long_name	AMHG_structural_error
	units	NA
	fill_value	-999999999999

node

river_type		
	dimensions	num_nodes
	type	float
	long_name	Brinkerhoff_class_number
	units	NA
	fill_value	-999

lowerbound_A0		
	dimensions	num_reaches
	type	float
	long_name	Median_area_min
	units	m^2
	fill_value	-999999999999

upperbound_A0		
	dimensions	num_reaches
	type	float
	long_name	Median_area_max
	units	m^2
	fill_value	-999999999999

lowerbound_logn		
	dimensions	num_reaches
	type	float
	long_name	Mannings_n_min
	units	NA
	fill_value	-999999999999

upperbound_logn		
	dimensions	num_reaches
	type	float

	long_name	Mannings_n_max
	units	NA
	fill_value	-999999999999

lowerbound_b		
	dimensions	num_reaches
	type	float
	long_name	AHG_b_min
	units	NA
	fill_value	-999999999999

upperbound_b		
	dimensions	num_reaches
	type	float
	long_name	AHG_b_max
	units	NA
	fill_value	-999999999999

lowerbound_logWb		
	dimensions	num_reaches
	type	float
	long_name	Bankfull_width_min
	units	m
	fill_value	-999999999999

upperbound_logWb		
	dimensions	num_reaches
	type	float
	long_name	Bankfull_width_max
	units	m
	fill_value	-999999999999

lowerbound_logDb		
	dimensions	num_reaches
	type	float
	long_name	Bankfull_depth_min
	units	m

	fill_value	-999999999999

upperbound_logDb		
	dimensions	num_reaches
	type	float
	long_name	Bankfull_depth_max
	units	m
	fill_value	-999999999999

lowerbound_logr		
	dimensions	num_reaches
	type	float
	long_name	Dingman_shape_min
	units	NA
	fill_value	-999999999999

upperbound_logr		
	dimensions	num_reaches
	type	float
	long_name	Dingman_shape_max
	units	NA
	fill_value	-999999999999

logA0_hat		
	dimensions	num_nodes
	type	float
	long_name	Median_area_mean
	units	m^2
	fill_value	-999999999999

logn_hat		
	dimensions	num_nodes
	type	float
	long_name	Mannings_n_mean
	units	NA
	fill_value	-999999999999

b_hat		
	dimensions	num_nodes
	type	float
	long_name	AHG_b_mean
	units	NA
	fill_value	-999999999999

logWb_hat		
	dimensions	num_nodes
	type	float
	long_name	Bankfull_width_mean
	units	m
	fill_value	-999999999999

logDb_hat		
	dimensions	num_nodes
	type	float
	long_name	Bankfull_depth_mean
	units	m
	fill_value	-999999999999

logr_hat		
	dimensions	num_nodes
	type	float
	long_name	Dingman_shape_mean
	units	NA
	fill_value	-999999999999

logA0_sd		
	dimensions	num_nodes
	type	float
	long_name	Median_area_sd
	units	m^2
	fill_value	-999999999999

logn_sd

	dimensions	num_nodes
	type	float
	long_name	Mannings_n_sd
	units	NA
	fill_value	-999999999999

b_sd		
	dimensions	num_nodes
	type	float
	long_name	AHG_b_sd
	units	NA
	fill_value	-999999999999

logWb_sd		
	dimensions	num_nodes
	type	float
	long_name	Bankfull_width_sd
	units	m
	fill_value	-999999999999

logDb_sd		
	dimensions	num_nodes
	type	float
	long_name	Bankfull_depth_sd
	units	m
	fill_value	-999999999999

logr_sd		
	dimensions	num_nodes
	type	float
	long_name	Dingman_shape_sd
	units	NA
	fill_value	-999999999999

lowerbound_logQ		
	dimensions	num_reaches
	type	float

	long_name	Discharge_min
	units	m^3/s
	fill_value	-999999999999

upperbound_logQ		
	dimensions	num_reaches
	type	float
	long_name	Discharge_max
	units	m^3/s
	fill_value	-999999999999

lowerbound_logWc		
	dimensions	num_reaches
	type	float
	long_name	AMHG_wc_min
	units	m
	fill_value	-999999999999

upperbound_logWc		
	dimensions	num_reaches
	type	float
	long_name	AMHG_wc_min
	units	m
	fill_value	-999999999999

lowerbound_logQc		
	dimensions	num_reaches
	type	float
	long_name	AMHG_Qc_min
	units	m^3/s
	fill_value	-999999999999

upperbound_logQc		
	dimensions	num_reaches
	type	float
	long_name	AMHG_Qc_max

	units	m^3/s
	fill_value	-999999999999

logWc_hat		
	dimensions	num_reaches
	type	float
	long_name	AMHG_wc_mean
	units	m
	fill_value	-999999999999

logQc_hat		
	dimensions	num_reaches
	type	float
	long_name	AMHG_Qc_mean
	units	m^3/s
	fill_value	-999999999999

logQ_sd		
	dimensions	num_reaches
	type	float
	long_name	Discharge_sd
	units	m^3/s
	fill_value	-999999999999

logWc_sd		
	dimensions	num_reaches
	type	float
	long_name	AMHG_wc_sd
	units	m
	fill_value	-999999999999

logQc_sd		
	dimensions	num_reaches
	type	float
	long_name	AMHG_qc_min
	units	m^3/s
	fill_value	-999999999999

Werr_sd		
	dimensions	num_reaches
	type	float
	long_name	Width_measurement_error
	units	m
	fill_value	-999999999999

Serr_sd		
	dimensions	num_reaches
	type	float
	long_name	Slope_measurement_error
	units	m/m
	fill_value	-999999999999

dAerr_sd		
	dimensions	num_reaches
	type	float
	long_name	d_Area_measurement_error
	units	m
	fill_value	-999999999999

sigma_man		
	dimensions	num_nodes
	type	float
	long_name	Manning_structural_error
	units	NA
	fill_value	-999999999999

sigma_amhg		
	dimensions	num_nodes
	type	float
	long_name	AMHG_structural_error
	units	NA
	fill_value	-999999999999