Overwriting SoS Priors

The following details the data and expected format required to overwrite SoS priors.

Different data is needed to successfully overwrite a prior in the SoS, this is described in the "Required Data" section. Prior data should be stored in a NetCDF file, and the expected structure is described in the "NetCDF File" section.

A template script that can be used to generate this NetCDF file can be found here: https://github.com/SWOT-Confluence/overwrite

Please note that this script has not been extensively tested and is meant to serve as a guide and may need modifications for different priors.

You will want to edit and run the store.py file to generate the NetCDF file. The operations used to overwrite the SoS are included in the repository in the overwrite.py file for reference. Please see the repository's README for instructions on installation and usage.

To use the above script, you will need to generate a JSON file to hold the prior data. The structure of the JSON data is described in the "JSON Data" section.

Please email Nikki Tebaldi (ntebaldi@umass.edu) if you have any questions, need help getting started, or have NetCDF file(s) that can be used to overwrite SoS priors.

Required Data

- The name of the SoS file that contains the prior you wish to overwrite.
- The name of the prior which should match the name of the prior in the SoS.
- The prior data values.
- The SWORD identifiers for the prior data values.
    - If you have reach-level data, you will need to include the reach identifiers.
    - If you have node-level data, you will need to include the node identifiers instead of the reach identifiers.
    - If your data is indexed on num_days, you will need to include the days.
    - If your data is indexed on num_months or probability, you do not need to include these dimensions.
- The index values or locations of where you would like to insert (overwrite) the prior data values in the SoS.
- This data should be contained within a NetCDF file.

JSON Data

Please see the GitHub repository 'priors.json' file (https://github.com/SWOT-Confluence/overwrite/blob/main/json_data/priors.json) for an example that contains actual data. The README also points to specific examples in the 'priors.json' file.

An empty JSON file with no data can be found here: https://github.com/SWOT-Confluence/overwrite/blob/main/json_data/empty_priors.json

```
{
        "source": {
                "name": {
                        "values": [x, x, …, x, x],
                        "data_type": "x",
                        "reach_ids": [x, x, …, x, x],
                        "indexes": [x, x, …, x, x],
                        "run_type": x
                }
        }
}
```

source: The data source ("wbm", "grades", "grdc", "usgs", "gbreach", or "gbnode").

- "gbreach" represents the gbpriors/reach group.
- "gbnode" represents the gbpriors/node group.

name: The name of the prior (this should match the name of the prior in the SoS).

values: The prior data values.

- The first dimension of values should equal the size of reach_ids (in other words there is a value for each reach identifier). This is also the case for node_ids.

data_type: The data type of the prior data values. Valid types are: "i4" for integers and "f8" for floats.

reach_ids: The reach identifiers for the prior data values.

node_ids: The node identifiers for the prior data values (not depicted above and is only applicable to gbnode).

indexes: The index values or location of the prior data that you would like to overwrite in the SoS.

run_type: Either "constrained" or "unconstrained". This determines whether the constrained or unconstrained SoS is updated.

NetCDF File

There should be one NetCDF file per continent of priors. In other words, if you have priors that span continents, please organize them into separate NetCDF files according to the way the SoS is organized.

The SoS is organized by continent like the NetCDF version of SWORD, see "SWORD_ProductDescription_v11.pdf" Table 2 on page 5 for a list of continents and their identifiers.

Global attributes

- Author
- Contact information for author
- SoS file name
- Production date

Group(s)

Each prior you wish to overwrite should be a group in the NetCDF file which should be named after the data source and the prior you wish to overwrite that is already present in the SoS. The file should contain the following attributes, dimensions, and variables:

Group Attributes

- run_type (constrained or unconstrained)

Dimensions (all may not apply to the prior)

- num_reaches
- num_nodes
- num_months
- probability
- num_days
- nchars

Please see the document titled "confluence_data_description.pdf" for information on the dimensions associated with each prior.

Variables

- reach_id or node_id
- indexes
- prior_values