

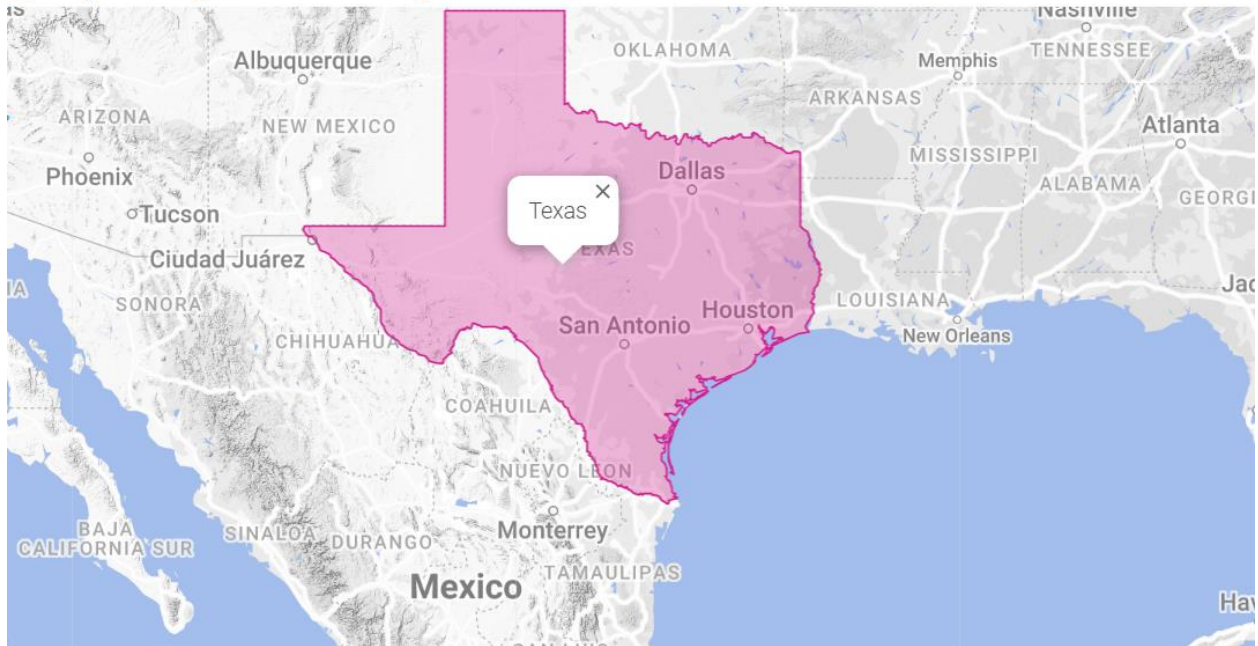
MODEL REGISTRATION STEPS

First, **login** to <https://tacc.mint.isi.edu/> by using the following username and password –

Username - mint@isi.edu

Password - Mint123!

Select Region – Texas



Go to **Prepare Models** and then **Configure Models**. Then **Add new setup** under **MODFLOW (in Hydrology)**.

For example,

A screenshot of a web browser displaying the 'Configure Models' page on the tacc.mint.isi.edu website. The browser's address bar shows the URL 'tacc.mint.isi.edu/texas/models/configure/MODFLOW/modflow_2005/modflow_2005_cfg/75e7eb90-de07-42f4-a652-8202a8...'. The page has a navigation bar with 'EXAS', 'Explore Models', 'Log in to see more', 'EMULATORS & RESULTS', and 'LOGIN'. The main content area is titled 'Configure Models' and features a list of model setups on the left and a detailed configuration for 'MODFLOW model setup for EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998' on the right. The configuration details include a description, keywords, region (Texas (USA)), setup creator (Khushboo Agarwal), parameter assignment method (Calibration), source code (None specified), and software image (mintproject/modflow2005:latest).

tacc.mint.isi.edu/texas/models/configure/MODFLOW/modflow_2005/modflow_2005_cfg/75e7eb90-de07-42f4-a652-8202a8...

scanlonb.pdf Welcome - Geoscie... Automated crater d... wait Final_report.docx ~... Final_report.docx ~... Fa22 - STATISTICAL... hospitality.jio.in Other book

EXAS Explore Models Log in to see more EMULATORS & RESULTS LOGIN

Configure Models

API DOCUMENTATION

the Barton Springs region. Files for average conditions have been pre-selected

- MODFLOW 2005 setup calibrated for Drought assessment (Recharge file is selected)
- MODFLOW 2005 model setup calibrated for the Barton Springs region. Well can be customized (the rest of inputs are average conditions, pre-selected)
- MODFLOW model setup for TRINITY-NORTH-TRANSIENT-1890-2012
- MODFLOW 2005 model setup calibrated for the Barton Springs region. Recharge can be customized (the rest of inputs are average conditions, pre-selected)
- Bolson-Mesilla-Transient-1915_1995
- MODFLOW model setup for EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998**
- MODFLOW 2005 model setup calibrated for the Barton Springs region on a drought season (files pre-selected)

⊕ Add new setup
⊕ Add new configuration

^ Penn State Integrated Hydrology Model (PIHM)
^ The Soil & Water Assessment Tool (SWAT)

SETUP: MODFLOW model setup for EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998

See in catalog

Model configurations are customizations of the model that use a subset of all the processes and functions that are possible with the general model software. Model set ups are manual configurations of a model for a specific geographical area or region, where some of the input data or parameters are constrained or fixed.

You can create a new model set up or do further customization of an existing one by editing the parameters to constrain their values further or to set defaults, fix input data files by providing a URL to them, and edit the descriptions of the model configuration to reflect the changes.

Description:	MODFLOW model setup for EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998
Keywords:	
Region:	Texas (USA)
Setup Creator:	Khushboo Agarwal
Parameter assignment method:	Calibration ?
Source Code:	None specified
Software Image:	mintproject/modflow2005:latest

The above model was setup for **EDWARDS BFZ BARTON SPRINGS**. For the setup, we need to add information like the description, Region, setup creator and input parameters. For the input parameters, all the GAM files like . ba6, . dis, . bc6, . dat and . hf6 files need to be registered. An example of registering a bas (.ba6) file can be seen below. The GAM file for Barton Springs was registered by adding external datasets to the 'Files' (as seen in the image below).

Editing dataset specification BAS file for EDWARDS_BFZ

A Dataset Specification is the description of an input/output file. The variables set in this resource will be used to search relevant datasets.

Name
BAS file for EDWARDS_BFZ

Description
Basic Package Input for the Groundwater Flow Process Basic file

Format
ba6

Variables:
STRT (m)

Number of files
Single file

Files:
BAS file for EDWARDS_BFZ

CANCEL SAVE

To add an external link/dataset, first, go to <https://ptdatax.tacc.utexas.edu/> . Next, go to Data Files - >> My Projects - >> Add New Project. Then upload the required GAMs and create a public URL. This public url can be added to the input parameter in the model setup. An example of public URL can be seen below –

Public Url for BARTON_SPRINGS_2001_2010DROUGHT (4).ba6



































The following URL can be used to access this file without authentication. Share at your own risk.

<https://portals-api.tacc.utexas.edu/postits/v2/599d0e3c-5fb7-443c-af32-9f2db5920ee7-010>



This URL is valid until **Jan 26, 2024 10:15:42 AM**.

Close

Name	Size	Last Modified	Permissions	Public URL
 BARTON_SPRINGS_2001_2010DROUGHT (4).ba6	352.0 kB	1/26/23 9:08 AM	Read/Write	 View/Edit
 EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998.ba6	241.5 kB	2/11/23 8:43 AM	Read/Write	 View/Edit
 EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998.bc6	553.0 kB	2/11/23 8:43 AM	Read/Write	 View/Edit
 EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998.dis	378.9 kB	2/11/23 8:43 AM	Read/Write	 View/Edit
 EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998.drn	1.5 kB	2/11/23 8:43 AM	Read/Write	 View/Edit
 EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998.hf6	1.6 MB	2/11/23 8:43 AM	Read/Write	 View/Edit
 EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998.oc	188.3 kB	2/11/23 8:43 AM	Read/Write	 View/Edit
 EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998.rch	23.2 MB	2/11/23 8:43 AM	Read/Write	 View/Edit
 EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998.sip	74.0 bytes	2/11/23 8:43 AM	Read/Write	 View/Edit
 EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998.wel	33.8 MB	2/11/23 8:43 AM	Read/Write	 View/Edit
 EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998.zip	3.0 MB	2/16/23 10:24 PM	Read/Write	 View/Edit
 MODFLOW-NWT.exe	7.1 MB	2/9/23 10:03 PM	Read/Write	 Create
 MODFLOW-NWT_64_usgs.exe	7.8 MB	2/9/23 10:03 PM	Read/Write	 Create
 rcharr008.ref	23.0 MB	2/9/23 10:04 PM	Read/Write	 Create
 rcharr009.ref	23.0 MB	2/9/23 10:04 PM	Read/Write	 Create
 rcharr011.ref	23.0 MB	2/9/23 10:05 PM	Read/Write	 Create
 rcharr013.ref	23.0 MB	2/9/23 10:05 PM	Read/Write	 Create

Creation of Public url using ptdatax

Example of a new setup under modflow -

https://tacc.mint.isi.edu/texas/models/configure/MODFLOW/modflow_2005/modflow_2005_cfg/75e7e090-de07-42f4-a652-8202a8b1bd2e

You can also go to “**see in catalog**” and visit the model catalog page -

API

DOCUMENTATION

Setup for Edwards-Barton Springs Model

See in catalog

SETUP: MODFLOW model setup for EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998

Model configurations are customizations of the model that use a subset of all the processes and functions that are possible with the general model software. Model set ups are manual configurations of a model for a specific geographical area or region, where some of the input data or parameters are constrained or fixed.

You can create a new model set up or do further customization of an existing one by editing the parameters to constrain their values further or to set defaults, fix input data files by providing a URL to them, and edit the descriptions of the model configuration to reflect the changes.

Description:

MODFLOW model setup for EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998

Keywords:

Texas (USA)

Setup Creator:

Khushboo Agarwal

Parameter assignment method:

Calibration

Source Code:

None specified

Software Image:

mintproject/modflow2005:latest

Component:

https://github.com/mintproject/MINT

This is how the model catalog page looks –

The screenshot shows the 'Model Catalog' page for MODFLOW. At the top, there are navigation tabs: 'TEXAS', 'Explore Areas', 'Prepare Models' (highlighted), 'Browse Datasets', 'Use Models', and 'Prepare Reports'. On the right, there are links for 'EMULATORS & RESULTS' and 'MINT@ISI.EDU'. Below the navigation, the page title is 'Model Catalog'. On the right side, there are buttons for 'API' and 'DOCUMENTATION'. The main content area is titled 'MODFLOW' and includes a 'Selected configuration' dropdown set to 'MODFLOW 2005 configuration' and a 'Selected configuration setup' dropdown set to 'MODFLOW model setup for EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998'. Both dropdowns have 'EDIT CONFIGURATION' and 'EDIT SETUP' buttons. Below this, there is a section for 'Modflow' with a description: 'Modflow is a popular open-source groundwater flow model distributed by the U.S. Geological survey'. It lists metadata: 'Authors: US Geological survey', 'Funding: US Geological survey', 'Publisher: US Geological survey', 'Preferred citation: Harbaugh, A. W. (2005). MODFLOW-2005: the US Geological Survey modular ground-water model: the ground-water flow process (pp. 6-A16). Reston, VA: US Department of the Interior; US Geological Survey.', 'Documentation: https://water.usgs.gov/ogw/modflow/', 'Regions: Barton Springs (Texas), Texas (USA)', and 'Keywords: Groundwater modeling, Steady and nonsteady flow, Areal recharge, Evapotranspiration, Flow to drains, Flow through river beds'. At the bottom, there are tabs for 'Overview' (selected), 'Inputs and Outputs', 'Variables', and 'Technical Information'.

The above steps showed how to create a model setup and hardcode external datasets to configure model. Next, we need to register the data in the catalog - <https://data-catalog.tacc.mint.isi.edu/> using the GitHub code available at - https://github.com/mintproject/data_registration

The code needs three files to run – dataset.json, variables.json and resources.json. See example files : dataset_Barton.json, resources_Barton.json and variables_Barton.json files for more details.

Once, you run the code, you get a record id and name of the model that was registered as seen below -

Registering dataset

```
{'result': 'success', 'datasets': [{'record_id': 'ef0e8226-192b-4dee-a723-e445b492f4b4', 'provenance_id': '9ef60317-5da5-4050-8bbc-7d6826fee49f', 'name': 'EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998_v1', 'description': 'Groundwater flow model developed for the Barton Springs segment of the Edwards Aquifer developed by the Bureau of Economic Geology, TWDB and Barton Springs Edwards Aquifer Conservation District. This region is hydrologically distinct from other parts of the Edwards Aquifer and is a major source of water.', 'json_metadata': {'temporal_coverage': {'start_time': '1989-01-01T00:00:00', 'end_time': '1998-01-01T00:00:00'}, 'datatype': 'modflow'}}]}
```

Registering Variables

```
{'result': 'success', 'standard_variables': [{'id': '65a6e85a-26d0-5a1f-bc37-3b0744f8adf4', 'ontology': 'SVO', 'name': 'aquifer_elevation', 'uri': 'http://www.geoscienceontology.org/svo/svl/variable#%28ground%40medium_water%29%40role%7Emain_water%40role%7aquifer_elevation', 'description': ''}, {'id': '97f89b28-0dd7-5a0f-9b16-1c5b779bd93a', 'ontology': 'SVO', 'name': 'aquifer_specific_yield', 'uri': 'http://www.geoscienceontology.org/svo/svl/variable#%28ground%40medium_water%29%40role%7Emain_water%40role%7aquifer_specific_yield', 'description': ''}, {'id': '9f017e2f-92e1-5fb9-9002-3aee59f3ec83', 'ontology': 'SVO', 'name': 'aquifer_horizontal_hydraulic_conductivity', 'uri': 'http://www.geoscienceontology.org/svo/svl/variable#%28ground%40medium_water%29%40role%7Emain_water%40role%7aquifer_horizontal_hydraulic_conductivity', 'description': ''}, {'id': 'f1ef8bb0-a32c-576e-822d-b3e337580118', 'ontology': 'SVO', 'name': 'aquifer_specific_storage', 'uri': 'http://www.geoscienceontology.org/svo/svl/variable#%28ground%40medium_water%29%40role%7Emain_water%40role%7Ein_recharge__recharge_volume_flux', 'description': ''}]}]
```

```
{'result': 'success', 'variables': [{'record_id': '12e50d9d-55c1-40ca-bc73-3aa63f8b1bbc', 'dataset_id': 'ef0e8226-192b-4dee-a723-e445b492f4b4', 'name': 'elevation', 'json_metadata': {'label': 'elevation', 'units': 'ft', 'data_type': 'float', 'type': 'numerical.continuous'}}, {'record_id': '01fd9e97-23a6-4672-988e-cca609498ecc', 'dataset_id': 'ef0e8226-192b-4dee-a723-e445b492f4b4', 'name': 'Horizontal hydraulic conductivity', 'json_metadata': {'label': 'Horizontal hydraulic conductivity', 'units': 'ft/d', 'data_type': 'float', 'type': 'numerical.continuous'}}, {'record_id': 'fff39f50-f4c0-4c02-93ef-22f3b867b409', 'dataset_id': 'ef0e8226-192b-4dee-a723-e445b492f4b4', 'name': 'specific yield', 'json_metadata': {'label': 'specific yield', 'units': '', 'data_type': 'float', 'type': 'numerical.continuous'}}, {'record_id': '9ad79649-496b-4184-bba3-fb05272705be', 'dataset_id': 'ef0e8226-192b-4dee-a723-e445b492f4b4', 'name': 'specific storage', 'json_metadata': {'label': 'specific storage', 'units': 'ft-1', 'data_type': 'float', 'type': 'numerical.continuous'}}]}
```

Registering Resources

Registering resource chunk 1

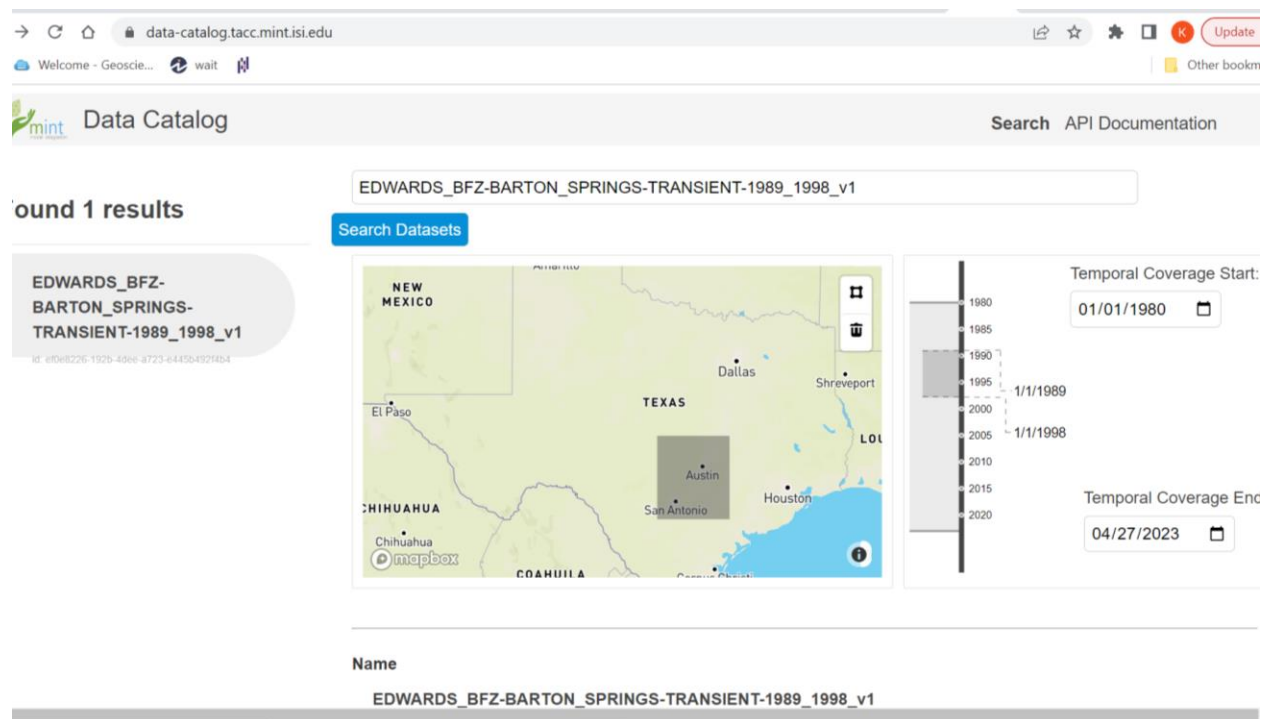
```
{'result': 'success', 'resources': [{'record_id': 'c5fd7841-53a1-409f-8cd4-21933b11979a', 'provenance_id': '9ef60317-5da5-4050-8bbc-7d6826fee49f', 'dataset_id': 'ef0e8226-192b-4dee-a723-e445b492f4b4', 'name': 'EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998', 'resource_type': 'model', 'data_url': 'https://tacc.mint.isi.edu/texas/models/configure/MODFLOW/modflow_2005/modflow_2005_cfg/75e7e090-de07-42f4-a652-8202a8b1bd2e', 'layout': {}, 'json_metadata': {'spatial_coverage': {'type': 'BoundingBox', 'value': {'xmax': -
```

```

97, 'xmin': -99, 'ymax': 31, 'ymin': 29}}, 'temporal_coverage': {'start_time': '1989-01-01T00:00:00', 'end_time': '1998-01-01T00:00:00'}}}, {'record_id': '09266e1a-e398-4345-a97b-abf9d7a88e06', 'provenance_id': '9ef60317-5da5-4050-8bbc-7d6826fee49f', 'dataset_id': 'ef0e8226-192b-4dee-a723-e445b492f4b4', 'name': 'EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998.zip', 'resource_type': 'Input data zip file', 'data_url': 'https://portals-api.tacc.utexas.edu/postits/v2/38e48b08-b6bc-44e9-b105-f8063289d890-010', 'layout': {}, 'json_metadata': {'spatial_coverage': {'type': 'BoundingBox', 'value': {'xmax': -97, 'xmin': -99, 'ymax': 31, 'ymin': 29}}, 'temporal_coverage': {'start_time': '1989-01-01T00:00:00', 'end_time': '1998-01-01T00:00:00'}}}}]}

```

After registering the data, the dataset name 'EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998_v1' can be searched on <https://data-catalog.tacc.mint.isi.edu/> as seen below –



The above figure shows both the temporal and spatial information of the dataset. If you click “View more details” you can see detailed information about the variables and resources.

Variables (4)

elevation

Id: 12e50d9d-55c1-40ca-bc73-3aa63f8b1bbc

Standard Variable Name:

aquifer_elevation

standard_variable_id: 65a6e85a-26d0-5a1f-bc37-3b0744f8adf4

Standard Variable URI:

http://www.geoscienceontology.org/svo/svl/variable#%28ground%40medium_water%29%40role%7Emain_water%40role%7Equil

Standard Variable Ontology:

SVO

type:

numerical.continuous

label:

elevation

units:

代

data_type:

float

Horizontal hydraulic conductivity

Standard Variable Name:

aquifer_horizontal_hydraulic_conductivity

standard_variable_id: 9f017e2f-92e1-5fb9-9002-3aee59f3ec83

Standard Variable URI:

http://www.geoscienceontology.org/svo/svl/variable#%28ground%40medium_water%29%40role%7Emain_water%40role%7Equifi

Standard Variable Ontology:

SVO

type:

numerical.continuous

data-catalog.tacc.mint.isi.edu/datasets/ef0e8226-192b-4dee-a723-e445b492f4b4

Resources (2)

EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998.zip

id: 09266e1a-e398-4345-a97b-abf9d7a88e06

File Type: Input data zip file

Data URL: <https://portals-api.tacc.utexas.edu/postits/v2/38e48b08-b6bc-44e9-b105-f8063289d890-010>

```
spatial_coverage: {"type": "BoundingBox", "value": {"xmax": -97, "xmin": -99, "ymax": 31, "ymin": 29}}
```

```
temporal_coverage: {"end_time":"1998-01-01T00:00:00","start_time":"1989-01-01T00:00:00"}
```

EDWARDS BFZ-BARTON SPRINGS-TRANSIENT-1989 1998

File Type: model

Data URL: https://tacc.mint.isi.edu/texas/models/configure/MODFLOW/modflow_2005/modflow_2005_cfg/75e7e090-de07-42f4-a652-8202a8b1bd2e

```
spatial_coverage: {"type": "BoundingBox", "value": {"xmax": -97, "xmin": -99, "ymax": 31, "ymin": 29}}
```

```
temporal_coverage: {"end_time": "1998-01-01T00:00:00", "start_time": "1989-01-01T00:00:00"}
```

The resources include the link to the model setup and all the GAM files.

Next, you can go to Explore Areas -> Hydrology . If you correctly added the bounding box information in the json file, the hydrology map will show your model.

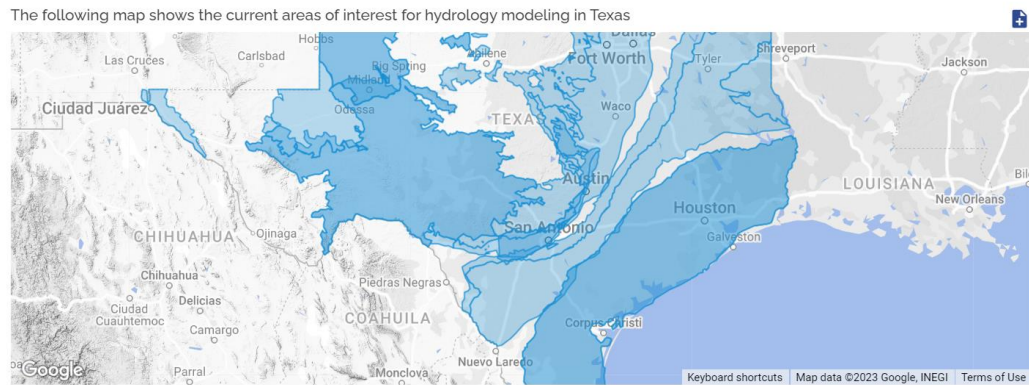
→ ↻ 🏠 tacc.mint.isi.edu/texas/regions/hydrology

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< **Hydrology Regions**

Hydrology Watersheds +



Ideally, when you click on the location in the hydrology map, it should show your dataset/model. But currently, the above map shows only 11 datasets for each hydrology region so if we keep adding more datasets to any region then you cannot see your data. Since Edwards_9 and Edwards_24 already have 11 models each, I used a different coordinate away from Edwards BFZ Barton Springs for a region which had less than 11 dataset registered in it.

→ ↻ 🏠 tacc.mint.isi.edu/texas/regions/hydrology

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- Global Basin Dataset**
Available on MINT servers - 1 files
- GPM Monthly 2008-2019**
Available for download | MINT Understandable Format - 144 files
- EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998_v4**
Available for download - 2 files

You can also access the model on the hydrology map using the following link (need to add your record id and then the region id after <https://tacc.mint.isi.edu/texas/datasets/browse>) –

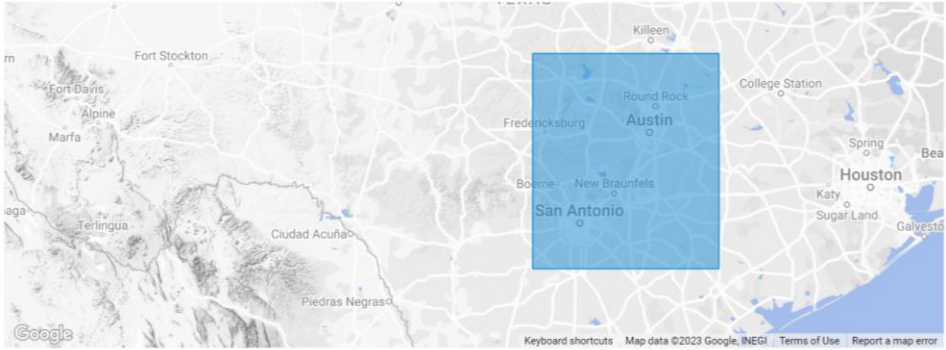
<https://tacc.mint.isi.edu/texas/datasets/browse/ef0e8226-192b-4dee-a723-e445b492f4b4/1ap0Inly6Lq3jYZgDDKy>

tacc.mint.isi.edu/texas/datasets/browse/ef0e8226-192b-4dee-a723-e445b492f4b4/1ap0Inly6Lq3jYZgDDKy

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TEXAS Explore Areas Prepare Models **Browse Datasets** Use Models Prepare Reports EMULATORS & RESULTS MIN

< Browse Datasets / ef0e8226-192b-4dee-a723-e445b492f4b4

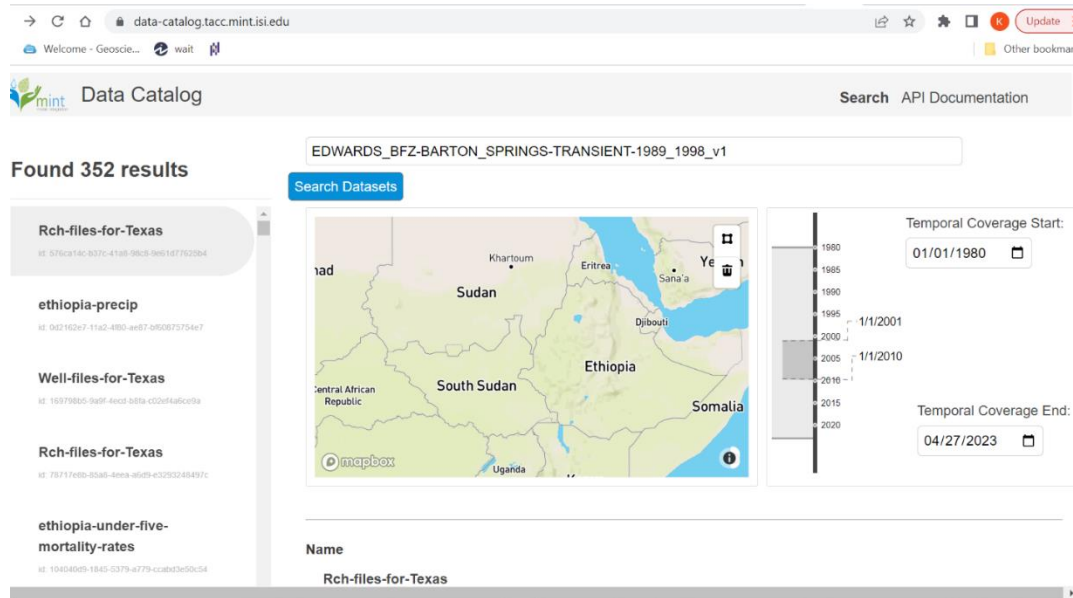


2 Resource(s)

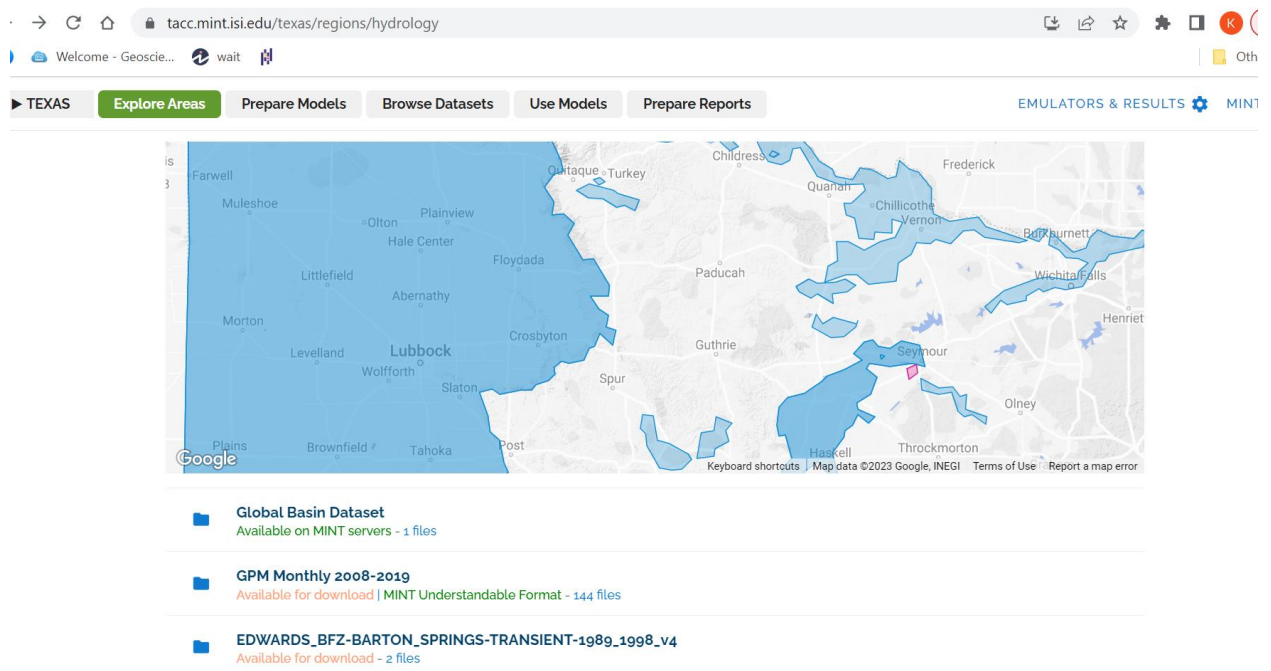
- EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998.zip
 - Download: <https://portals-api.tacc.utexas.edu/postits/v2/38e48bo8-b6bc-44e9-b105-f8063289d890-010>
 - Time: 1/1/1989 to 1/1/1998
- EDWARDS_BFZ-BARTON_SPRINGS-TRANSIENT-1989_1998

User Comments –

1. The search Dataset in <https://data-catalog.tacc.mint.isi.edu/> resets itself to Ethiopia after every search. So, the user needs to refresh the page after every search -



2. Only 11 models are visible under each hydrology region in the hydrology map. So, your model may not show up in the hydrology map even after adding the correct spatial location. This needs to be fixed.



For example, I registered the Edwards Barton Spring model, which showed up on the hydrology map but disappeared later. This is because the hydrology region where the Barton Spring model was registered, already had 11 models. So, I changed the spatial coverage of this model to make it visible on the hydrology map as seen above (the model is now visible in the Seymour region). If you want to see the model in the correct location, you need to go to - <https://tacc.mint.isi.edu/texas/datasets/browse/ef0e8226-192b-4dee-a723-e445b492f4b4/1ap0Inly6Lq3jYZgDDKy>

Additionally, it is hard to click on smaller regions on the hydrology map.

3. A user can modify an existing registered model by adding the record id in the dataset.json file but it is hard to overwrite or delete an existing model/dataset. The code keeps appending new information to the existing model but is not able to replace the metadata.
4. It may be better to use a scripted approach to create the model setup instead of using GUI
5. It is hard to create a smaller polygon on the hydrology map. Also, it is possible to show a bounding box on the hydrology map but will be useful to know how to show an entire shapefile on the map.
6. In the model setup process, while uploading an external dataset, the user must manually enter the description twice. It will be better if the interface can inherit the description itself.