



Advancing GeoAI: CyberTraining using I-GUIDE and National Artificial Intelligence Computing Research Resource (NAIRR)

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Introduction of the Projects



NAIRR Pilot Utilizing NAIRR Pilot Resources for Building Sustainable Blue Economy (# 2526748)

- Strengthens Blue Economy research by expanding funding, fostering cross-sector partnerships, and building an AI-enabled research network connecting students and scholars across U.S. institutions.
- Through workshops, training, and NAIRR-supported computing resources, participants gain practical AI skills for ocean and coastal sustainability. Project Website: <https://nairr-blueeconomy.geos.tamu.edu/nairr-blueeconomy>

CyberTraining: Broadening Adoption of Cyberinfrastructure and GeoAI for Disaster Management (# 2519476)

- Establishing an International CyberTraining network to equip students, scientists, and faculty with CyberTraining and GeoAI capabilities for disaster management across diverse disciplines.
- Develop core computational literacy and practical skills for analyzing large-scale disaster data and building new CyberTraining-enabled tools for monitoring and managing hazard events. Award website: https://www.nsf.gov/awardsearch/show-award?AWD_ID=2519476

Objectives of Learning:

- **Learn how to access the NSF-funded ACES Supercomputer and I-GUIDE including how to create an account, log in, and access training notebooks.**
- **Understand how to use high-performance AI algorithms to conduct research in disaster management and sustainability.**

This training material is mainly supported by the CyberTraining and NAIRR projects funded by NSF

Collaborators



Technical
University
of Munich



Computing Platforms

- **NSF ACCESS – Texas A&M ACES**
<https://hprc.tamu.edu/aces/>
- **NSF I-GUIDE**
<https://i-guide.io/>
- **NSF Jetstream 2**
<https://jetstream-cloud.org/>

NSF ACES Training

Step 1 — Open the ACES Portal



1. Go to:
<https://hprc.tamu.edu/aces/>
2. Click Portal (top right)
3. Select ACES Portal in the dropdown menu

Step 2 — Select Login Provider



After redirected to the the login page:

1. Select Identity Provider:
ACCESS CI (XSEDE)
2. Click Log On

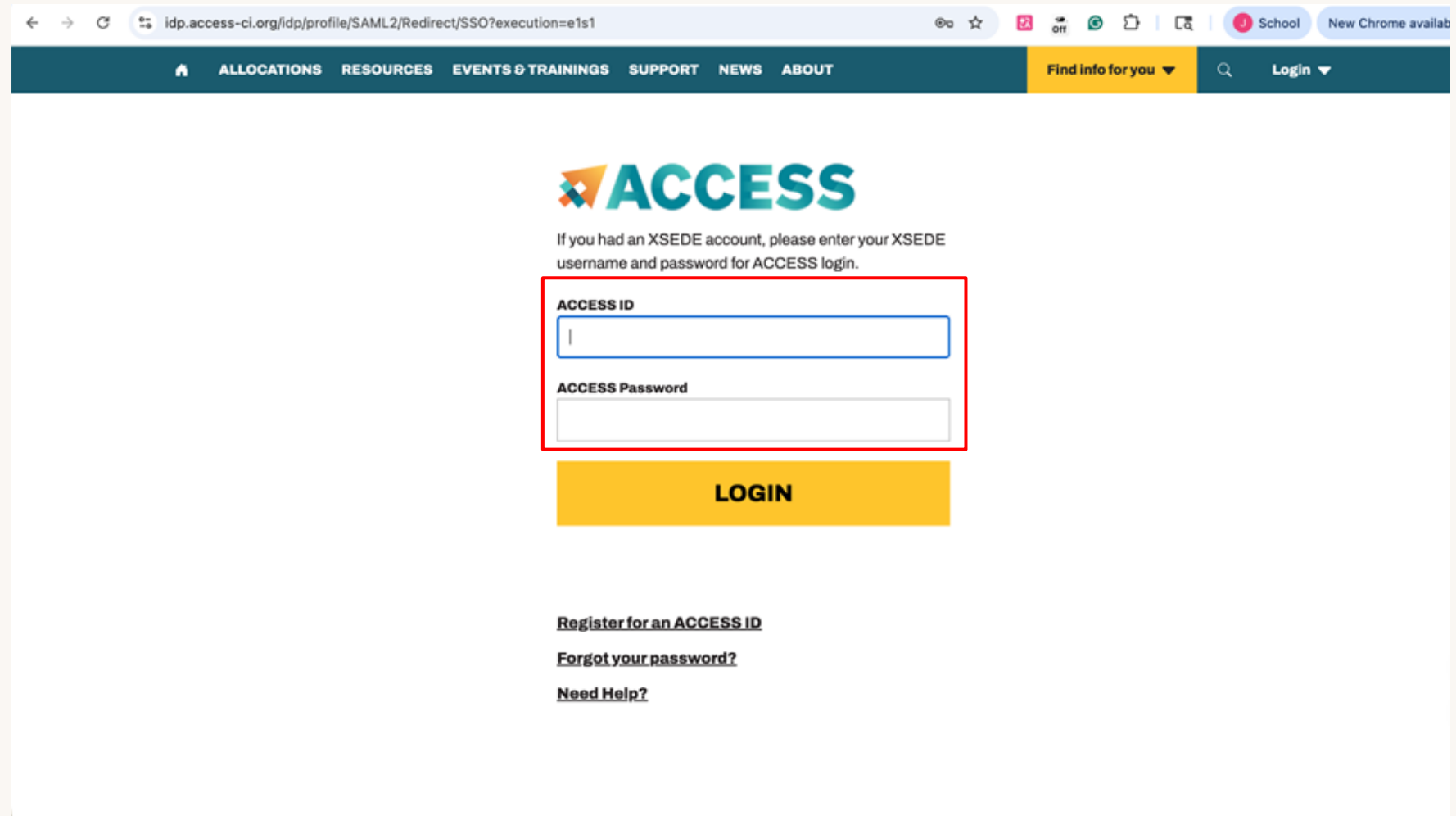
Don't log in with your university account!
Use the nsf allocation by choosing
"ACCESS CI (XSEDE)"

The screenshot shows the CILogon login page. The browser address bar displays a URL starting with 'cilogon.org/authorize?response_type=code&scope=openid%20email%20profile%20org.cilogon.userinfo&client_id=cilo...'. The page has a dark blue header with navigation links: ALLOCATIONS, RESOURCES, EVENTS & TRAININGS, SUPPORT, NEWS, ABOUT. On the right of the header are links for 'Find info for you' and 'Login'. The main content area features the 'ACCESS' logo. Below it is a 'Consent to Attribute Release' section with a dropdown arrow. The consent text states: 'TAMU ACES ACCESS OIDC requests access to the following information. If you do not approve this request, do not proceed.' followed by a list of requested information: 'Your CILogon user identifier', 'Your name', 'Your email address', and 'Your username and affiliation from your identity provider'. Below the consent section is the 'Select an Identity Provider' section. It contains a dropdown menu with 'ACCESS CI (XSEDE)' selected. A red box highlights the dropdown, and a white arrow points to it with the text 'Select ACCESS CI (XSEDE)'. Below the dropdown is a checkbox labeled 'Remember this selection' with a help icon. At the bottom right of the section is a yellow 'LOG ON' button. A white arrow points to the button with the text 'Then Click Here'. At the very bottom, a small line of text reads: 'By logging on to this site, you agree to the [privacy policy](#).'

Step 3 — Log in with ACCESS Account



1. Enter your ACCESS ID
2. Enter your ACCESS Password
3. Click LOG ON

A screenshot of a web browser showing the ACCESS login page. The browser's address bar displays 'ldp.access-ci.org/ldp/profile/SAML2/Redirect/SSO?execution=e1s1'. The page has a dark teal header with navigation links: 'ALLOCATIONS', 'RESOURCES', 'EVENTS & TRAININGS', 'SUPPORT', 'NEWS', and 'ABOUT'. On the right of the header are links for 'Find info for you' and 'Login'. The main content area features the 'ACCESS' logo, a message about XSEDE accounts, and a login form. The login form consists of two text input fields: 'ACCESS ID' and 'ACCESS Password', both of which are highlighted with a red rectangular border. Below these fields is a large yellow button labeled 'LOGIN'. At the bottom of the page, there are three links: 'Register for an ACCESS ID', 'Forgot your password?', and 'Need Help?'.

ldp.access-ci.org/ldp/profile/SAML2/Redirect/SSO?execution=e1s1

ALLOCATIONS RESOURCES EVENTS & TRAININGS SUPPORT NEWS ABOUT

Find info for you Login

ACCESS

If you had an XSEDE account, please enter your XSEDE username and password for ACCESS login.

ACCESS ID

ACCESS Password

LOGIN

[Register for an ACCESS ID](#)

[Forgot your password?](#)

[Need Help?](#)

Step 4 - Updating to the Latest Training Materials



To get the latest materials:

1. Go to the home page:

<https://portal-aces.hprc.tamu.edu/pun/sys/dashboard>

2. Click on:

`/scratch/user/u.jz324199`

(Your username will be different.)

Continue on the next slide

The screenshot shows the ACES OnDemand Portal dashboard. The browser address bar displays `portal-aces.hprc.tamu.edu/pun/sys/dashboard/`. The top navigation bar includes links for Files, Jobs, Clusters, Interactive Apps, Affinity Groups, Dashboard, Training, Utilities, My Interactive Sessions, and a Help icon. A dropdown menu for the 'Files' link is open, showing 'Home Directory' and the path `/scratch/user/u.jz324199`. The main content area features the ACES logo with the tagline 'ACCELERATING COMPUTING FOR EMERGING SCIENCES'. Below the logo, a message states: 'OnDemand provides an integrated, single access point for all of your HPC resources.' A 'Message of the Day' section follows, titled 'IMPORTANT POLICY INFORMATION', which lists four bullet points regarding HPRC resource usage and policies. A warning message below states: 'WARNING: THERE ARE ONLY NIGHTLY BACKUPS OF USER HOME DIRECTORIES. SCRATCH IS NOT BACKED UP AND IS NOT MEANT FOR LONG TERM STORAGE.' The footer includes the text 'powered by OPEN OnDemand' and 'OnDemand version: 4.0.8'.

Step 4 - Updating to the Latest Training Materials(Continue)



3. Locate the “2026_cybertraining” folder, Click the dropdown menu.

4. Click “Delete”

5. Then follow Steps 4–7 in the previous slides to launch a new job

6. **Take a screenshot to show the material successfully get deleted.**

The screenshot shows the ACES OnDemand Portal interface. The breadcrumb path is /scratch/user/u.jz324199/. A table of files and directories is displayed with columns for Type, Name, Size, and Modified at. The '2026_cybertraining' folder is highlighted with a red box. A context menu is open for this folder, with the 'Delete' option highlighted by a red arrow and the text 'Then click here'. Another red arrow points to the dropdown menu icon of the '2026_cybertraining' folder with the text 'click here'.

Type	Name	Size	Modified at
Folder	2026_cybertraining	-	10/10/2025 2:21:24 PM
Folder	cybertraining-summerchool_v1	-	11/4/2025 2:03:09 PM
Folder	cybertraining-wkshop	-	10/30/2025 4:35:46 PM
Folder	cybertraining_notebooks	-	1/5/2026 4:39:05 PM
Folder	drona_composer	-	9/16/2025 1:25:01 PM
Folder	ondemand	-	8/11/2025 3:13:36 PM

⚠ IMPORTANT:
If an old JupyterLab session is still active, it will NOT load the updated materials.
You must create a new job.

Step 5 — Open JupyterLab



On the ACES OnDemand Portal:

1. In the top menu, click Interactive Apps
2. Select:
JupyterLab (CTDM Project)

The screenshot shows the ACES OnDemand Portal interface. The top navigation bar includes links for Files, Jobs, Clusters, Interactive Apps, My Groups, Dashboard, Training, Utilities, My Interactive Sessions, Develop, Help, and a user login status. The 'Interactive Apps' menu is open, displaying a list of applications under 'Desktops', 'Imaging', and 'Servers' categories. The 'JupyterLab (CTDM project)' option is highlighted. Two red arrows with text provide instructions: '1. Click Here First' points to the 'Interactive Apps' menu, and '2. Click this one(JupyterLab (CTDM Project))' points to the highlighted 'JupyterLab (CTDM project)' option. The background shows the ACES logo and a 'Message of the Day' section.

Step 6 — Configure Session Settings



1. Scroll down to the setting field

Recommended settings:

- Number of hours: 1
- Number of cores: 4
- Memory: 8 GB

Required setting:

- Optional Environment to be activated: **cybertraining-env-v26**
- Account number: **156181483173**

After fill in the setting, click **Launch**

- choose "aces-training-env" for aces folder
- choose "cybertraining-env-v26" for all other notebooks
- For the example shown in this tutorial, choose the "cybertraining-env-v26" one

click here, then choose "156181483173"

Step 7 — Wait for Session to Launch



- Your job will enter the queue briefly
- Status will change from Queue → Starting → Running
- If you close the page:
 - Return to ACES Portal
 - Click My Interactive Sessions(see the last slides for more detail)

A screenshot of the ACES OnDemand Portal web interface. The browser address bar shows 'portal-aces.hprc.tamu.edu/pun/sys/dashboard/batch_connect/sessions'. The top navigation bar includes links for 'Files', 'Jobs', 'Clusters', 'Interactive Apps', 'Affinity Groups', 'Dashboard', 'Training', 'Utilities', 'My Interactive Sessions', 'Develop', 'Help', and 'Logged in as'. A green notification banner at the top states 'Session was successfully created.' Below this, the breadcrumb 'Home / My Interactive Sessions' is visible. On the left, a sidebar titled 'Interactive Apps' lists categories: 'Desktops' (VNC), 'Imaging' (ChimeraX, CryoSPARC, CryoSPARC 4.2.1, ImageJ), 'Jmol', 'Paraview', 'cisTEM', and 'Servers' (Jupyter AI Assistant, Jupyter Notebook, JupyterLab, JupyterLab (CTDM project)). The main content area displays details for the 'JupyterLab (CTDM project) (1467363)' session, which is in a 'Queued' state. It shows the creation time as '2026-02-21 16:28:50 CST', a 'Time Requested' of '1 hour', a 'Session ID' of 'a06d7f30-3d29-4476-87d9-6402f475bf35', and a 'Module' of 'Anaconda3/2022.10'. A red 'Delete' button is present. A message at the bottom of the session details states: 'Please be patient as your job currently sits in queue. The wait time depends on the number of cores as well as time requested.'

Step 8 — Connect to JupyterLab



- Once the session is running:
- Click
 - **Connect to JupyterLab**
- This will open the JupyterLab interface.

The screenshot shows the ACES OnDemand Portal interface. At the top is a dark red navigation bar with links for 'ACES OnDemand Portal', 'Files', 'Jobs', 'Clusters', 'Interactive Apps', 'Affinity Groups', 'Dashboard', 'Training', 'Utilities', 'My Interactive Sessions', 'Develop', 'Help', and 'Logged in as'. Below this is a light blue header with 'Home / My Interactive Sessions'. The main content area is divided into two panels. The left panel, titled 'Interactive Apps', lists various applications under 'Desktops', 'Imaging', and 'Servers' categories. The right panel displays details for a 'JupyterLab (CTDM project) (1467363)' session, which is 'Running' on '1 node' and '2 cores'. It shows the host as 'ac003', creation time as '2026-02-21 16:28:50 CST', time remaining as '57 minutes', session ID as 'a06d7f30-3d29-4476-87d9-6402f475bf35', and module as 'Anaconda3/2022.10'. A red 'Delete' button is present. At the bottom of the right panel is a blue 'Connect to JupyterLab' button, which is highlighted by a red arrow and the text 'Click Here'.

Step 9 — Open Training Notebook and Run All Cells



1. Training folders are on the left panel
2. To show you how to run the notebooks click:
Fish Habitat Suitability Modeling folder
3. Open notebook file:
fish.ipynb
4. Continue on the next slide

The screenshot shows the portal-aces.hprc.tamu.edu interface. The left panel displays a file explorer with the following table:

Name	Last Modified
ACES_Training	22 days ago
Fish Habitat Suitability Modeling	3 days ago
Maritime Traffic	3 days ago
Visualization	22 days ago

An arrow labeled "Training material" points to the "ACES_Training" folder. Another arrow labeled "click this one first" points to the "Fish Habitat Suitability Modeling" folder. A third arrow labeled "Then double-click on this notebook" points to the "Fish.ipynb" file in the expanded "Fish Habitat Suitability Modeling" folder.

The main panel displays the notebook content for "Fish Habitat Suitability Modeling". The title is "GeoAI for Fish Habitat Suitability Modeling". The authors are Jinyu Zhou, Zhe Zhang (Associate Professor), Cyberinfrastructure and Spatial Decision Intelligence Research Group, <https://www.cidigis.com>, Department of Geography, Texas A&M University. The notebook content includes a section for "Learning Objectives".

Step 9 — Open Training Notebook and Run All Cells(Continue)



1. Click the Run button (top toolbar)
2. Select:
 - a. Run All Cells
3. The notebook will execute step-by-step.

A screenshot of a Jupyter Notebook interface in a web browser. The browser address bar shows a URL from portal-aces.hrc.tamu.edu. The notebook is titled 'Fish.ipynb'. The 'Run' button in the top toolbar is highlighted with a red box. A dropdown menu is open from the 'Run' button, and the 'Run All Cells' option is highlighted with a red box. The notebook content includes a title 'GeoAI for Fish Habitat Suitability Modeling', authors information (Jinyu Zhou, Zhe Zhang), learning objectives, a case study on Red Snapper, and a code cell for setting up libraries.

portal-aces.hrc.tamu.edu/node/1713745/lab/workspaces/auto-ctree/2026_cybertraining_copy/Fish%20Habitat%20Suitability%20Modeling/Fish.ipynb

File Edit View **Run** Kernel Tabs Settings Help

Run Selected Cell
Run Selected Cell and Insert Below
Run Selected Cell and Do not Advance
Run Selected Text or Current Line in Console
Run All Above Selected Cell
Run Selected Cell and All Below
Render All Markdown Cells
Run All Cells
Restart Kernel and Run All Cells...

GeoAI for Fish Habitat Suitability Modeling

Authors: Jinyu Zhou, Zhe Zhang (Associate Professor)
Cyberinfrastructure and Spatial Decision Intelligence Research Group
<https://www.cidigis.com>
Department of Geography
Texas A&M University

Learning Objectives

By the end of this notebook, you will be able to:

1. Load & Explore fisheries survey data from SEAMAP trawl surveys
2. Use existing package to build a Geo AI Model (XGBoost) to predict habitat suitability
3. Interpret Results using SHAP values to understand species-environment relationships
4. Simulate Weather Ocean Environment Condition Change to predict habitat shifts under environmental stress

Case Study: Red Snapper in the Gulf of America

Target Species: Red Snapper (*Lutjanus campechanus*) - a high-value fishery species (~\$100M+ annually) with well-documented habitat preferences and Environment sensitivity.

Data: <https://seamapdata.gsmfc.org/> NOAA SEAMAP trawl surveys with in-situ environmental measurements (temperature, salinity, dissolved oxygen, depth).

Section 1: Setup

Run this cell to import libraries and configure the study area.

```
[1]: # Core libraries
import pandas as pd # pandas is a library for data manipulation and analysis using dataframes
import numpy as np # numpy provides support for large, multi-dimensional arrays and matrices, along with mathematical functions
import geopandas as gpd # geopandas extends pandas to allow spatial operations on geometric data types
from shapely.geometry import Point # shapely is a library for manipulation and analysis of planar geometric objects, with Point representing a single coordinate
from pathlib import Path # pathlib offers an object-oriented approach for handling filesystem paths
import warnings # warnings is a built-in module to manage warning messages
```

Tips / Notes



Tips

- First launch may take a few minutes
- If you accidentally close the browser and want to go back to the jupyterlab:
 - follow step 1-4, then click on “My Interactive Sessions”

portal-aces.hprc.tamu.edu/pun/sys/dashboard/batch_connect/sys/jupyterlab_ctdm/session_contexts/new

ACES OnDemand Portal Files Jobs Clusters Interactive Apps Affinity Groups Dashboard Training Utilities My Interactive Sessions Develop Help Logged in as

Home / My Interactive Sessions / JupyterLab (CTDM project)

JupyterLab (CTDM project)

This app will launch a JupyterLab server on the ACES cluster for the CyberTraining for Disaster Management Network (CTDM) project.

ACES OnDemand Portal Files Jobs Clusters Interactive Apps Affinity Groups Dashboard Training Utilities My Interactive Sessions Develop Help Logged in as

Home / My Interactive Sessions

JupyterLab (CTDM project) (146) 2 cores | Running

Host: [sc063](#)

Created at: 2026-02-21 16:28:50 CST

Time Remaining: 57 minutes

Session ID: a06d7f30-3d29-4476-87d9-64021475bf35

Module: Anaconda3/2022.10

[Connect to JupyterLab](#)

[Delete](#)

If you want to delete the job, Click here

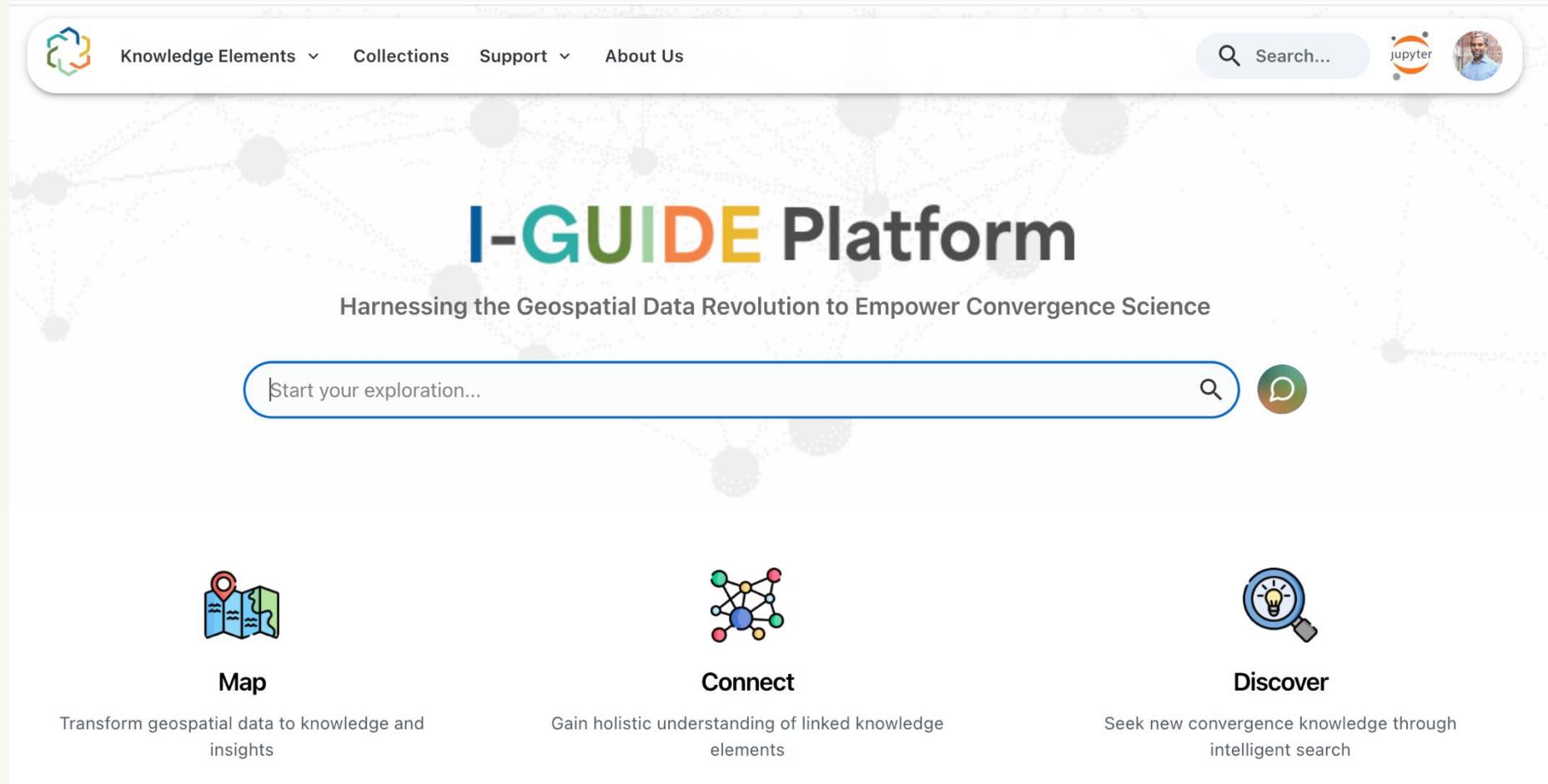
Click here to go back to the active jupyterlab

NSF I-GUIDE Training

What is the I-GUIDE Platform

- The I-GUIDE Platform is a cyberinfrastructure environment designed to advance geospatial data-intensive convergence science and knowledge discovery.
- I-GUIDE Platform integrates domain specific knowledge elements including
 - Geospatial data
 - Computational notebooks and code
 - Publication
 - Maps
 - Open educational resources
- Empowers researchers and practitioners to tackle complex scientific challenges cutting across multiple disciplines.

I-GUIDE Platform User Environment



Sign In to the I-GUIDE Platform

Navigate to platform.i-guide.io.

Click on "Sign In" (top right corner)

Login with your educational account.

If you do not have an educational account, use Google, GitHub, or other personal account.

However, access to some features might be limited.

You can reach out to us by sending email to help@i-guide.io

Explore Knowledge Elements

Knowledge Elements can be considered as units of knowledge on the I-GUIDE Platform.

Six types of Knowledge Elements.

Data, Notebooks, Publications, Maps Code, Educational Resources.

All elements are actionable and built around FAIR (Findable, Accessible, Interoperable, Reusable) data principles.

Go to the Platform and explore knowledge elements.

Contribute Knowledge Elements

Upload your own datasets, code, notebooks, publications and maps to expand the platform's knowledge base.

Connect to other knowledge elements and share them.

Get DOIs for original datasets.

Share your knowledge elements

Launch Jupyter Hub

The screenshot shows the I-GUIDE Platform homepage. At the top, there is a navigation bar with links for Knowledge Elements, Collections, Support, and About Us. A search bar is located on the right side of the navigation bar. In the top right corner, there is a Jupyter logo and a user profile picture. Two red arrows point to these elements: one from the text 'Check if you are Logged in' pointing to the user profile picture, and another from the text 'Launch JupyterHub' pointing to the Jupyter logo. Below the navigation bar, the main heading 'I-GUIDE Platform' is displayed, followed by the tagline 'Harnessing the Geospatial Data Revolution to Empower Convergence Science'. A large search bar with the placeholder text 'Start your exploration...' is centered below the tagline. At the bottom of the page, there are three main sections: 'Map' (with a map icon and description 'Transform geospatial data to knowledge and insights'), 'Connect' (with a network icon and description 'Gain holistic understanding of linked knowledge elements'), and 'Discover' (with a lightbulb icon and description 'Seek new convergence knowledge through intelligent search'). A 'Tour' button is located at the bottom right of the page.

Knowledge Elements ▾ Collections Support ▾ About Us

Search...

jupyter

Check if you are Logged in

Launch JupyterHub

I-GUIDE Platform

Harnessing the Geospatial Data Revolution to Empower Convergence Science

Start your exploration...

Map
Transform geospatial data to knowledge and insights

Connect
Gain holistic understanding of linked knowledge elements

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Seek new convergence knowledge through intelligent search

Tour



THANK YOU

Texas A&M University