HPC Tool: Accessing & Processing Digital Elevation Model (DEM) data for larger waterhseds

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FAIR Science in Water Resources

Introduction

In this tutorial, we will use HPC resources to access and process DEM for larger watersheds with USGS site ID and resolution. We will use community-centered CyberGIS platform to work with higher number of DEM tiles.

Instructions

1. Open a browser and navigate to the following link "https://cyberfaces.org". Click on the Login at the upper right side.
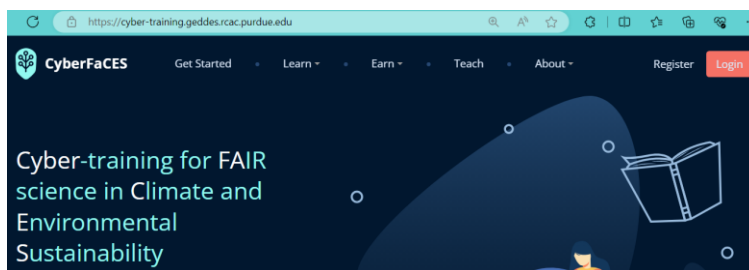
2. Either you can select Sign in with CILogon with institutional credentials or ORCID or use Google Account (there are a number of login options in the dropdown and if nothing works you may need to register as a new user as you are accessing CyberFaCES for the first time). Also, select the "Remember this selection" option

for future easy access to CyberFaCES.

3. Navigate to "Learn" on the top ribbon and select "Explore Modules".
4. Check Type on the left as "**Courses**" and select "**WaterSciCon24 Hands-On Workshop: Web-based Modules on Geospatial Data Processing Using Python**" course from the list of courses as shown below.

5. Click on "Start now" and you will be able to see the material for completing this workshop. If you have not completed the Pre-Workshop, please complete the first item.

6. The handout (in PDF format) and the Jupyter Notebook for the coding exercises for

this workshop can be found here. Now, we will complete the Geospatial & Hydrological Science: HPC Based DEM Accessing and Processing (Single Job). Select "I-GUIDE Launch Link" Jupyter Notebook and it will redirect to the Interactive Jupyter Notebook Hub. Please note that we are using different Jupyter Hub here.

7. Again, either you can select your institutional credentials or ORCID or your Google Account. Select the remember your login option for future access to CyberFaces. Enter the credentials to log on to the CyberFaCES platform.

8. Be patient until the Notebook opens, and it has the correct Kernel (iguide-ewd) as shown below. This kernel has all modules preinstalled for completing this tutorial.

9. Run the first code cell to im port the essential modules i n the current kernel. Also, e xecute the next cell to get th
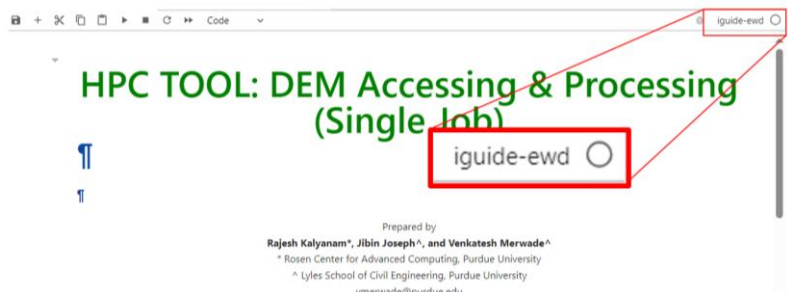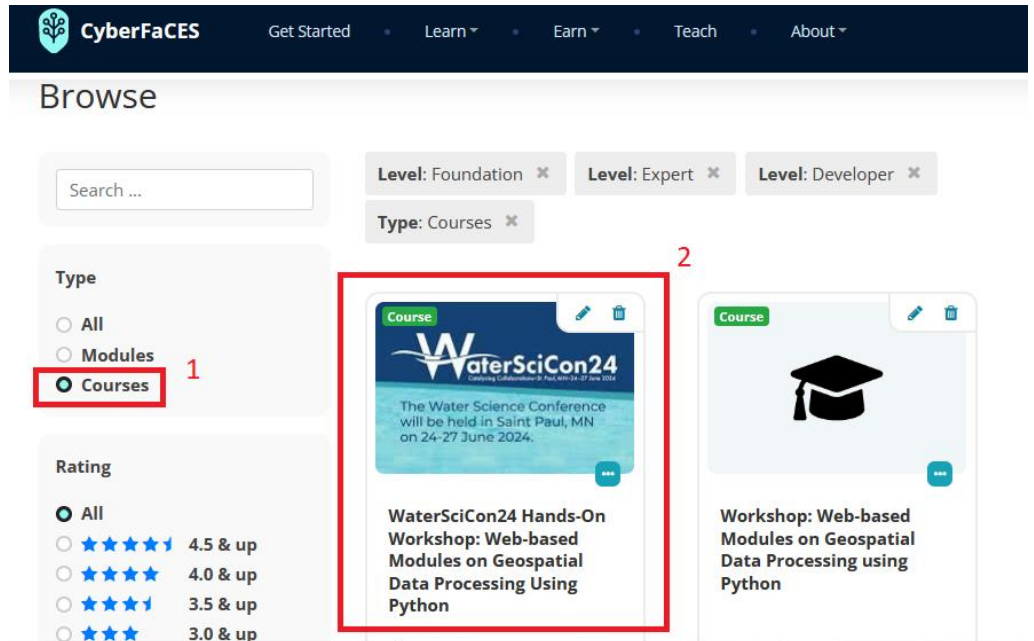
e version number of the packages that we will be using in this module.

Step 1: Define the variables

10. Define the USGS site ID and resolution. We will use 05331000 for Mississippi River at St. Paul, MN and the resolution as 1/3 arc-second. This watershed has an area of around 36000 sq. mi. and it can be completed using earlier modules due to high RAM requirements.

Step 2: HPC Job Submission

11. Run the next cell and it will show the user interface of CyberGIS. In the Job Configuration Tab, go to Slurm Computing Configurations, set the time to 30 minutes and number of CPUs per task as 128. Submit the job and be patient.
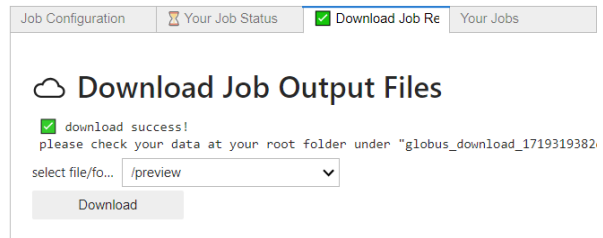
12. Once the job is completed you will see Job is completed. You can get the current progress in "Your Job Status" tab.

13. Now, select the preview folder in the Download Job Result and click Download. Wait until it is completed.

Step 3: Plotting the clipped DEM (preview)

14. Run the next cell to download the preview plot created for the large watershed. The file downloaded from HPC to local platform and is plotted.

Clipped Raster DEM with a buffer of 150 m and with EPSG:32615 Projected CRS
(for USGS 05331000)
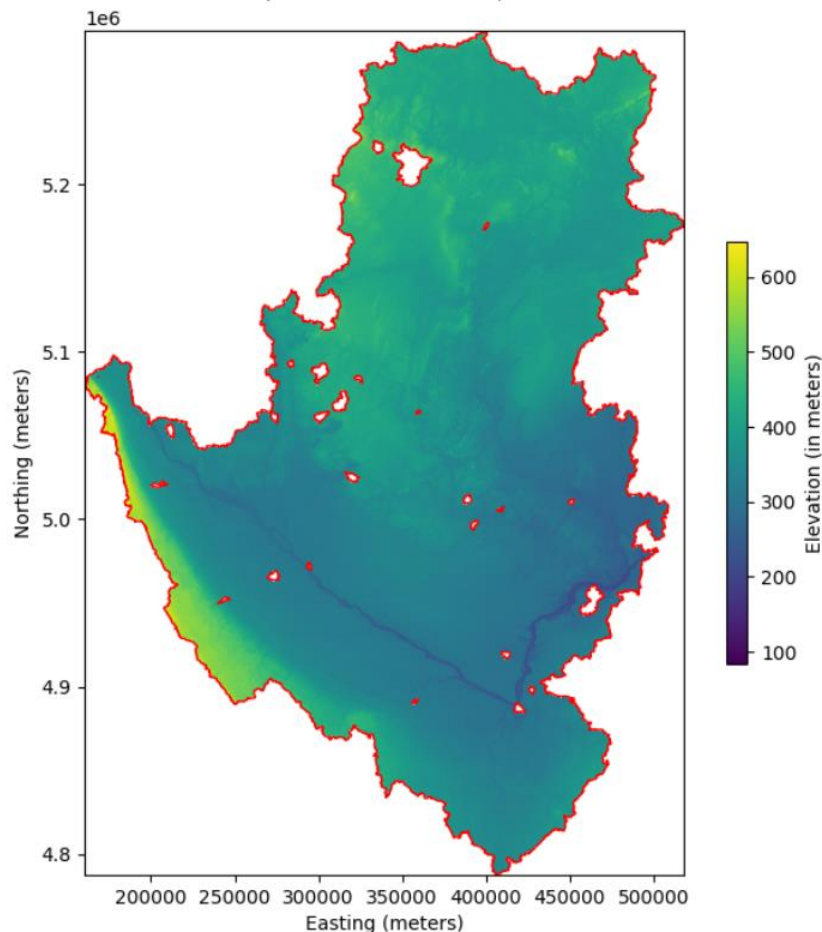
Ok, you have now completed the tutorial successfully. Congratulations!