EASTWeb V2.2.4 Manual

August 3, 2017

EASTWeb V2.2.4 Manual

Contents

1. Installation

1.1 Recommended Hardware Specification

- CPU: At least 4 cores available
- RAM: Allow the application to use up to 0.5GB of memory
- HDD: Having at least 100 GB of available space will allow multiple projects and plugins to work for some time but this is entirely dependent on the projects the users create and run. As an example, downloading about two years' worth of files for ModisLST, ModisNBAR, NldasForcing, TRMM3B42, and TRMM3B42RT products takes up approximately 11GB. A single project for both Modis and both TRMM3B42 products takes up another 13GB while including intermediate files.

1.2 Installing Required Software

Currently, PostgreSQL and Java must be installed to run EASTWeb V2.2.4

1.2.1 Downloading EASTWeb installer

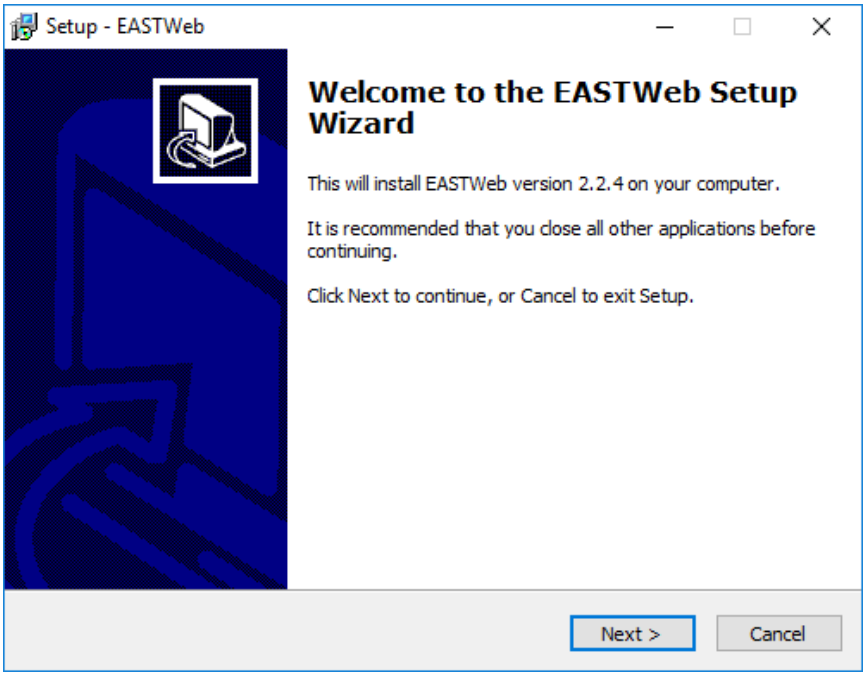
Navigate to http://eastweb.sdstate.edu/software.php and click on "EASTWebV2.2.4 Installer."

Navigate to the folder where you downloaded the .zip file and extract the EASTWebV2.2.4Installer.exe. Once extracted, navigate to the location you extracted it to and double click on "EASTWebV2.2.4Installer.exe" to start installation.

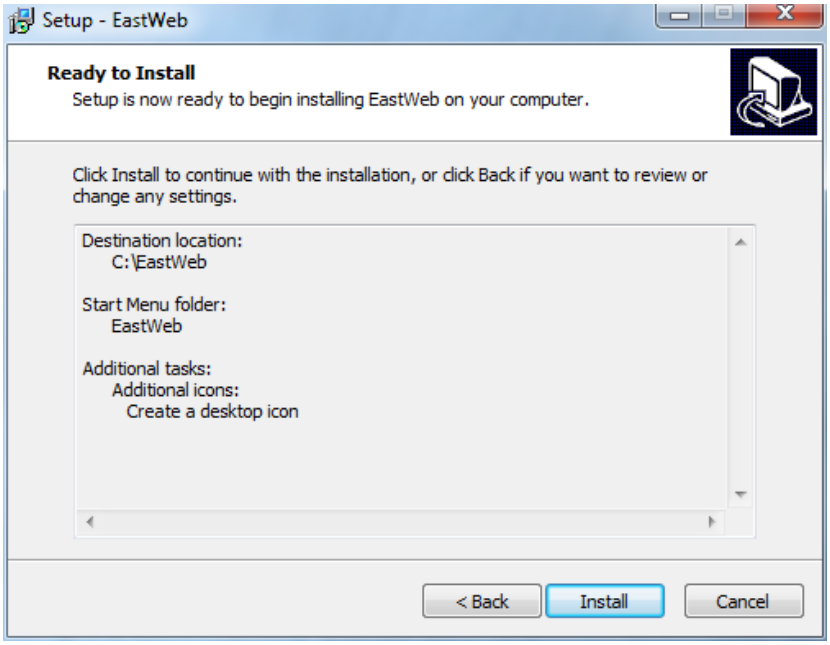
1.2.1.1 Installing EASTWeb

Step 1. Installing EASTWeb

The Following installation wizard will appear:



Click “Next” and follow the prompts until you get to “Ready to Install.” At this point click “Install”. Install in the C:\ directory itself.



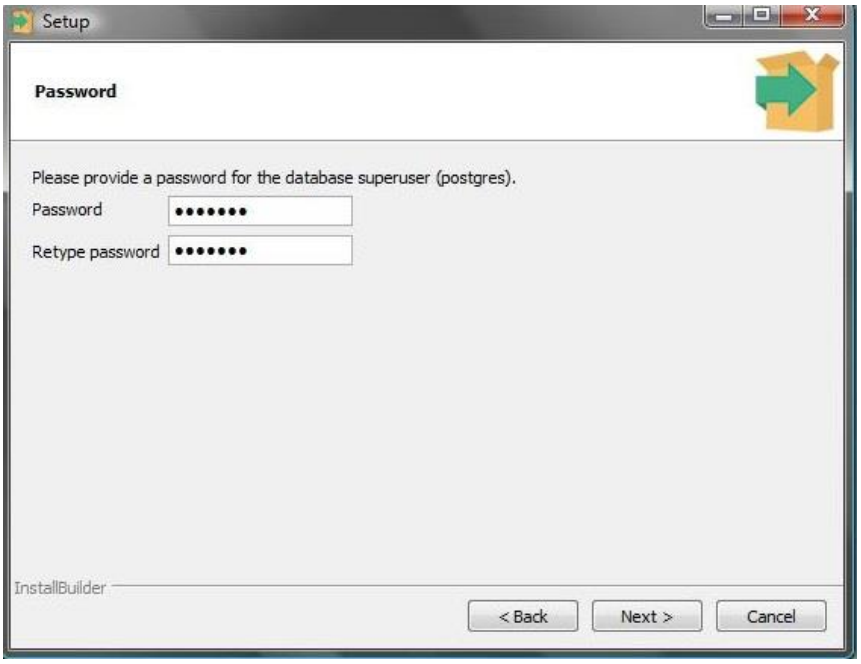
Wait until the installation is complete. It will then prompt you to install PostgreSQL and Java.

1.2.1.2 Installing PostgreSQL

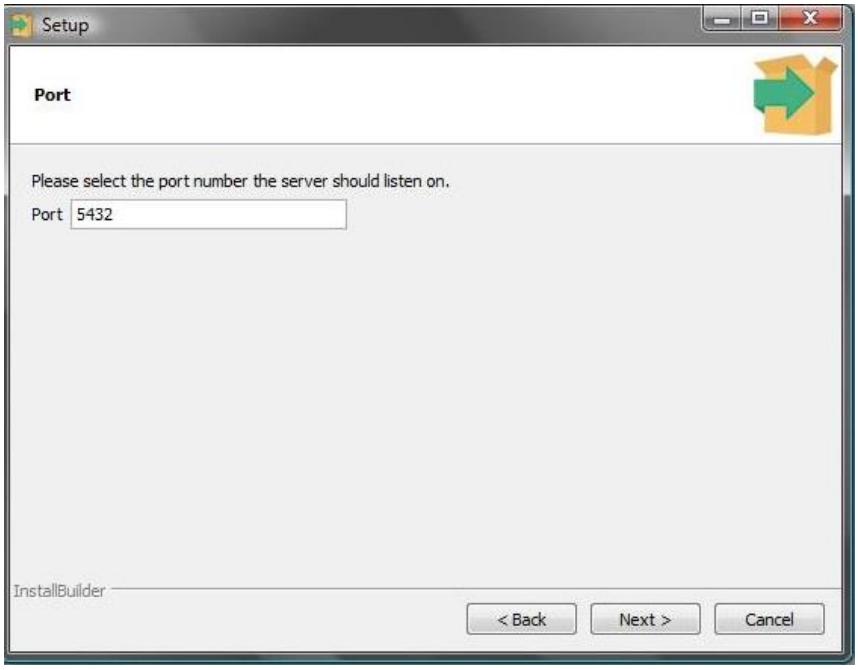
Step 1. Installing PostgreSQL

The Following installation wizard will appear:

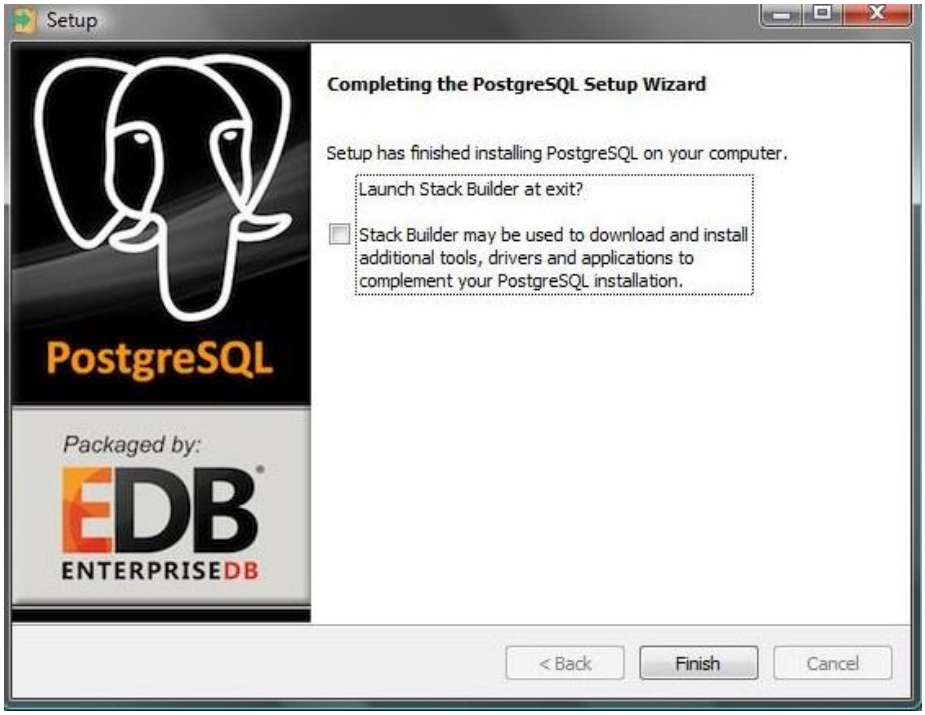
Click the “Next” button until the “Password” setup. Set the password to “eastweb.” This is the password that the will be needed to access the database and allow software to access the database.



Click the “Next” button. If not already set, type “5432” in the “Port” text entry. This is the port the software will use to attempt to communicate with the database on.



Click the “Next” button until the progress bar appears. When installation is complete, uncheck the “Launch Stack Builder at exit?” checkbox and click “Finish.”



1.2.1.3 Installing Java 64-bit

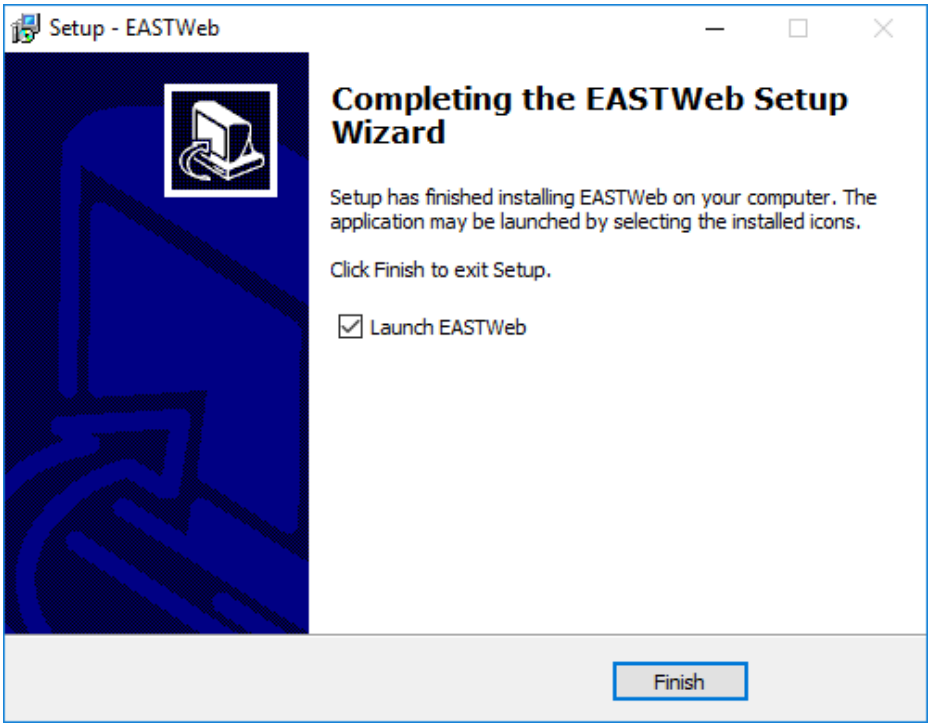
Java 64-bit must be used in order to run the GDAL 64-bit libraries. For this application to run, 64-bit Java version 1.8.0_141 or higher must be installed.

Step 1. Installing Java

The following installation wizard will appear:

Click “Install.” When the installation completes, click “Close.”

Once PostgreSQL and Java have been installed, click “Finish” to launch EASTWeb or choose to restart now or later and then click “Finish.”

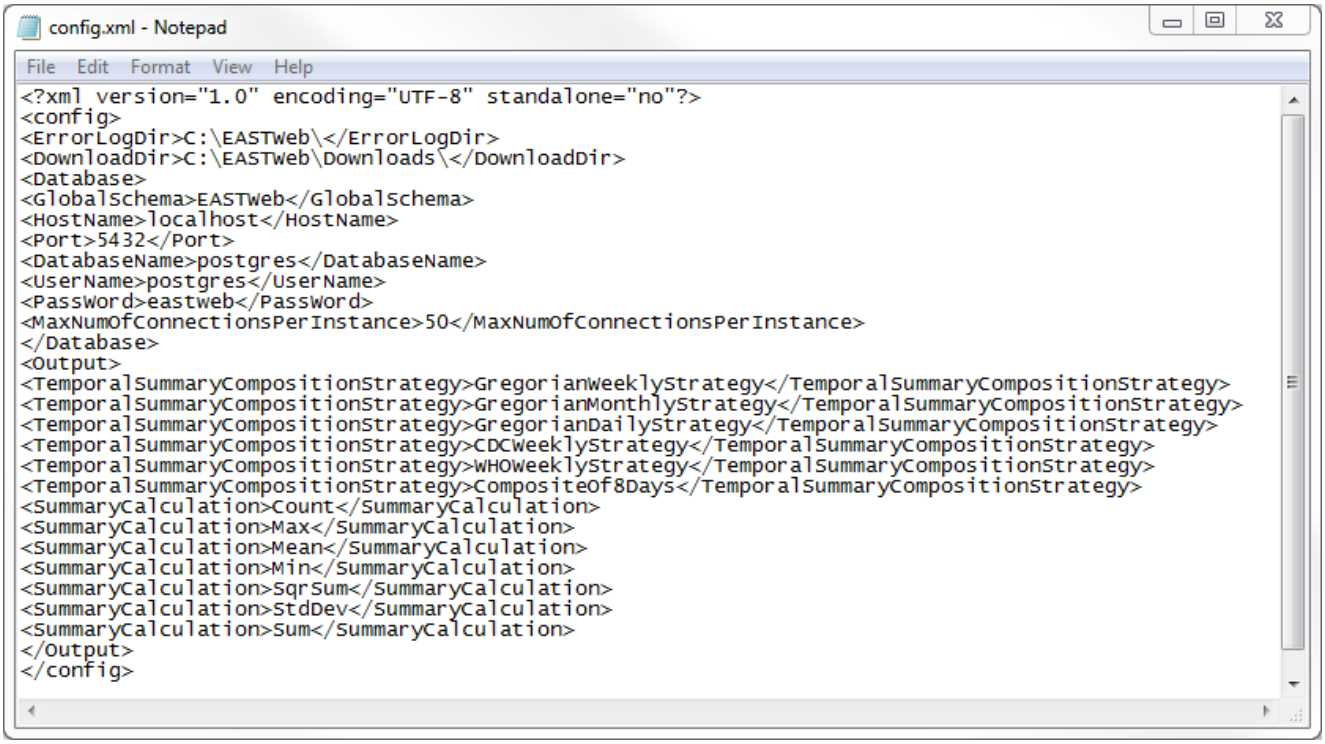


1.3 Configuration

The software may need to be configured before use. A configuration file located within the EASTWeb V2.2.4 installation directory specifies the location of resources, values needed to use the resources, and advanced EASTWeb V2.2.4 settings.

Navigate to the installation directory. Locate the “config.xml” document and “c3p0-config.xml” document within the config subdirectory.

1.3.1 config.xml

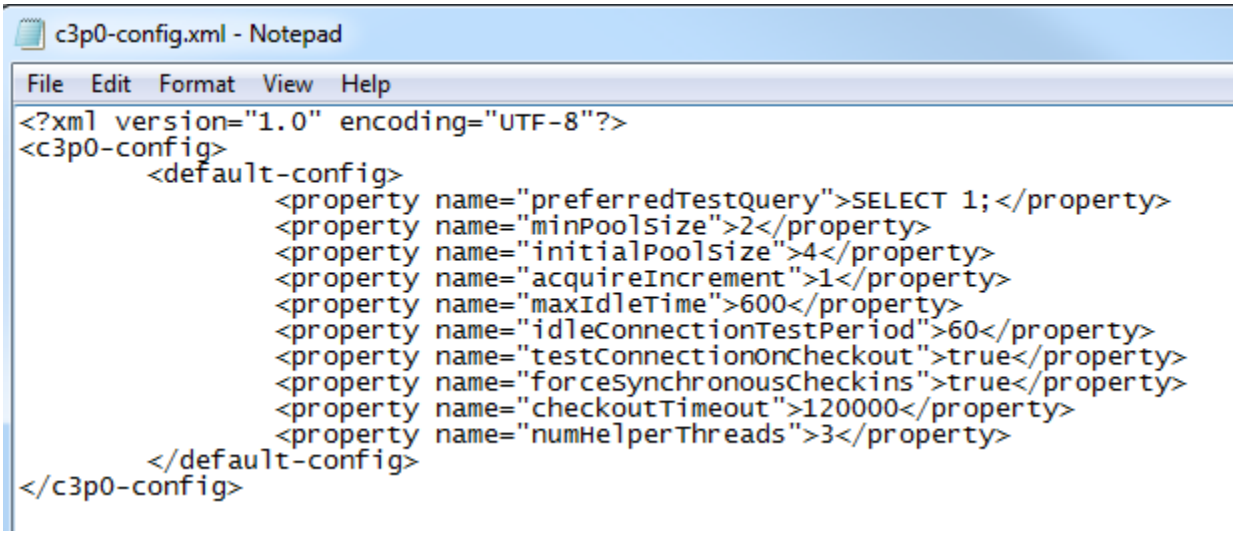


Valid element tag names – each tag should be defined only once unless otherwise specified.

ErrorLogDir	Directory path to use when printing error logs (errors will either print here or at a location of batch file). Directory will be created if it does not exist.
DownloadDir	Directory path to use when saving downloaded data files. Directory will be created if it does not exist.
GlobalSchema	Name of schema to use for global information for EASTWeb V2.2.4 application
HostName	Host name to use when connecting to the database
Port	Port number to use when connecting to the database

DatabaseName	Name of the database to use for all application created schemas
UserName	Login user name
Password	Password for user account
MaxNumOfConnectionsPerInstance	Maximum number of simultaneous connections to allow EASTWeb V2.2.4 to create
TemporalSummaryCompositionStrategy	Name of TemporalSummaryCompositionStrategy implementing class to include in EASTWeb V2.2.4 (1+ can be defined)
SummaryCalculation	Name of SummaryCalculation implementing class to include in EASTWeb V2.2.4. Any of these may be removed if not necessary (1+ must be defined)

1.3.2 c3p0-config.xml



Valid element tag names- each tag should be defined only once unless otherwise specified. See http://www.mchange.com/projects/c3p0/#configuration_properties for more information.

- c3p0-config:
  - default-config:
    - property element list…

2. Description of Products

2.1 IMERG and IMERG RT

2.1.1 Indices

- Total Rainfall

2.2 TRMM3B42 and TRMM3B42 RT

2.2.1 Indices

- Total Rainfall

2.3 ModisLST

2.3.1 Indices

- **Day:** The day temperature calculated from band 1.
- **Night:** The night temperature calculated from band 2.
- **Mean:** The mean of day temperature and night temperature.

2.4 ModisNBAR

2.4.1 Indices

- **NDVI:** Normalized difference vegetation index, ranging from -1 to 1. It is used to access the target being observed contains live green vegetation or not.
- **EVI:** Enhanced Vegetation Index
- **NDWI 5:** Normalized Difference Water Index (using channel 5 SWR 1) for retrieving the vegetation water content.
- **NDWI 6:** Normalized Difference Water Index (using channel 6 SWR 2) for retrieving the vegetation water content.
- **SAVI:** Soil-Adjusted Vegetation Index

2.5 NldasForcing

2.5.1 Indices

- **Total Precipitation:** Sum of 24 hourly rainfall values for each day (mm)
- **Max Air Temperature:** Maximum of 24 hourly temperature values for each day (°C)
- **Min Air Temperature:** Minimum of 24 hourly temperature values for each day (°C)
- **Mean Air Temperature:** Mean of 24 hourly temperature values for each day (°C)
- **WNV Amplification:** Degree days > 14.3 °C starting on January 1st
- **Lyme Disease Index:** Degree days > 0 °C starting on January 1st
- **Overwintering Index:** Degree days < 0 °C starting on July 1st
- **Max Windspeed:** Maximum of 24 hourly windspeed values for each day (m/s). Calculated from the NLDAS U and V components using the following formula
    - $W = \text{sqrt}\ (U^2 + V^2)$

- Where,
  - W = the hourly aggregate windspeed in m/s
  - U = the hourly U wind component
  - V = the hourly V wind component

- **Mean Windspeed:** Mean of 24 hourly windspeed values for each day (m/s). Calculated from the NLDAS U and V components using the same formula as Max Windspeed
- **Mean Relative Humidity:** Mean 24 hourly relative humidity values for each day (%). Hourly relative humidity calculated from 3 NLDAS fields (specific humidity, surface pressure, air temperature) using the following formula
  - $RH = 0.263 * p * q * (\exp(17.67*(T-To)/(T-29.75))^{-1}$
  - Where,
    - RH = hourly relative humidity (%)
    - q = hourly specific humidity (proportion)
    - p = hourly surface pressure (Pa)
    - T = hourly temperature (K)
    - To = 273.15
- **Max Heat Index:** Maximum of 24 hourly heat index values for each day. Calculated from hourly air temperature and relative humidity using the following algorithm
  - If T > 20

    $HI = -8.784695 + 1.61139411 * T + 2.338549 * RH - 0.14611605 * T * RH - 0.012308094 * T^2 - 0.016424828 * RH^2 + 0.002211732 * T^2 * RH + 0.00072546 * T * RH^2 - 0.000003582 * T^2 * RH^2$

    Else

    $HI = T$

  - Where,
    - HI = hourly index
    - T = hourly temperature (°C)
    - RH = hourly relative humidity (%)
- **Mean Heat Index:** Mean of 24 hourly heat index values for each day. Calculated from hourly air temperature and relative humidity using the same algorithm as Max Heat Index.

3. Project Tutorial

This tutorial walks through the steps required to create, run, and query a project. The tutorial also includes discussion of important things to know when creating your own project. If an issue is encountered while following the tutorial, refer to the troubleshooting section of this document.

3.1 Creating a New Project

3.1.1 Load the EASTWeb V2.2.4 Main Window

Navigate to the installation directory and double click on “EASTWeb.jar” or double click on

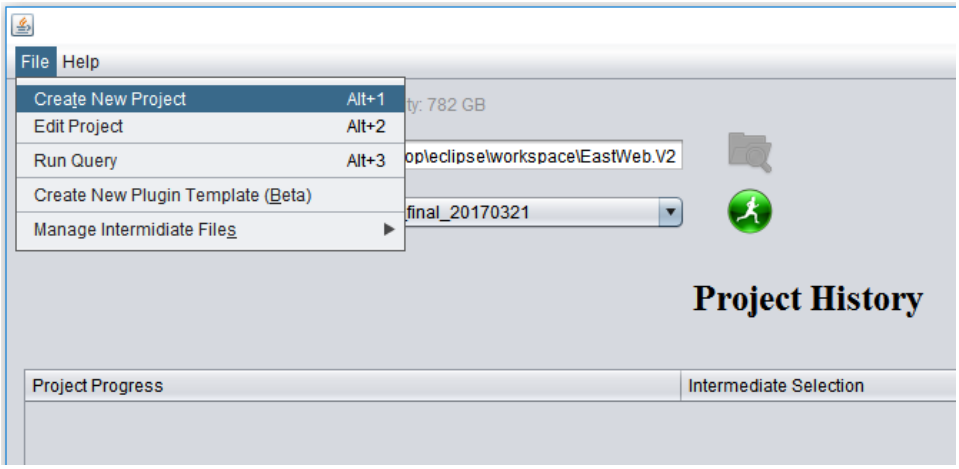


Figure 1. EASTWeb V2.2.4 Main Window

Desktop Icon for EASTWeb.

NOTE: Not recommended to run multiple instances of EASTWeb at the same time

Select File -> Create New Project and a Project Information window will be prompted.

3.1.2 Project Information Window

3.1.2.1 Adding Plugins

Step 1. Load the Plugin Information Window

Click the “+” button on the top left corner of the Project Information window (Figure 2)

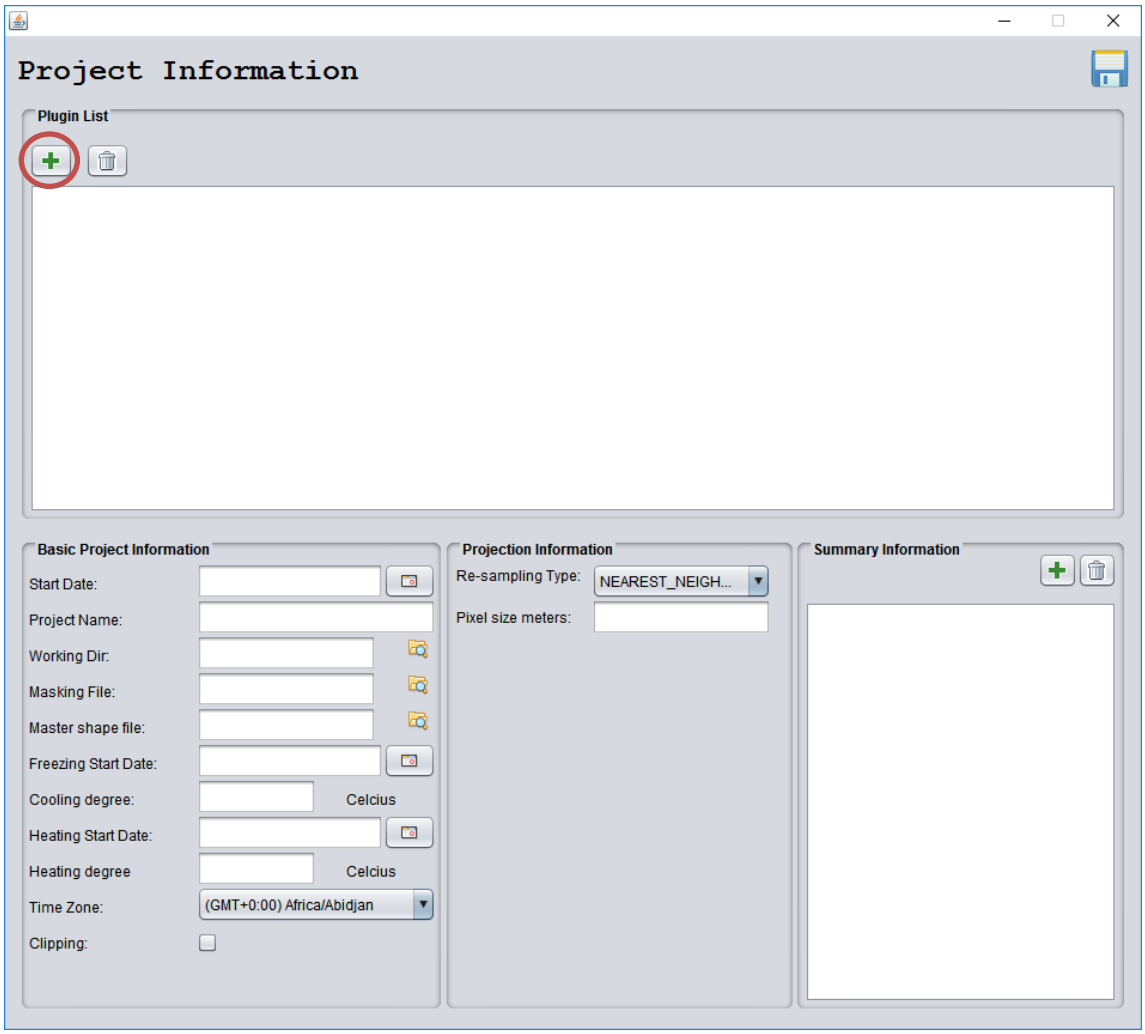


Figure 2. Project Information Window

A plugin information window will be prompted.

Step 2. Select plugin

Use the “Plugin” dropdown box (circled in red in Figure 3) to choose a plugin for a project.

Step 3. Choose Quality Control

Use the “Quality control” dropdown box (circled in orange in Figure 3) to choose the desired quality level, if applicable.

Step 4. Choose Indices

Use the “Indices” dropdown box (circled in green in Figure 3) to choose one index calculator, click “+” button in green to add it to project.

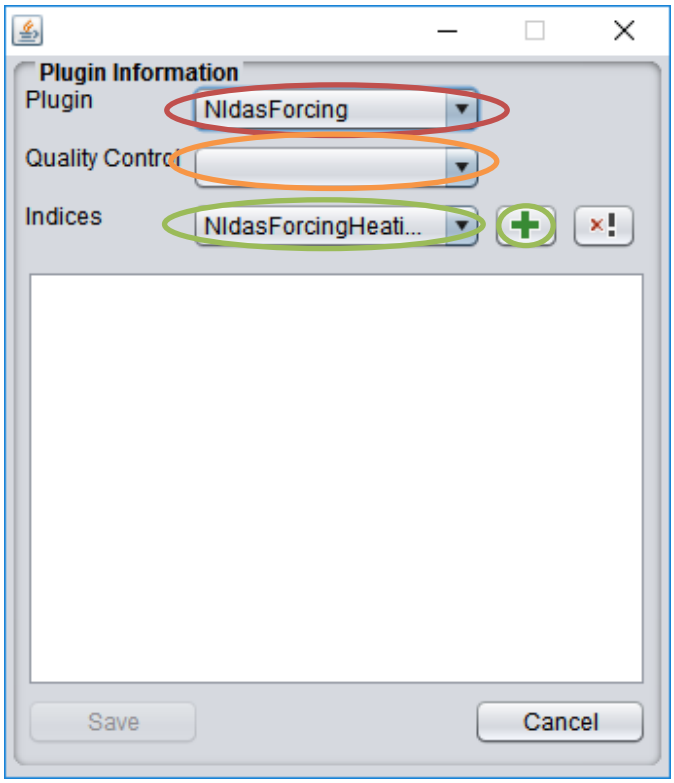


Figure 3. Plugin Information Window

Repeat this step until all the desired indices are added in. Figure 4 shows NldasForcing plugin with six indices selected.

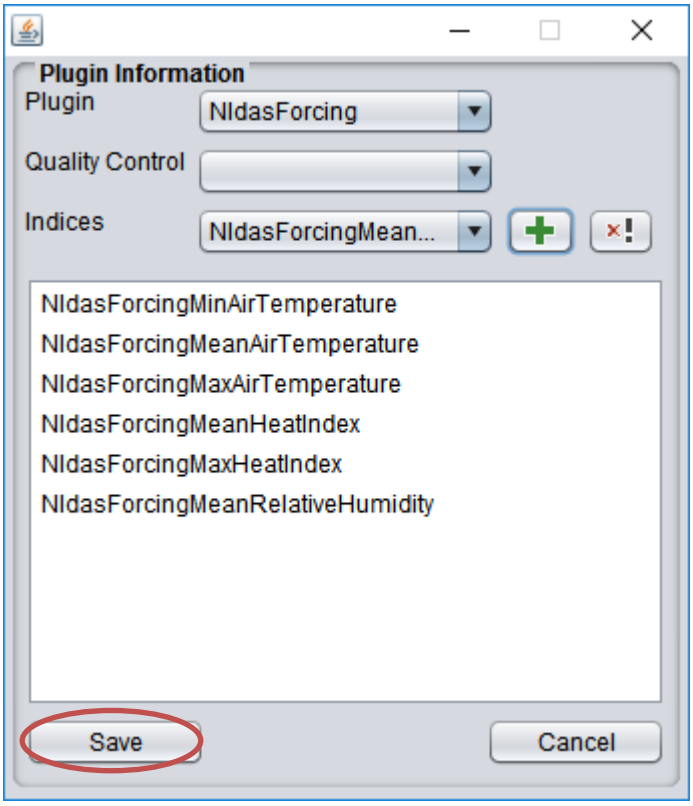


Figure 4. NIdasForcing plugin with six indices selected

To remove an index, first click on the index then the "x!" button.

NOTE: If MODIS products used enter tile information in the dialog window when prompted. Tile input format is h followed by two digits and v followed by two digits (e.g. h11v05). Any MODIS plugin saved will contain the same Modis Tiles as the first MODIS plugin entered. (All tiles will be the same for all MODIS plugins)

Step 5. Save the plugin information

Click "Save" button (circled in red in Figure 4).

The Plugin Information will be shown in the Project Information Window.

Repeat step 1 through 5 to add more plugins to the project.

To remove a plugin, in the Project Information Window, click the plugin and click "x!" button.

3.1.2.2 Input Basic Project Information

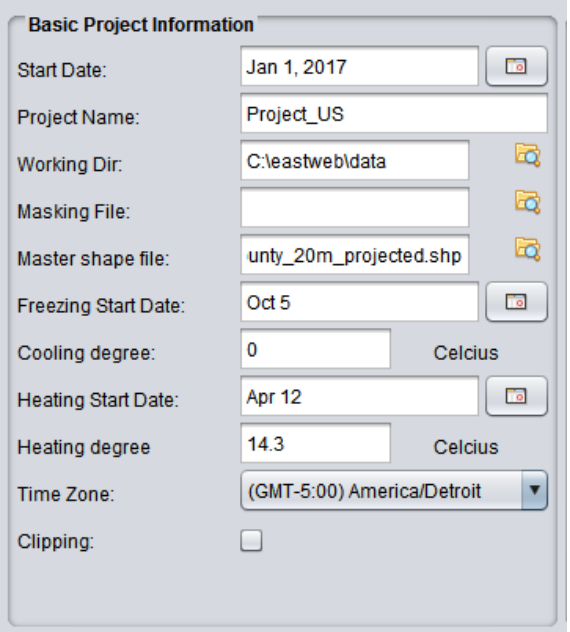


Figure 5. Basic Project Information section in the Project Information Window

Descriptions of the Basic Project Information fields are as follows:

Start Date: The earliest date for which data will be downloaded and processed. The project will contain data from the start date up to the present date.

Project Name: A descriptive name for the project. The project name can contain spaces, underscores, 0-9 and a-Z.

Working Directory: The location where all downloaded and intermediate files will be stored. These files can take up many GB of space, so be sure there is sufficient storage available.

Masking File: This is a raster data file that indicates areas that will be masked out and not included in the zonal summary statistics. For example, it is often desirable to mask out water bodies when summarizing land surface temperature or spectral indices such as NDVI. This file must be in GeoTiff format. A masking file is not required and can be left blank.

Master Shape File: The master shape file defines the boundaries of the study area for which the environmental datasets will be processed and summarized. This should be an ESRI shapefile in polygon format, and should contain at least one polygon. The shapefile should be projected, and the GeoTiff files that are generated by EASTWeb will be in the same projection as the shapefile. Note that in most cases, the most straightforward approach will

be to use the same shapefile as the master shapefile and the summary shapefile that is defined in the Summary Information window.

Freezing start date: Required but can be an arbitrary day if not using FreezingDegreeDays index

Cooling degree: Required but can be an arbitrary value if not using FreezingDegreeDays index

Heating start date: Required but can be an arbitrary day if not using HeatingDegreeDays index

Heating degree: Required but can be an arbitrary value if not using HeatingDegreeDays index

Time Zone: This should correspond to the time zone of the summary area, which is specified by the shapefile. For hourly datasets such as NLDAS, the time stamp of the data will be adjusted from GMT to the local time zone.

Clipping: If this box is checked then the gridded datasets will be clipped to the irregular boundary of the shapefile. If the box is left unchecked, then the gridded datasets will be clipped to the original boundaries of the shapefile.

Add all the needed information about the project. The sample information of a project is shown in Figure 5.

3.1.2.3 Inputting Project Information

Enter desired information in the Projection Information section as shown in Figure 6.

Figure 6. Projection Information section in the Project Information Window

Descriptions of the Projection Information fields are as follows:

Re-sampling Type: Indicates whether nearest neighbor or bilinear resampling will be used when reprojecting the data. Nearest neighbor resampling should be sufficient in situations where the Pixel size (specified below) is similar to the native resolution of the data. Bilinear resampling should be selected in situations where coarse resolution data are being projected to a finer grid (for example, if data like GPM or NLDAS are being reprojected to a 2000 m grid).

Pixel size meters: The resolution that the data will be reprojected into. When a masking file is provided, this resolution is also used to determine if masking will be performed. If the pixel size and the masking file resolution are the same then masking will be done otherwise no masking will be done.

Note that the user does not need to explicit specify the projection for the output data. Instead, EASTWeb will automatically read the project of the master shape file and use it as the projection for all project outputs.

3.1.2.4 Summary Information

To add summary units, please follow the three steps listed below:

Step 1. Click the "+" button in the Summary Information section in the Project Information Window.

Step 2. Select the shapefile, field name and temporal summary in the prompted window (shown in Figure 7) and click the "Save" button.

Step 3. Repeat step 1 and 2 until the desired summary units are all added. Summary units are displayed in the Summary Information section.

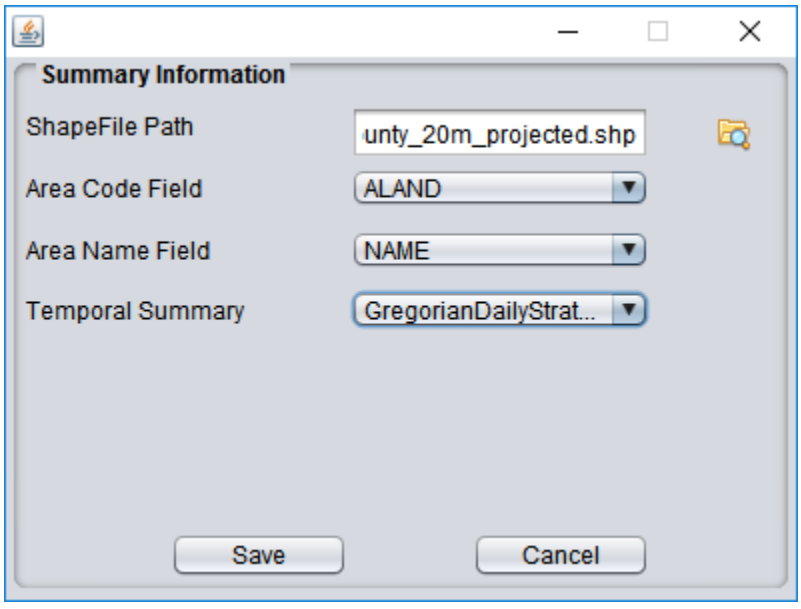


Figure 7. Prompt Window for summary units

Descriptions of the Projection Information fields are as follows:

ShapeFile Path: This is an ESRI shapefile containing polygons that will be used to generated the zonal summaries. The attribute table for the shapefile should contain at least two fields: one containing a unique area code for each polygon and one containing a unique area name for each polygon. This can be the same shapefile that was provided as the master shapefile in the Basic Project Information window. Alternately, it is possible to use one master shapefile to define the area of raster grids that will be clipped and a different shapefile here to define the polygons that will be used for zonal summaries. In this case, the shapefile provided for summaries should be located within the boundaries of the master shapefile.

Area Code Field: This is the field in the shapefile that will be used to identify the unique polygons that will be summarized. For example, for US counties, this would be the unique FIPS code that is assigned to each county. The field can only be a numeric field.

Area Name Field: This is the field in the shapefile that is used to identity a longer name for each unique polygon that will be summarized. For example, for US counties, this would contain the name of each county. The field should be a string. This field is required and must not be left blank.

Temporal Summary: Defines the temporal window that will be used to summarized the environmental datasets. The options will depend on the specific plugin that is selected. For example, MODIS 8-day products can only be summarized by 8-day MODIS composite periods. Daily products such as GPM and NLDAS can be summarized at a variety of temporal resolutions, including daily, weekly, and 8-day MODIS composite periods.

Additional Notes on Temporal Summarization:

- **No interpolation is done within EASTWeb V2.2.4 currently.**
- **If product cannot be summarized into the specified amount of days then summaries will not be produced for that product in association to the invalid temporal summary.**
- **Currently, multiple summaries within a project should not be done.**

To delete a summary unit, click the  button.

3.1.2.5 Create the new project

Click the  button on the right corner of the Project Information window. After a message “Project was saved!” is prompted and the “ok” button is clicked, the Main window will be brought back.

3.2 Running a Project

The Created projects are listed in the "Project List." Check "Intermediate Files" to save the files produced during processing and choose a location to store the intermediate files. If "Intermediate Files" remains unchecked the intermediate files produced during processing will be removed. Select the project in the "Project List" and then click the  button.

Once the project appears in the Project Progress list click the play button in the actions column to start running.

NOTE: If the newly created project does not appear in project list, restart EASTWeb.

Status bar colors

Yellow- Project Processing

Green – Project has completed processing

3.3 Query Database

To query the summary in the database, select->Run query in the Main window. The query UI will be prompted as shown in Figure 8.

Step 1. Running Query

Select the project in the dropdown menu, then fill in the query criteria. To run the query, click on  .

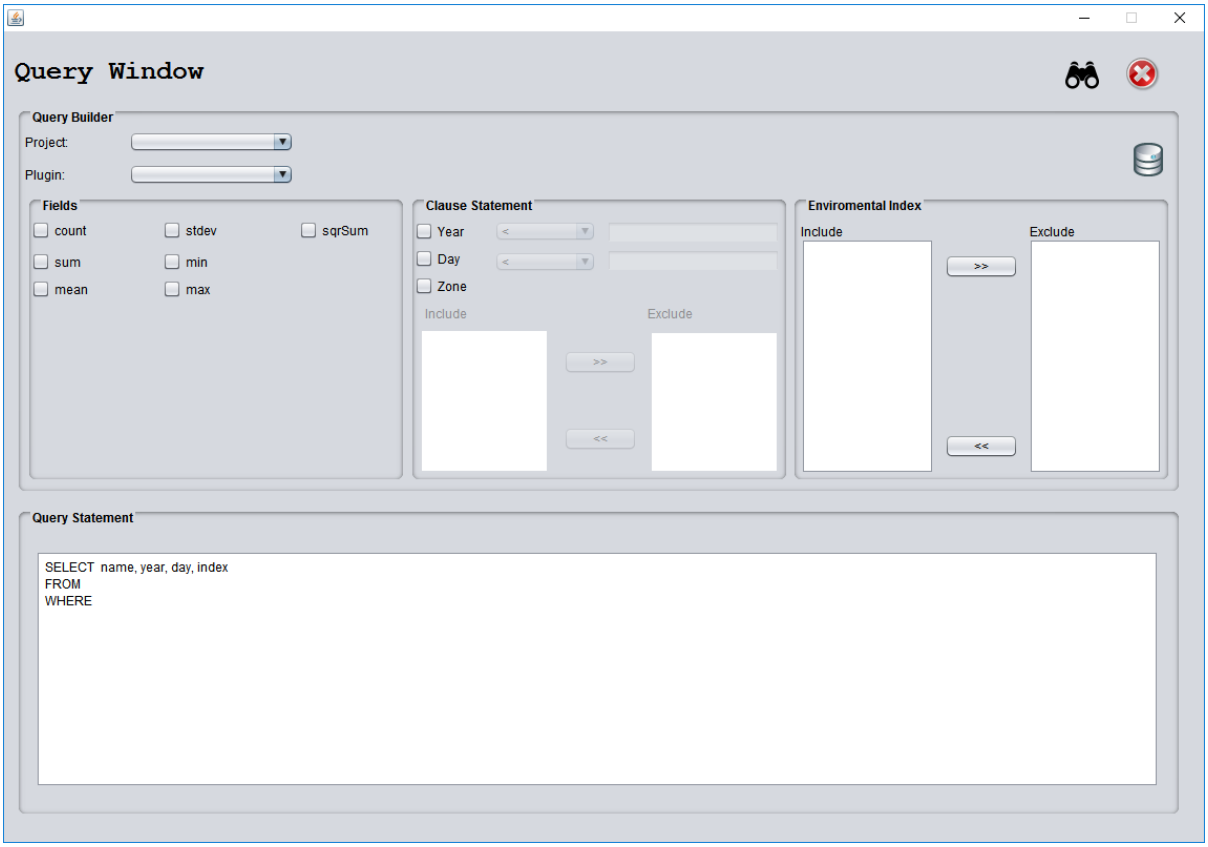


Figure 8. Query Window

Step 2. Save Results

When prompted enter the entire file path to where you want to save the query results to.

4. Troubleshooting

- At times, it can take several minutes for EASTWeb V2.2.4 to close, a project to stop, or to see progress update for the Processor step.
- The Modis product's servers have been known to be down from time to time more so than the others. When needing to download Modis data be sure to check for any new error logs.
- When starting a project with Modis product(s) the startup of the project will take noticeably longer than for other plugin products.
- Saving query results may lead to a "Folder not found" prompt. If this occurs, check to make sure you are selecting summary calculations (e.g. Count, Max, etc.) that were included in the project and that your file path is set to an existing folder.

5. Contact Information

- Yi Liu
  - Yi.Liu@sdstate.edu