Using Satellite Data in ArcGIS

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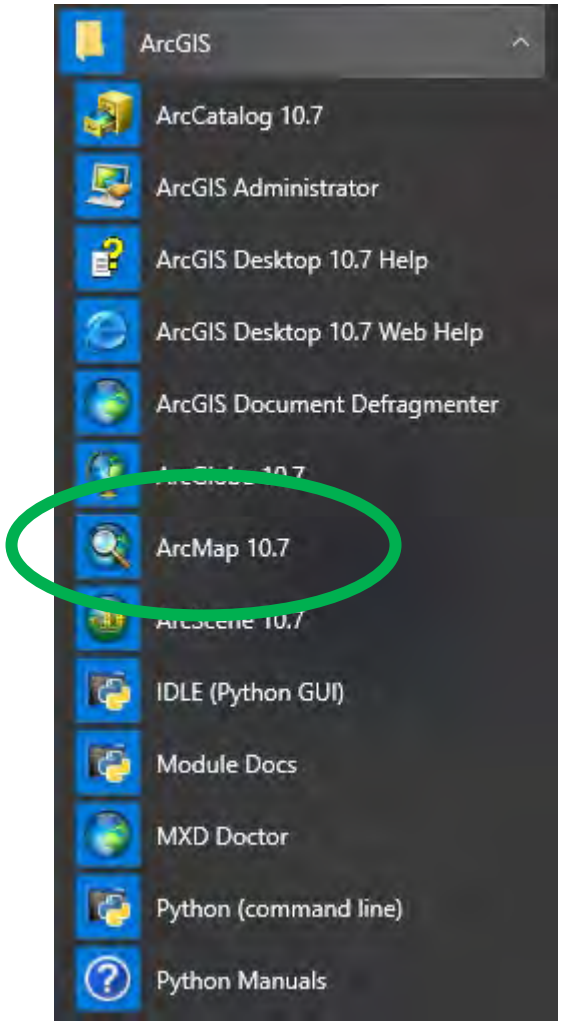
Versioning:
2020, Soracco
2019, Soracco

ArcGIS 10.7 (10.7.1 latest release)

- ArcMap is the primary user interactive GIS application
- Based on Python 2.7
  - Being the last of the 2.x series, 2.7 will receive bugfix support until 2020. Support officially stops January 1 2020, but the final release will occur after that date.
  - Planned future release dates:
    - 2.7.18 code freeze January, 2020
    - 2.7.18 release candidate early April, 2020
    - 2.7.18 mid-April, 2020
- All the Python 2.7 code in ArcGIS will continue to work. Also, Esri will continue to support Python 2.7 in ArcMap, ArcCatalog, ArcMap extensions (including ArcScene and ArcGlobe, which are part of the ArcGIS 3D Analyst extension), ArcGIS Engine, and ArcGIS Server.

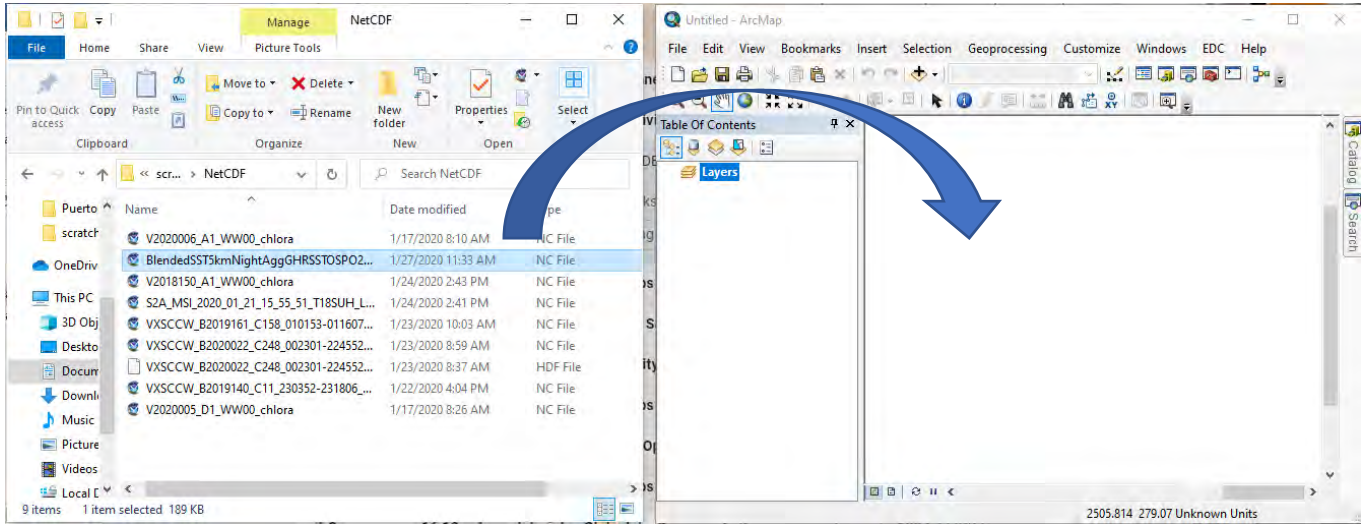


Useful Extensions / Add-ons

- ArcGIS Spatial Analyst (license) – ESRI
  - Raster tools
- Environment Data Connector (EDC)
  - Helper tool to obtain multidimensional data (space-time-+)
  - https://www.pfeg.noaa.gov/products/EDC/EDCdownloads.html

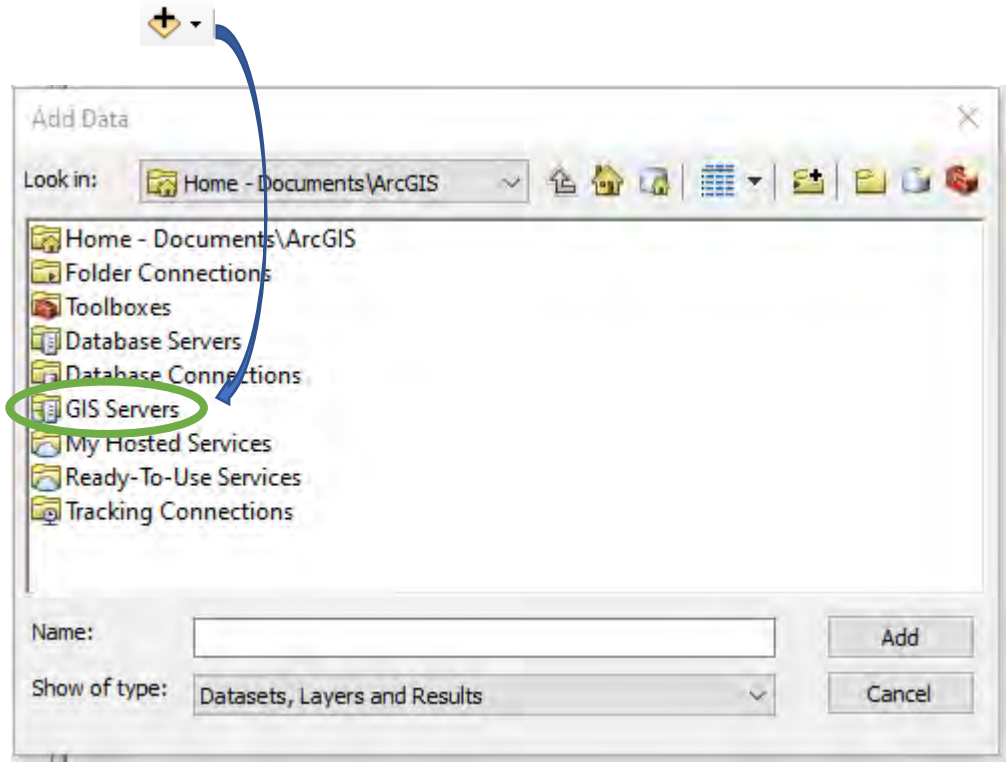
Methods to add Satellite Data

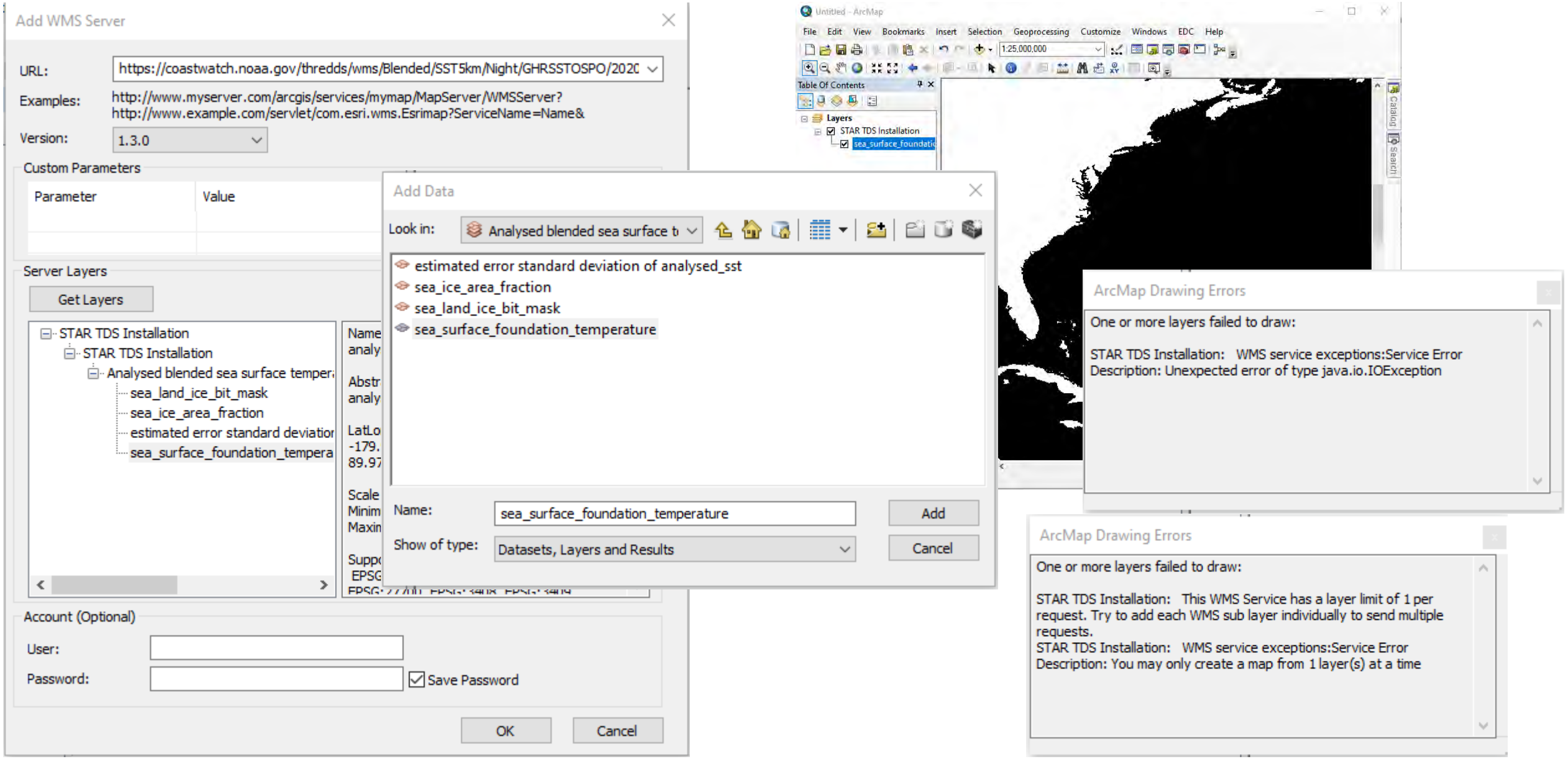
- WMS and WCS
- Drag-n-drop
  - GeoTIFF,NetCDF,JPEG2000
- Multidimension Toolbox
  - Make OpenDAP Raster Layer (ArcToolbox->Multidimensional Tools)
  - Make NetCDF Raster Layer (ArcToolbox->Multidimensional Tools)
- EDC (Environmental Data Connector)



Web Mapping and Coverage Services (WMS and WCS)

- WMS: the image
- WCS: the data values
- Ok for single time/place
- Can be frustrating on finding the correct URL
- Each change in PZI results in refresh call….and sometimes errors




Add WMS Server
URL:
https://coastwatch.noaa.gov/thredds/wms/Blended/SST5km/Night/GHRSSTOSPO/2020
Examples:
http://www.myserver.com/arcgis/services/mymap/MapServer/WMSServer?
http://www.example.com/servlet/com.esri.wms.Esrimap?ServiceName=Name&
Version:
1.3.0
Custom Parameters
Parameter
Value
Server Layers
Get Layers
STAR TDS Installation
STAR TDS Installation
Analysed blended sea surface temper
sea_land_ice_bit_mask
sea_ice_area_fraction
estimated error standard deviation
sea_surface_foundation_tempera
Account (Optional)
User:
Password:
Save Password
OK
Cancel
Add Data
Look in:
Analysed blended sea surface t
estimated error standard deviation of analysed_sst
sea_ice_area_fraction
sea_land_ice_bit_mask
sea_surface_foundation_temperature
Name:
sea_surface_foundation_temperature
Add
Show of type:
Datasets, Layers and Results
Cancel
Untitled - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows EDC Help
1:25,000,000
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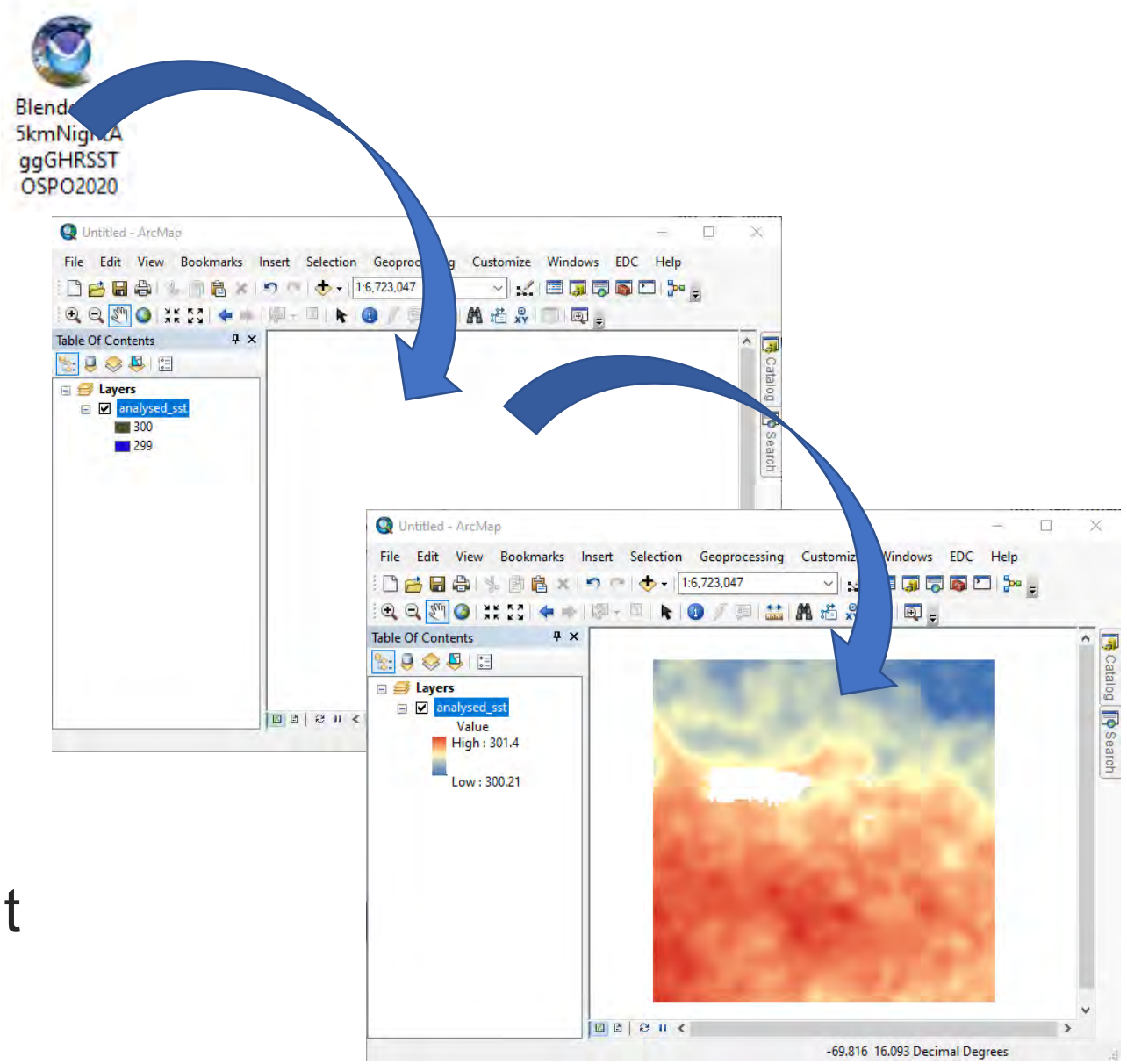
sea_surface_foundati
ArcMap Drawing Errors
One or more layers failed to draw:
STAR TDS Installation: WMS service exceptions:Service Error
Description: Unexpected error of type java.io.IOException
ArcMap Drawing Errors
One or more layers failed to draw:
STAR TDS Installation: This WMS Service has a layer limit of 1 per request. Try to add each WMS sub layer individually to send multiple requests.
STAR TDS Installation: WMS service exceptions:Service Error
Description: You may only create a map from 1 layer(s) at a time

Drag -n- Drop

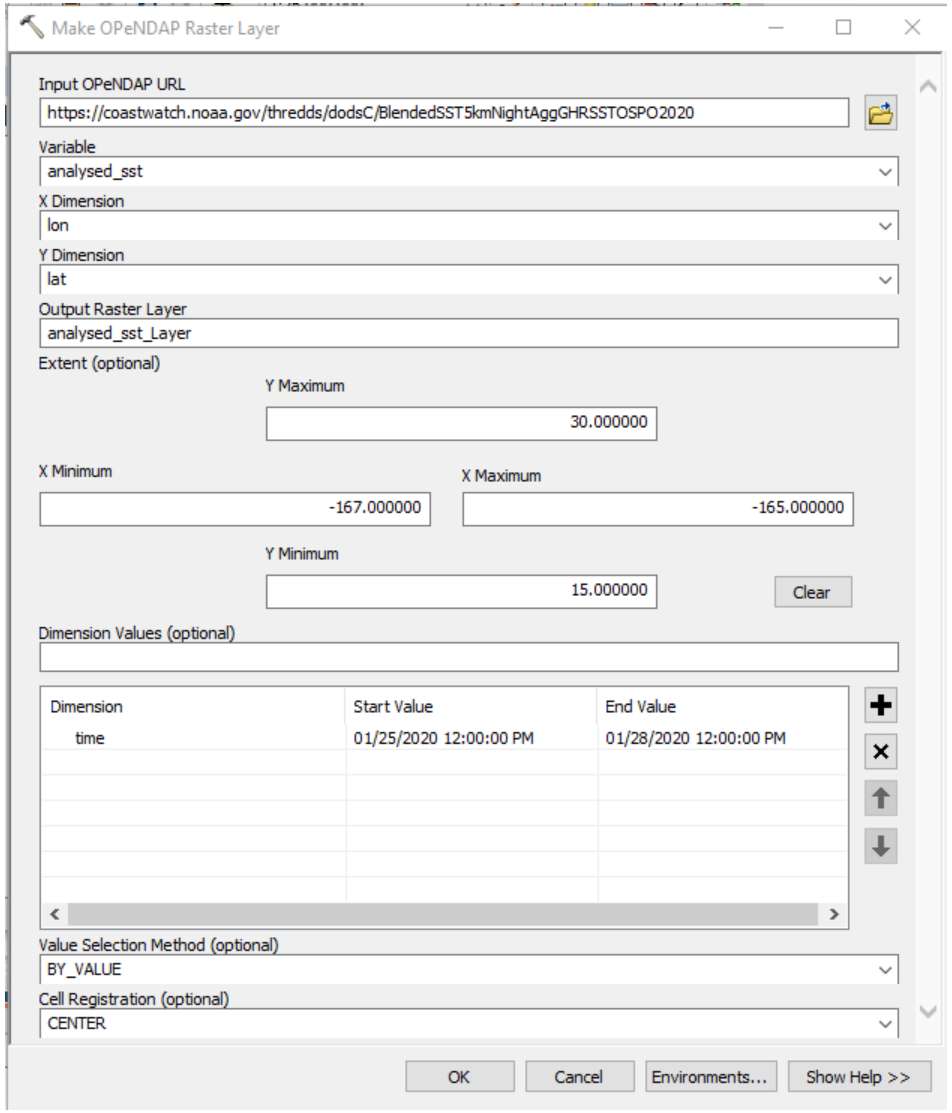
- Quick and easy
- Requires additional configuration [symbology, NetCDF, time, time slider]
- Defaults to first variable
- Don’t always get what you want



Make OpenDAP Raster Layer

ArcToolbox->Multidimension Tools->Make OpenDAP Raster Layer

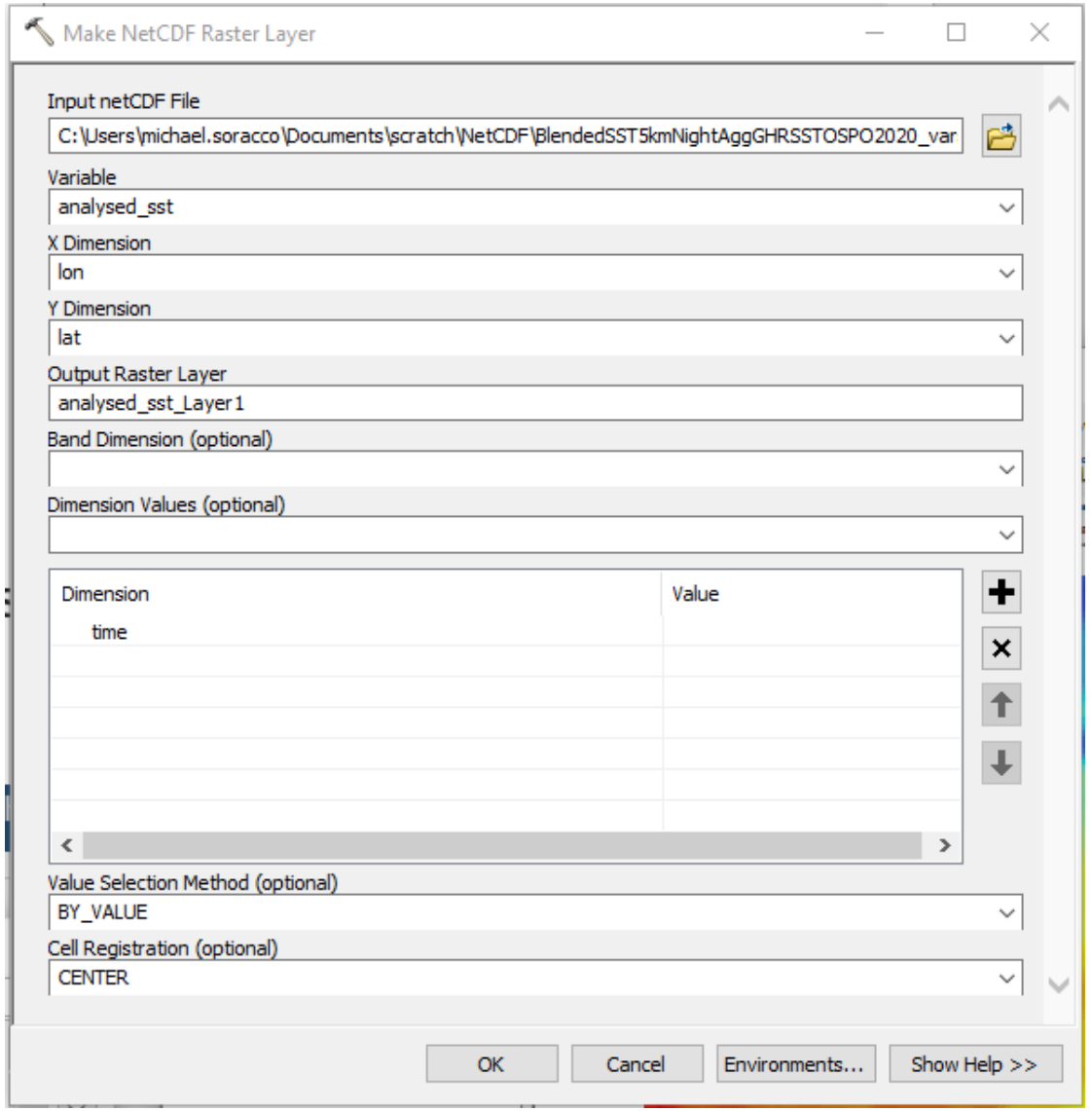
- A few clicks, but results may vary
- Menu-driven configuration to maximize usefulness
- Handles file or aggregates. Enter URL without extension
- Requires additional configuration [time, time slider] to maximize usefulness
- Unexpected Errors



Make NetCDF Raster Layer

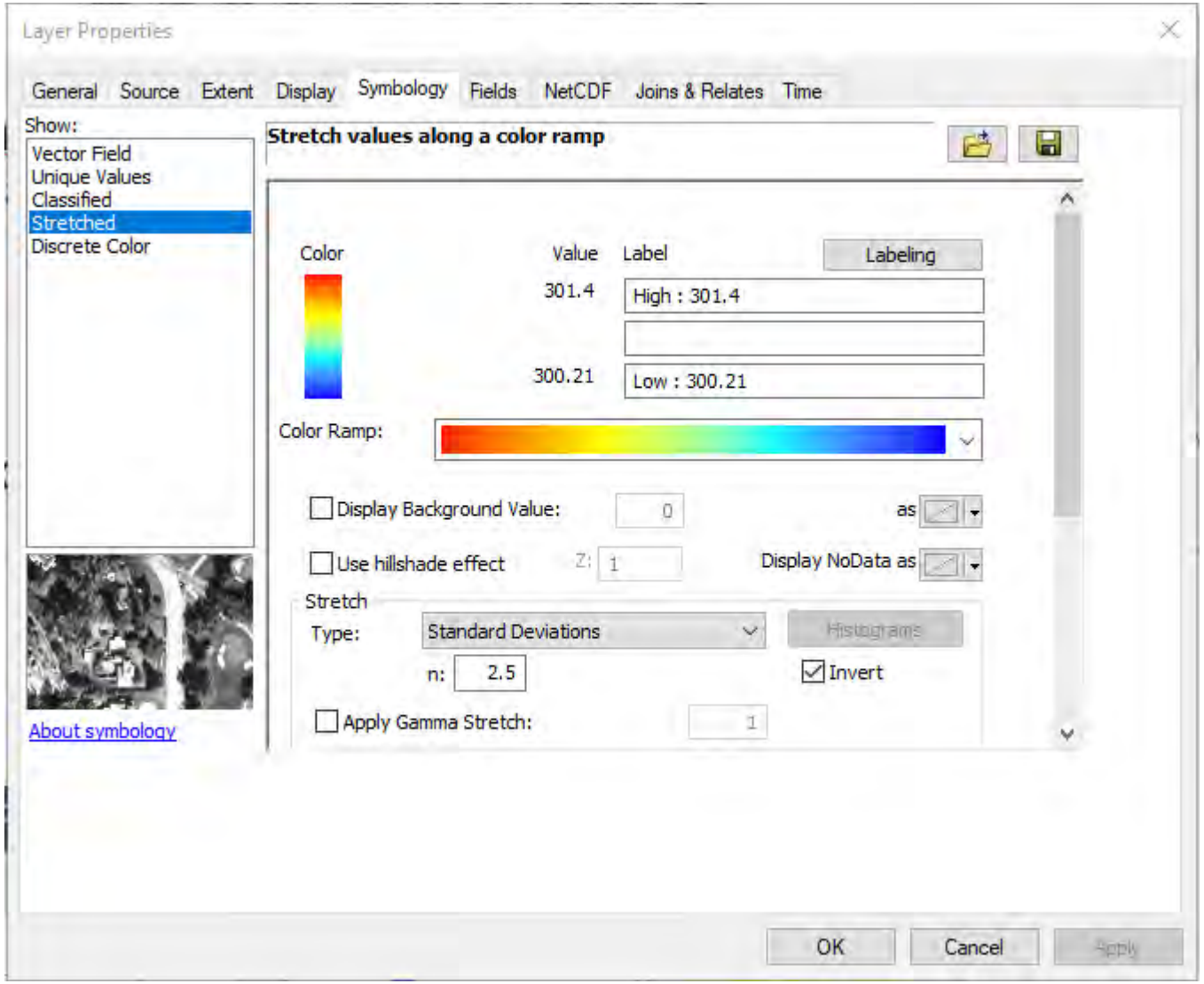
ArcToolbox->Multidimension Tools->Make NetCDF Raster Layer

- A few clicks
- Menu-driven configuration to maximize usefulness
- Requires additional configuration [time, time slider] to maximize usefulness



Layer Properties: Symbology

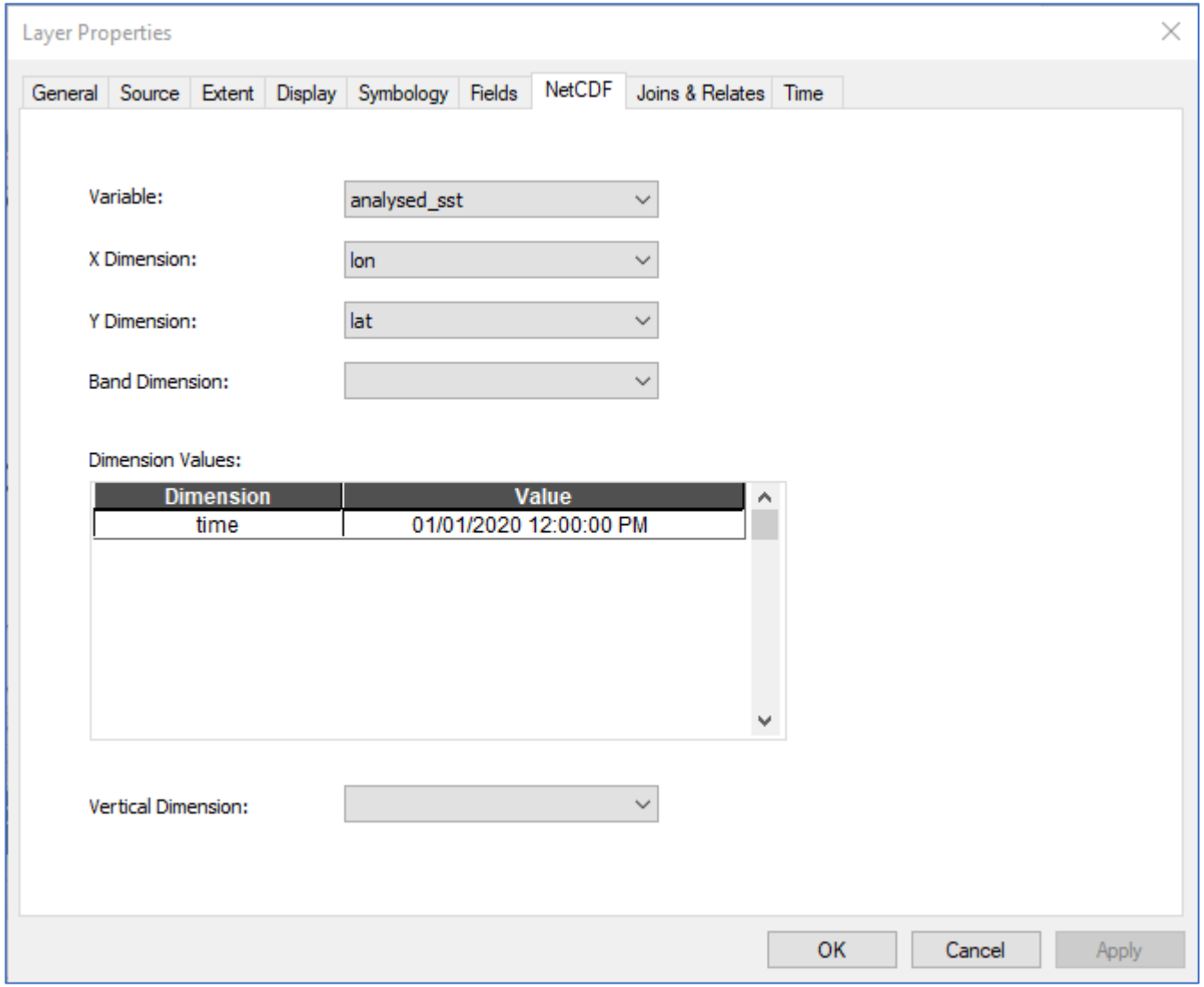
- ArcToolbox-> Multidimension Tools-> Make NetCDF Raster Layer
- Menu-driven configuration to maximize usefulness



Layer Properties: NetCDF

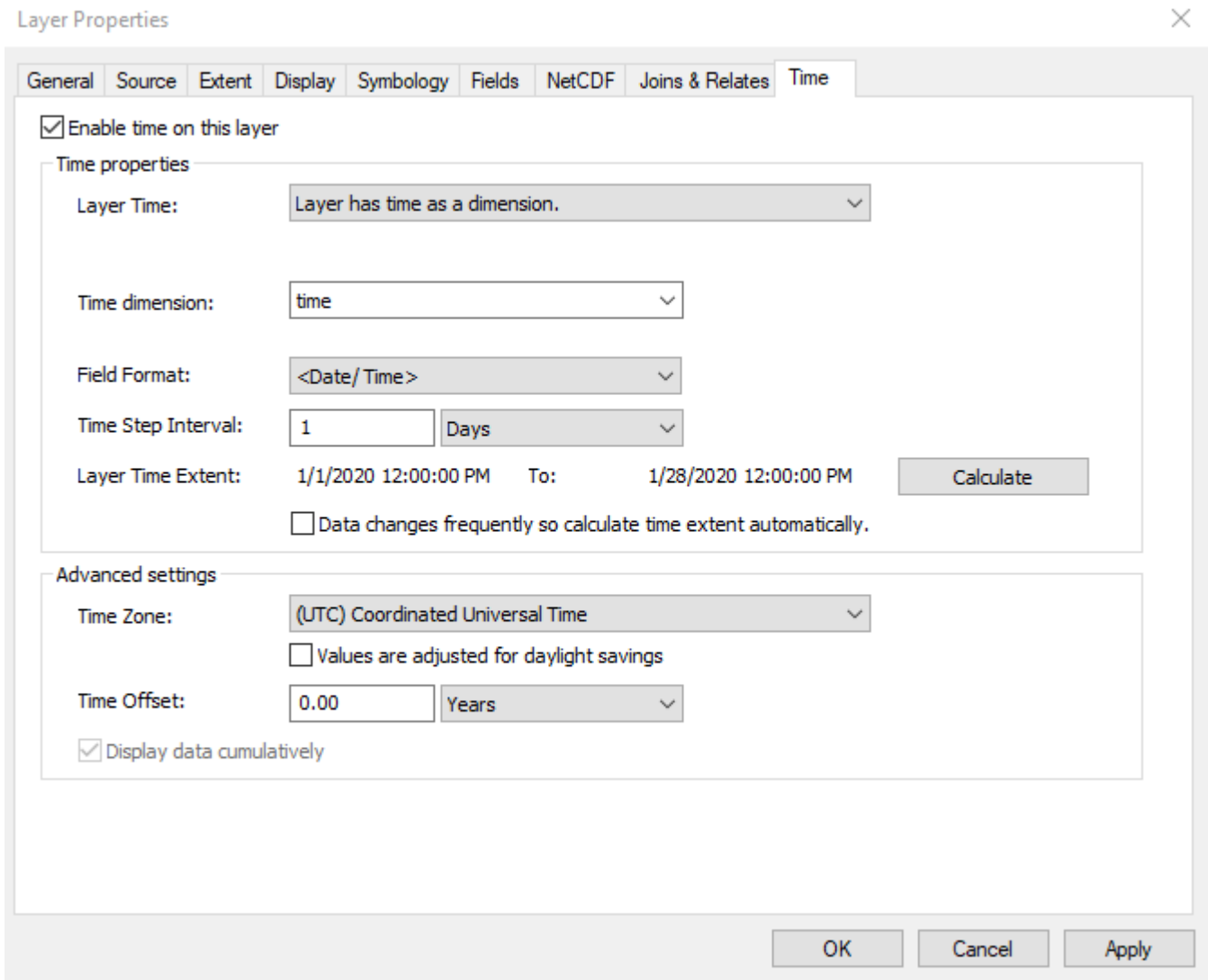
- ArcToolbox->Multidimension Tools->Make NetCDF Raster Layer

- Menu-driven configuration to maximize usefulness



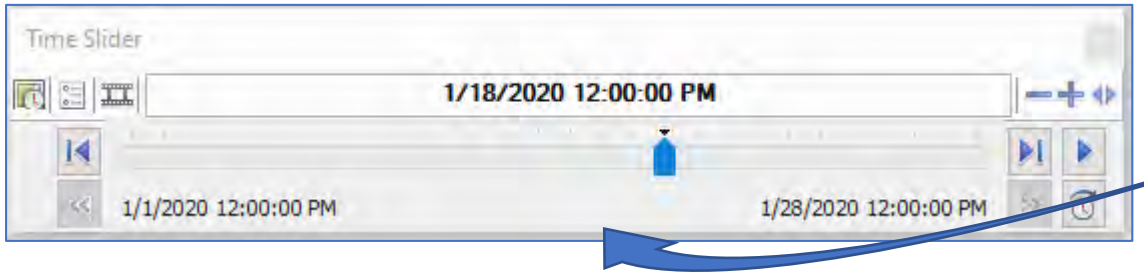
Layer Properties: Time

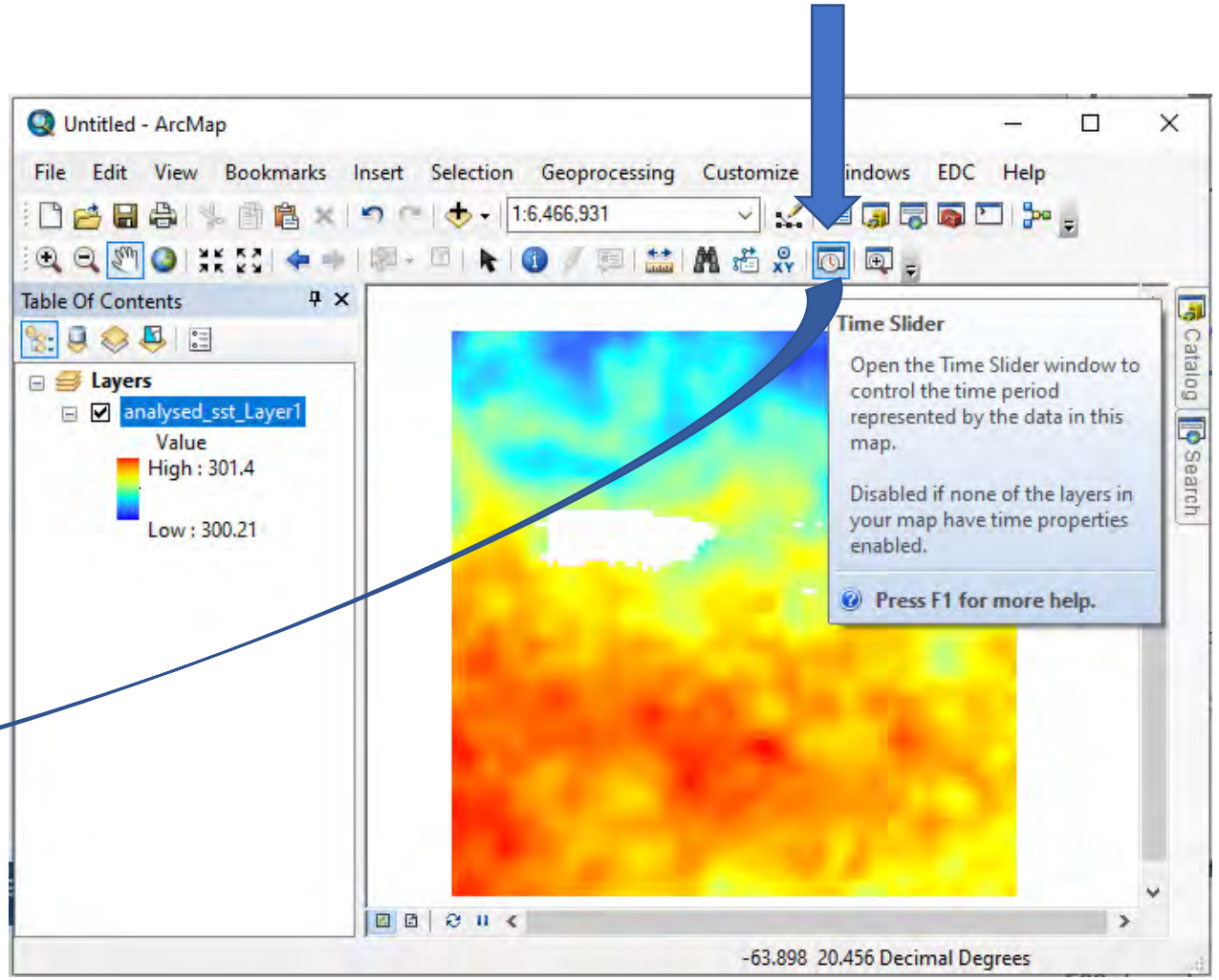
- ArcToolbox->Multidimension Tools->Make NetCDF Raster Layer
- Menu-driven configuration to maximize usefulness



Enable Time Slider for the Map

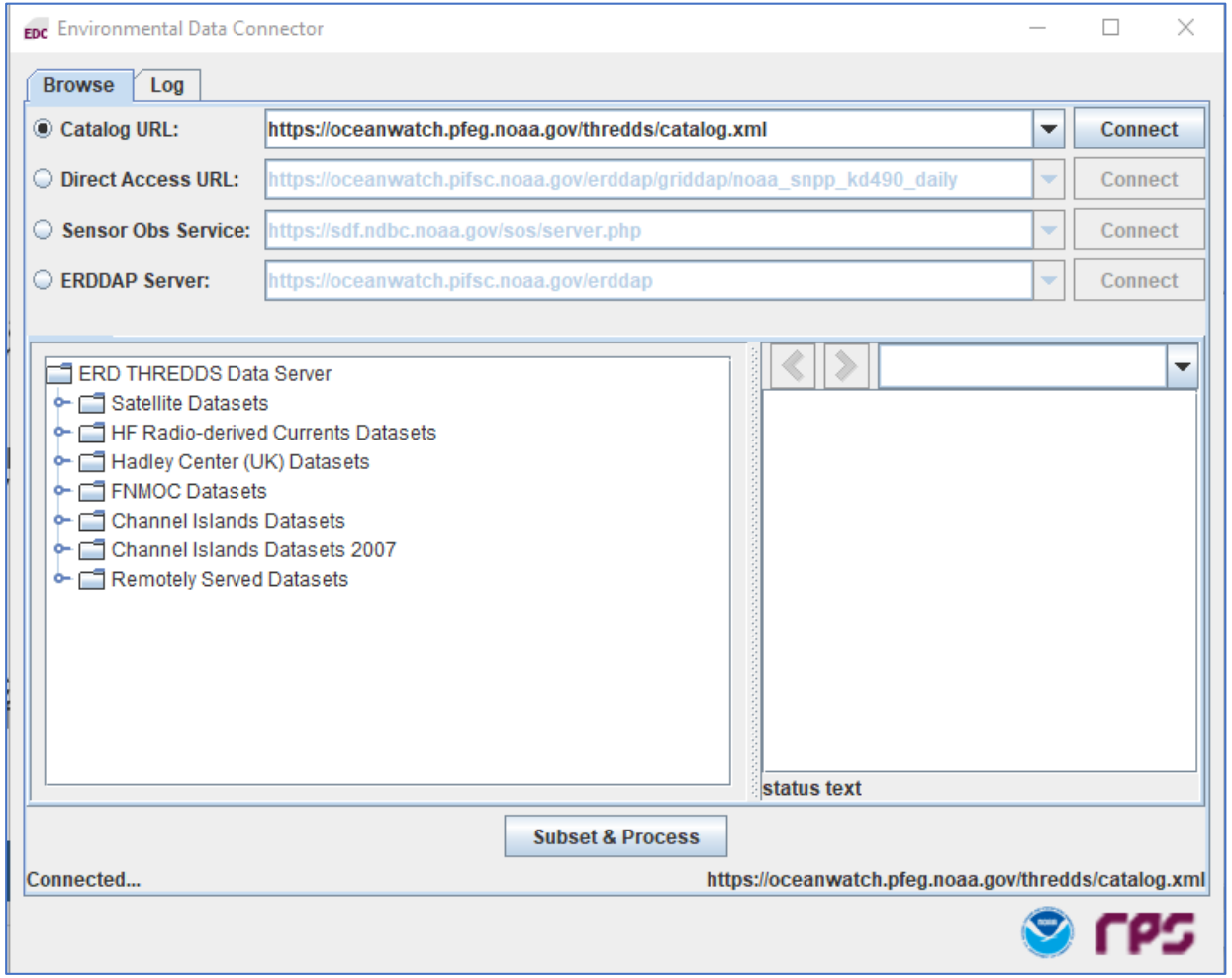
- Select the ‘Time Slider’ icon to activate the slider control





Environmental Data Connector

- Updated for ArcMap 10.7, a few tweaks remain
- Connects to a variety of services
- Provides data listings
- Subsets by space and time to only retrieve data that is needed
- Simplifies import by automating the ‘layer properties’ steps

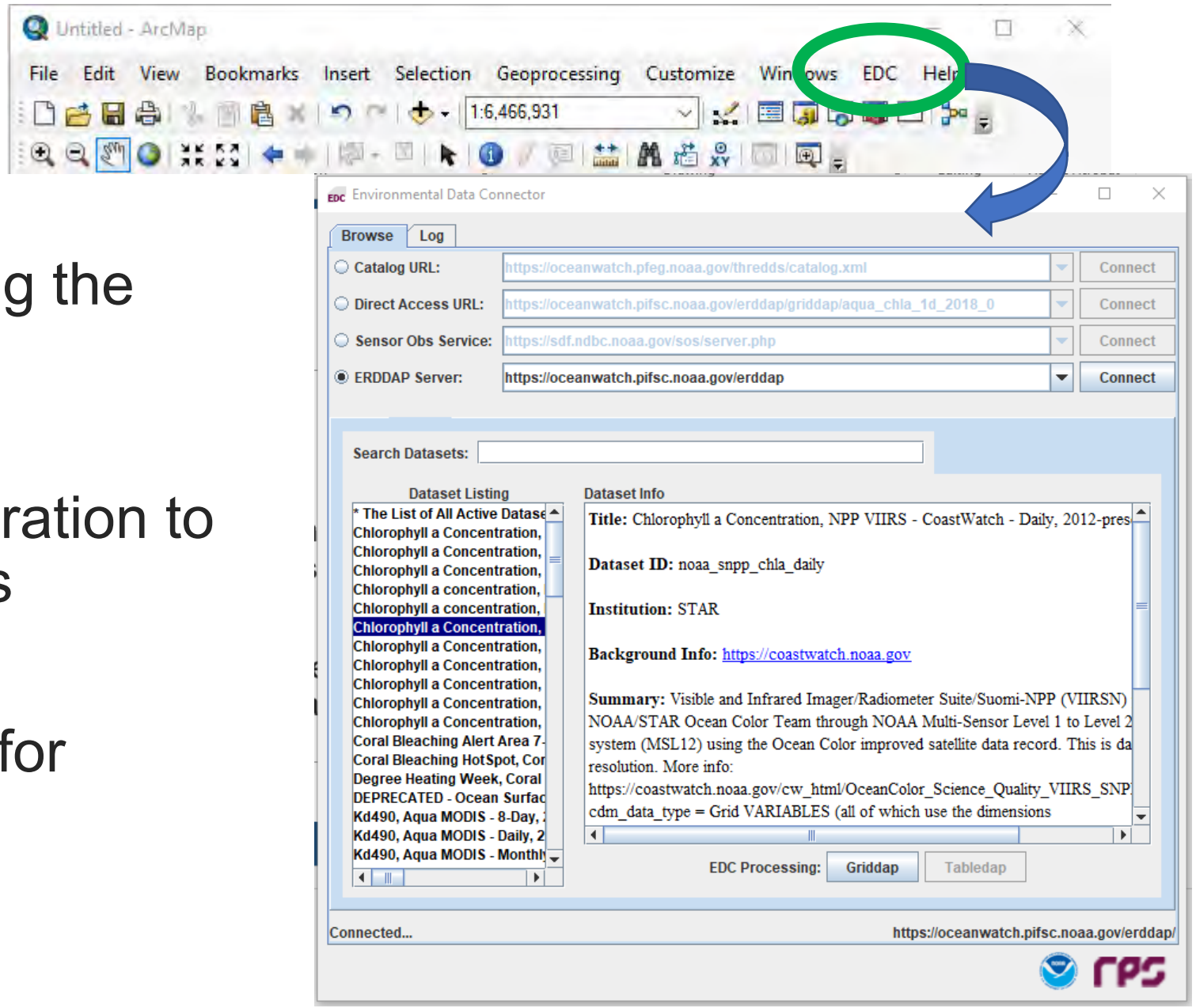


Installing EDC

- Use Java to run the ‘setup.jar’ file
  - Java –jar <path>\setup.jar
  - Upon execution, it will re-launch under wscript with command-line options
- Installation:
  - Creates directory for EDC standalone programs
  - Integrates with ArcMap
  - Extra steps/permissions if installed within Program Files.

Activating EDC

- Activated by selecting the EDC menu
- Menu-driven configuration to maximize usefulness
- Custom Time Slider for syncing data



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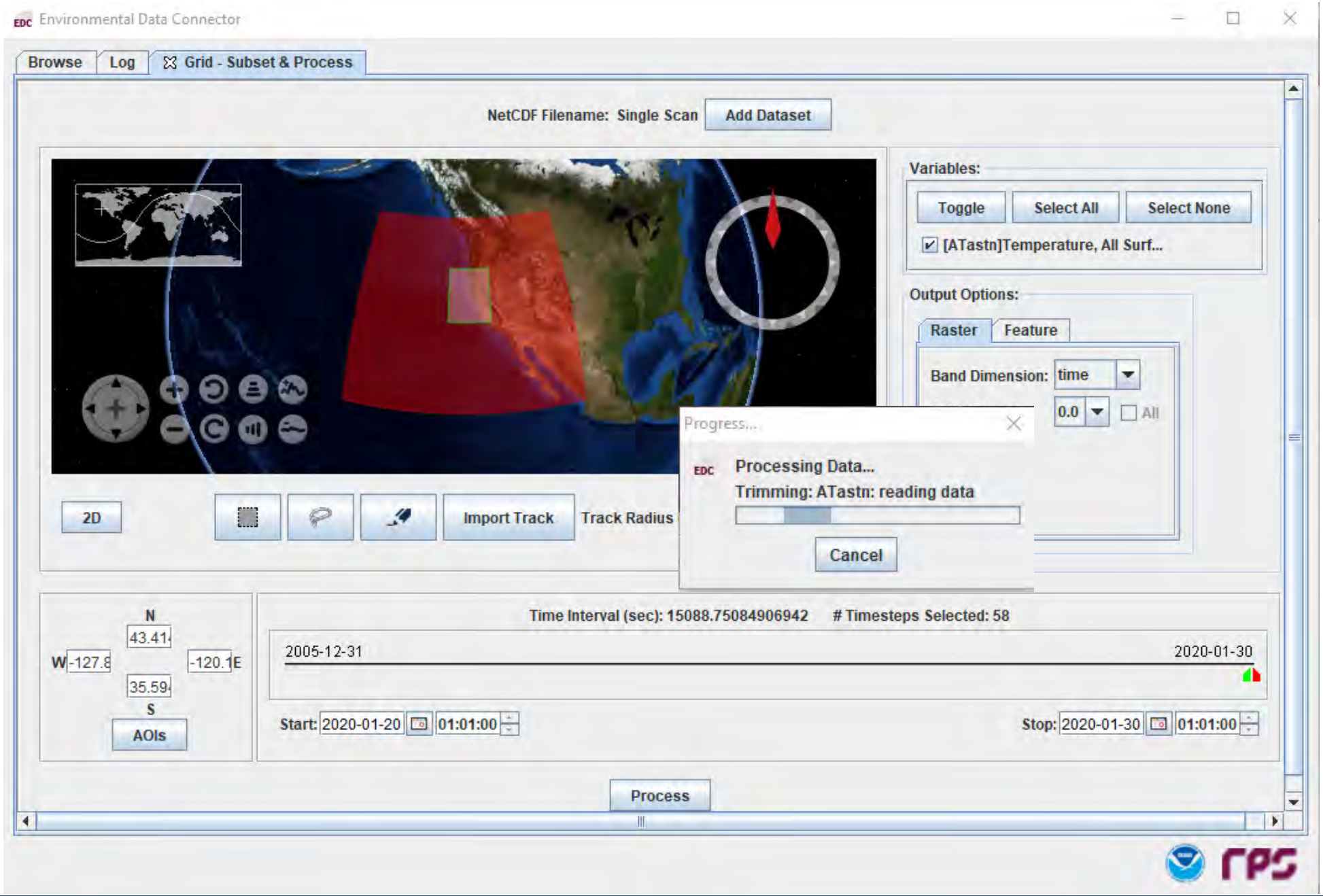
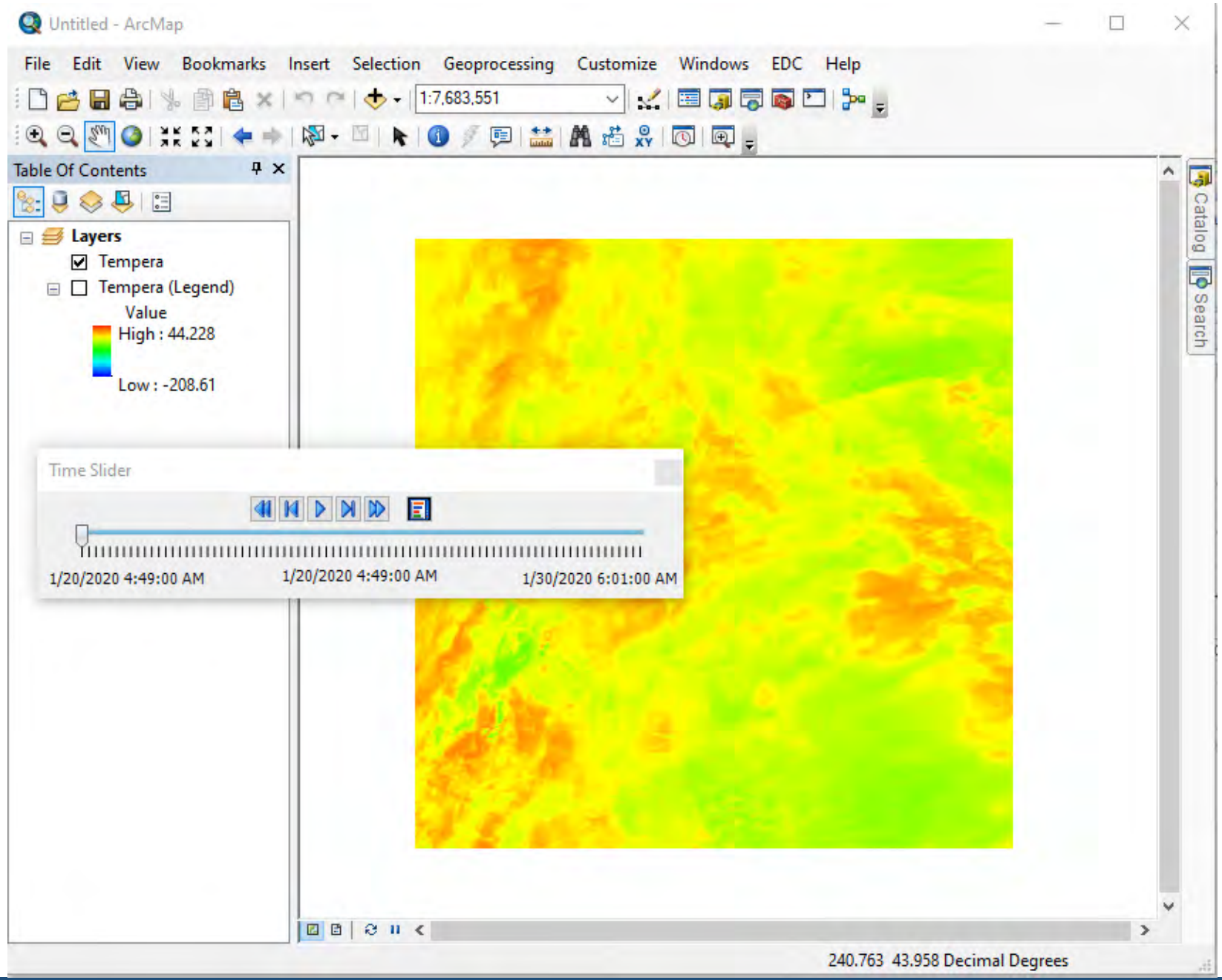
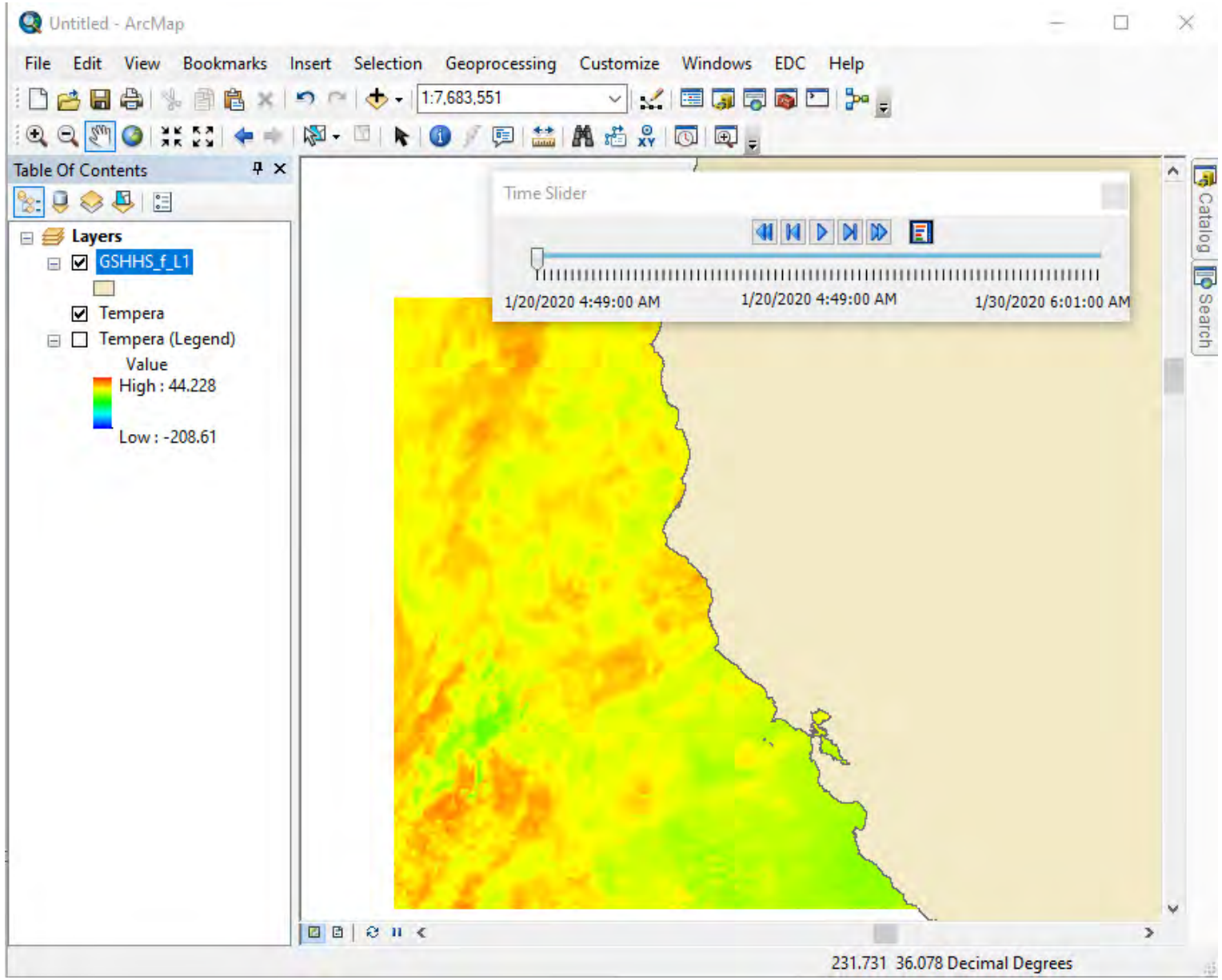


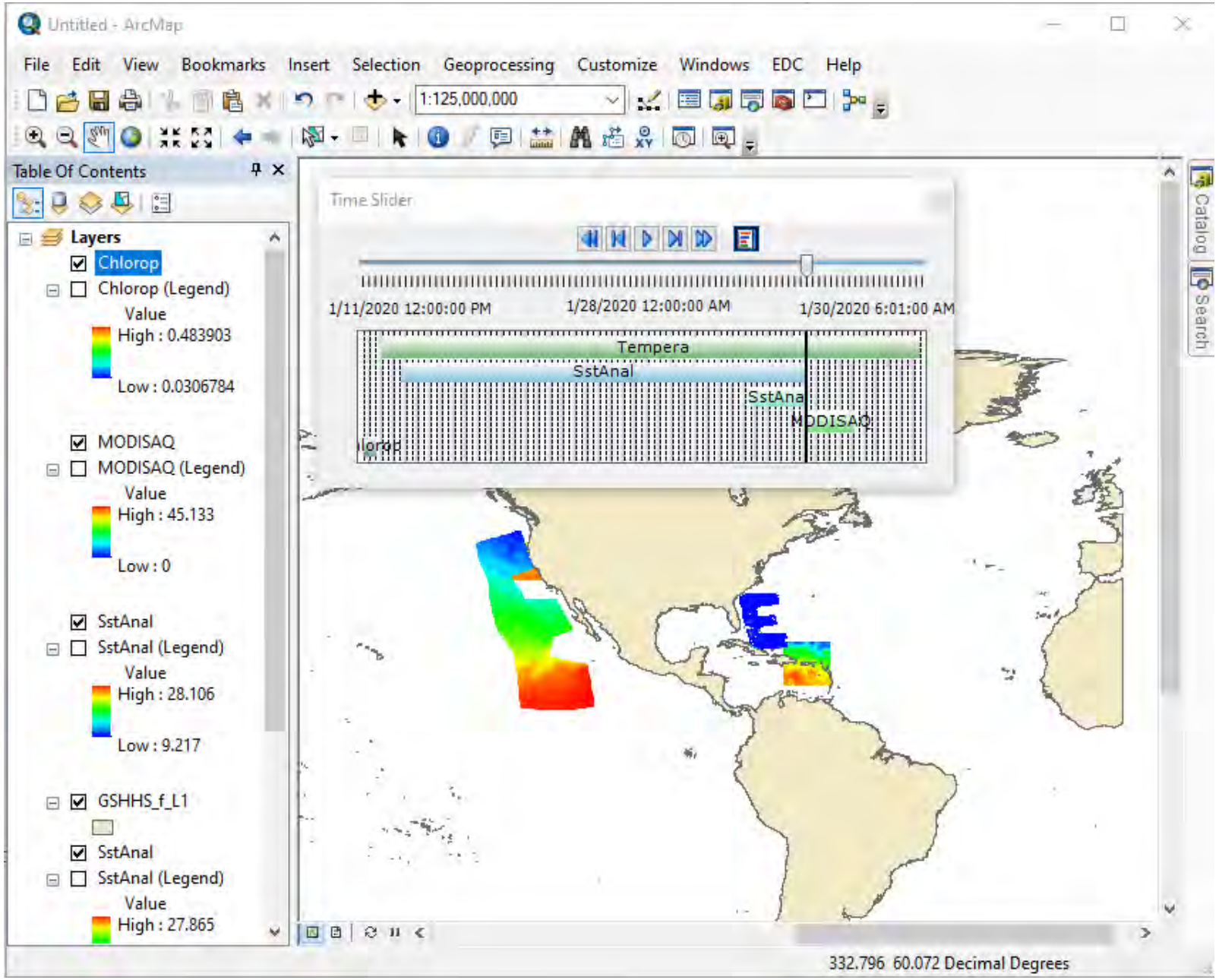
- Layer and Layer's Legend are loaded time-enabled with default scaling and color bar applied.



- Spatial alignment



- Time Slider shows alignment/range of temporal data



Things to keep track of

- Data Units:
  - SST may come in Kelvin or degrees Celsius (rarely Farenheit)
  - Chl comes in several units that do not necessarily change the values

- Time: Check the time zones for data – likely UTC

- Dateline: Most satellite data on services are composited daily products and may span 180W-180E
  - May introduce a mismatch in actual data collection time across the dateline

- Projection / Map Units:
  - Note units within ArcMap – usually the first data loaded sets projection and units
  - Ellipsoids/Datum – satellite data is most likely WGS84, land/coastal data may be NAD83

Additional Resources

- Environmental Data Connector
  - Download: https://www.pfeg.noaa.gov/products/EDC/EDCdownloads.html
  - User Guide: https://www.pfeg.noaa.gov/products/PFELData/EDC/EDC-1.3.6-ReleaseNotes_UserGuide.pdf
- ArcGIS [w/EDC] Satellite Data Tutorials/Examples*
  - Tutorial for EDC and Make NetCDF Raster
    - ArcGIS_EDC_Training_PFEG.pdf
    - https://coastwatch.pfeg.noaa.gov/projects/arcgis/
  - Tutorial for Make NetCDF Raster matchup with XY data
    - ArcGIS_XYMatchup.pdf
  - Tutorial for Make NetCDF Raster and data extraction by polygon, etc
    - ArcGIS_training_NetCDF_ex1_2_3.pdf

*Tutorials and accompanying data files are included in the Google Drive "ArcGIS_Tutorials_and_Data"