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CERSER - SeaSpace Training

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SeaSpace Training

In this report I will be talking about SeaSpace training that was broken into two sessions, the first during December and second during January. This training was completed over two weeks and during this time I was able to learn about different command lines, ways terminal could be used, what SeaSpace does with Center of Excellence in Remote Sensing Education and Research (CERSER) and how it relates with things like Polar Grid. During this training the moderators for the first week was Andrew Brumfield and during the second was David Mobley from SeaSpace. SeaSpace was founded in 1982 and has one of the leading remote sensing companies in the country and has been in business for 30 years. SeaSpace is a corporation and has more than 550 ground stations and processing systems in near 47 countries. During the first week we learned about the GOES East and GOES West satellites. GOES stands for geostationary operational environmental satellite-system. GOES is a satellite that orbits the earth and takes various data information the satellites are about 35,800 km (22,300 miles) above the Earth. We also learned about the processor that holds all the information is called Trex, which is linked to all the Linux computers in Dixon Hall on the campus of Elizabeth City State University. There is also a Tera vault that saves all the data. We learned that on top of the roof there is a satellite that is polar orbiting around the earth and then is linked to the server to the computers. We also learned how to make a directory, the command used was mkdir and then behind that you name the file. For example you want to make a directory for NOAA data sets so then you would put mkdir noaa and then return.

SeaSpace uses different configurations; each one is geared to particular satellite telemetry. The documentation of the information of the system and all the trouble shoots can be found in a large binder in the lab side with the Linux computers. This information is also on the thelp command and online. The SeaSpace antenna is on top of Dixon Hall and to get to this antenna you have to go through a small closet and climb a small ladder that is on the side of the wall. The antenna holds a major role in collecting the information passing over from the satellites. The satellite is large about 3.8m in diameter and has a fixed direction. The supported platforms that SeaSpace supports are Red Hat Enterprise Linux and CentOS. TeraScan software is based on a UNIX operating system and consists of TeraScan Data Format (TDF), more than 600 command-line functions, a set of daemons and services to help run continuously to manage automated operation, reference files, data files and a graphical user interface that lets the TeraScan user exercise as many operations at once that the system is capable to running.

During the new training with David Mobley we got more in depth with the more with SeaSpace. During this training we got to do more one on one using the computers in the lab. During this training I found that I was prepared from the training that I learned with Andrew Brumfield. Having Mr. Mobley was very insightful. We learned new commands that we used in terminal. One thing that I found useful was to use thelp, which helps with finding what

commands do, what TeraScan is and any other information that you may need to know about the terminal for TeraScan. So what is TeraScan? TeraScan is a system that is made of hardware and software that is designed for automated retrieval of data from environmental satellites and then that data is processed into images and data overlays. Each of the data files for these images and overlays have unique formats called TeraScan Data Format that can then be displayed with the viewer called TeraVision.
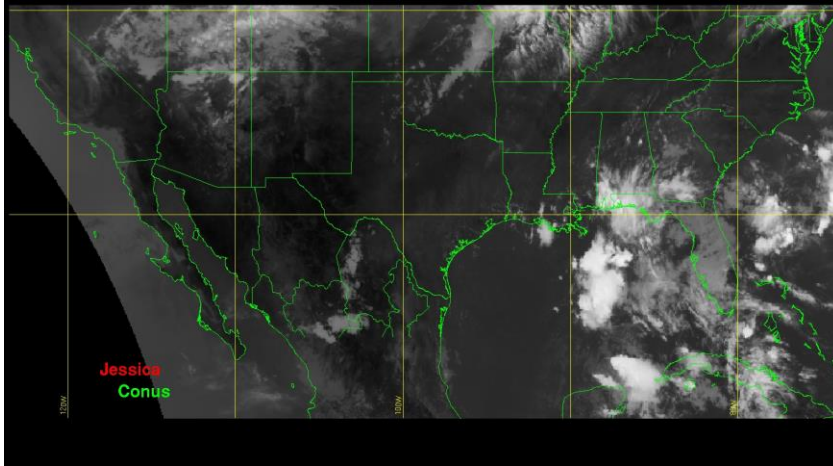

Image above is a sample of a data image made in TeraScan using TeraVision.

TeraScan is an important system that can be configured to the reception and processing of many different types of data from many satellites, like the L-Band and X-Band-transmitting polar orbiting satellites. Each band of data collects different information. For example the L-band data from Polar-Orbiting Satellites collect for NOAA, AVHRR and others that we used. In order to see this information you can code into terminal and use a command. A useful the command was tview, this helped when wanted to look over different areas and you want a quick look of where you data is laid out and if you need to change the pixels or coordinates to move closer or farther than where you are. For example if you want to used lspass, which lists all entries in the online pass catalog and also listing the passes on the pass disk. For example you want to list the records in the online catalog on the system that captures data from terra-1, aqua-1, and the noaa-xx satellites. By doing this you will get a chart style list that has all the pass from those satellites and it will have the terminal, date, time duration and lines. Using this data you can then do a command into tvis &. This command is called TeraVision, it is a graphical user interface (GUI) that is used to display and manipulate TeraScan data files.

TeraVision consists of a menu bar, icon bar, action panel, toolbar, and the area that displays the data image and has option to make overlays, plots and reports. In the animation tool, you can flip through multiple images that are loaded into the window and then his the forward play, for a continuous loop, or use previous frame or next frame to toggle back and forth between the images, along with a stop play to stop the looping. When loading the data it helps to put a boundaries overlay to add a geopolitical boundary to the image. Along with this you can add a latitude and longitude overlay. When loading the data at times you may need to use the

enhancement. There are three image-enhancement tools on the toolbar above the imaging area. In multiform mode, the enhancement operation can affect a single image or multiple images, depending on how the variables are linked. I found this tool useful to show different levels of vegetation and to distinguish what was land and water and also how much of water or land I wanted to be shown.

In using TeraVision, we launched a shelf builder that would in turn open the data. In order to create a data shelf you first open data library editor, then click the new button on the shelves side of the dialog box. On go back on this process, I learned that the next window popped up behind the window that was already opened so it helps to slide the window over while the other window is open. Once you have clicked new, you then choose shelf location dialog box, enter the path to the user's home directory box. Once that is done you hit accept button and done then the image will load.

The next command we used was emathp; it is a function for an element on TeraScan datasets. You can use this for complex expressions and use it to help out put land cover. In doing this activity we were able to calculate in terminal and then output that into TeraVision. We also put data into the master file. Something I learned is when using the smaller system you can put the master folder anywhere but when putting into the Trex machine you have to put it in the folder labeled Master. Because that system is already set to have the masters inputted into a designated folder. We also were able to use channel, channel 1 is visible, channels 2 and 3 are near-IR, and channels 4 and 5 are thermal IR. These channels were mainly used in NOAA and AVHRR, which stands for Advanced Very High Resolution Radiometer imager. This is how in the image that is below could be seen so clearly. There are only 5 channels that are transmitted at any time and operate on daylight passes and which are channel 3A and nighttime passes are on channel 3B. It is easier to see the daytime passes during some passes due to there being more natural light whereas at night some cities may not have a lot of lights on. During that time we used the command Cat, that shows what is in the file and then used the > sign to add too the file. By doing this we were able to make a script that we then used that to input coordinates.
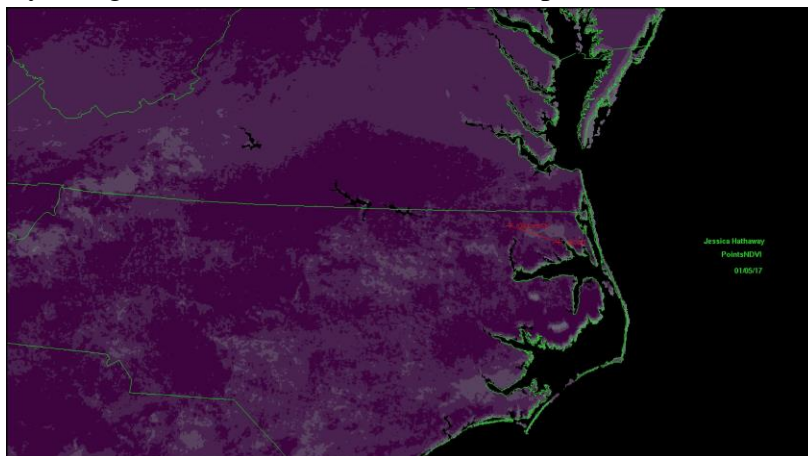
The coordinates for ECSU and my hometown of Gates county where used to show where they are and the distance between them. This coordinates are latitude and longitude so make points using csv, to put this in we used the impasc command then naming the in/out files

point.csv point.tdf, after that setting the dimension size to 5 and accepting default. By doing this setting this you get a message that says complete lines because during this we only set to longitude and latitude lines.

We also used the command sample; this takes one or more inputs of datasets and samples them into a list in the point_file. This is then outputted into one output file for each input file. An example of how this output would look:

[teradm@cerser-vis9 regndvi]$ sample
in/out files   : char(255) ? n18.15161.2000.avhrr n18.15161.2000.avhrr.pts
point_file   : char(255) ? point.tdf
points_are   : char(8) ? [points]
include_vars   : char(255) ? []
output_coords : char(3) ? [no] yes
[teradm@cerser-vis9 regndvi]$ ls
Composite   n15.15161.2158.avhrr.pts   n18.15161.2000.avhrr.pts
n19.15161.1720.avhrr point.csv   n15.15161.2158.avhrr n18.15161.2000.avhrr

The output files have point.tdf on the end those are the files that are then loaded into terminal that then output the image above. We then did this again for another set point. By doing this I was able to see the distance between ECSU and Gates County. I found the process a little challenging because in order to see the information you had to change the view setting in TeraVision. The interesting part of this information is you can look up different time of information and see the Sea Surface Temperature (SST). This information is important and knowledge to see for example how your area fairs in different weather climates.

So when coming to the end of the training I started to think about how can SeaSpace training be used outside of just CERSER? Who could use it and what grade levels would benefit from it? Being an Mathematics Education major I think that students learning about climate change and sea level rise can benefit from this information by being able to plot coordinates like we did using the impasc, sample and then doing an lspass to be able to see what times the water could be rising and the seasons. By doing this they will be able to physically see what is happening in their region and even across the world. Then they can also use the pass data and the new data to see the changes that are used that to make a correlation of what is happening and get a better understanding that global warming is happening.

This overall experience has taught me that using terminal and command lines are challenging but not impossible. By doing this training it is useful information than can be used on future project and information that can be shared when going to other internships to talk with other students that may have used or heard of SeaSpace and Terascan. The information taught will not be forgot and also added onto future work done. This training was an experience that was education and challenging and helped me feel more confident in my computer coding skills.

References

Thelp commands
http://localhost/terascan/thelp/33_RN.html#tvis_I

NOAA Satellite Information System (NOAASIS)." *NOAA Satellite Information System (NOAASIS); Office of Satellite and Product Operations*. N.p., 5 Mar. 2014. Web. 05 Jan. 2017.

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