Calculating and Mapping seasonal SST differences LAB 8

Objective: to identify the SST differences from the same location during a season from two different years. For example, What was the SST difference in the South Asian Sea between winter 2000 and winter 2010?

To do this you need to identify 2 parts: 1) the season of interest and 2) the region of interest. Seasons can be either winter (December, January, February), spring (March, April, May), summer (June, July, August), or fall (September , October, November). Zoom into any region of interest.

GENERAL DIRECTIONS:

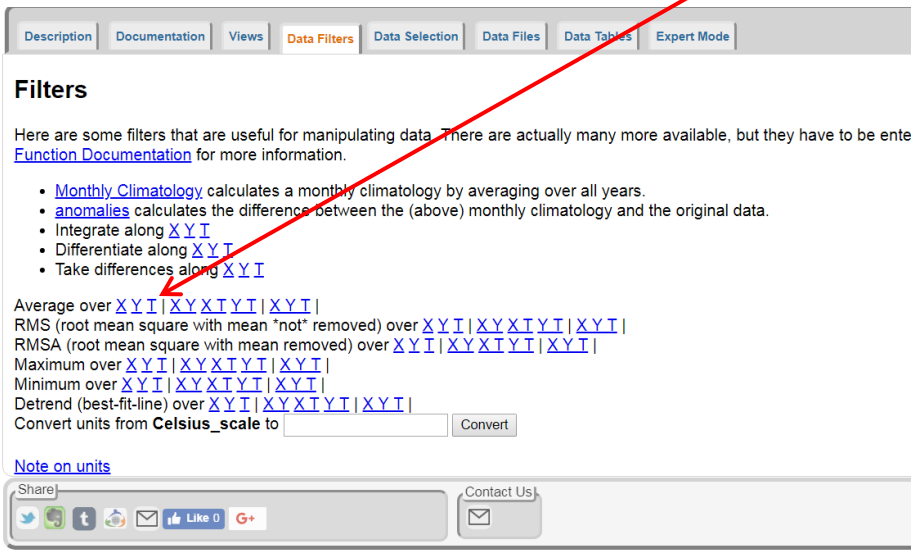
1) **Select SST dataset from the data library**
2) **Subset the season 1 period**
3) **Subset the region**
4) **Subset the season 2 period**
5) **Subset the region**
6) **Subtract the two seasons**
7) **Plot a difference map**

DETAILS:

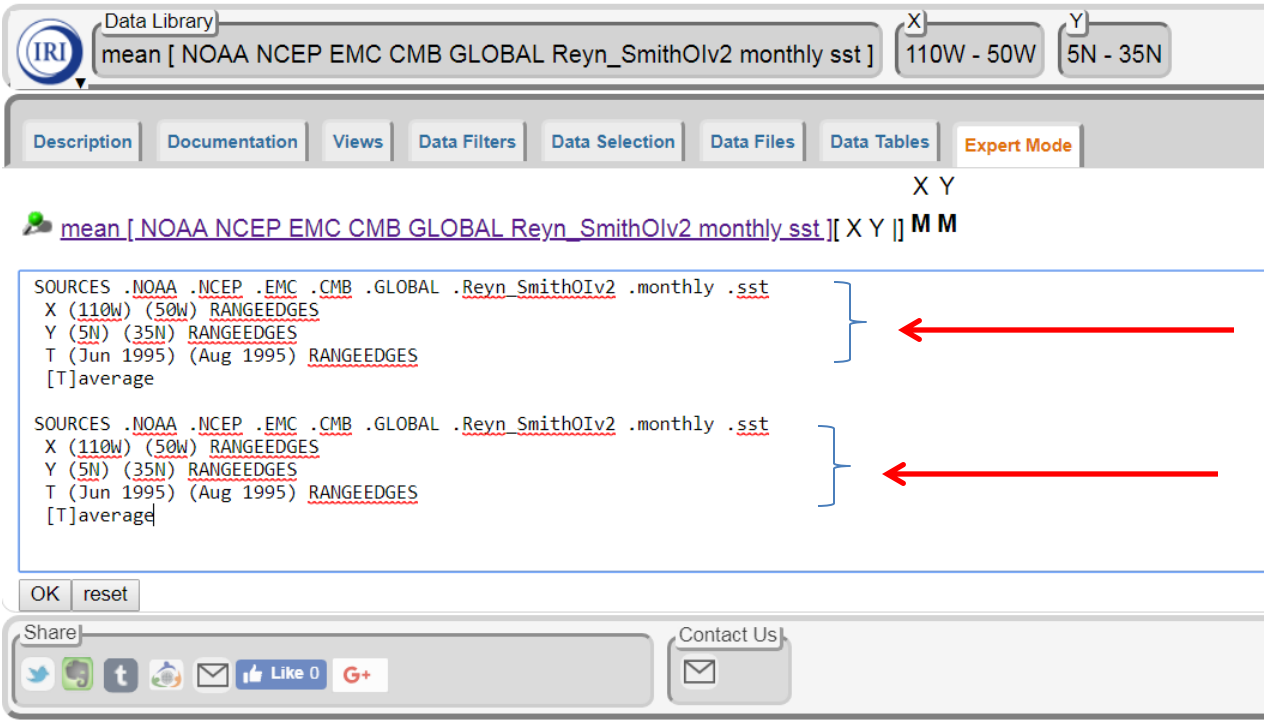
1. Click here to select the SST dataset:
https://iridl.ldeo.columbia.edu/SOURCES/.NOAA/.NCEP/.EMC/.CMB/.GLOBAL/.Reyn_SmithOIv2/.monthly/.sst/

2. Click on the Data Selection tab near the top
3. Enter your longitude, latitude, and time. Your longitude and latitude will determine your regional subset. The time will identify your season of interest. For the time, if you want to look at summer 1995 then the time selection would be , **Jun 1995 to Aug 1995**. (DO NOT USE THIS EXAMPLE, PICK YOUR OWN)
4. Click on the **Restrict Ranges** link at the bottom of the setting ranges section
5. Click **Stop Selecting** from the Data Selection section.
Now you have subsetted your region and season.

6. Click on the **Data Filters** tab near the top of the page.
7. Locate where you see the words, **Average over.** Click on the **T**.



8. Now you have average the three months of your first season to calculate the seasonal average SST
9. Click on **Expert Mode** tab from above
10. Copy and past the lines of code just below the original lines of code

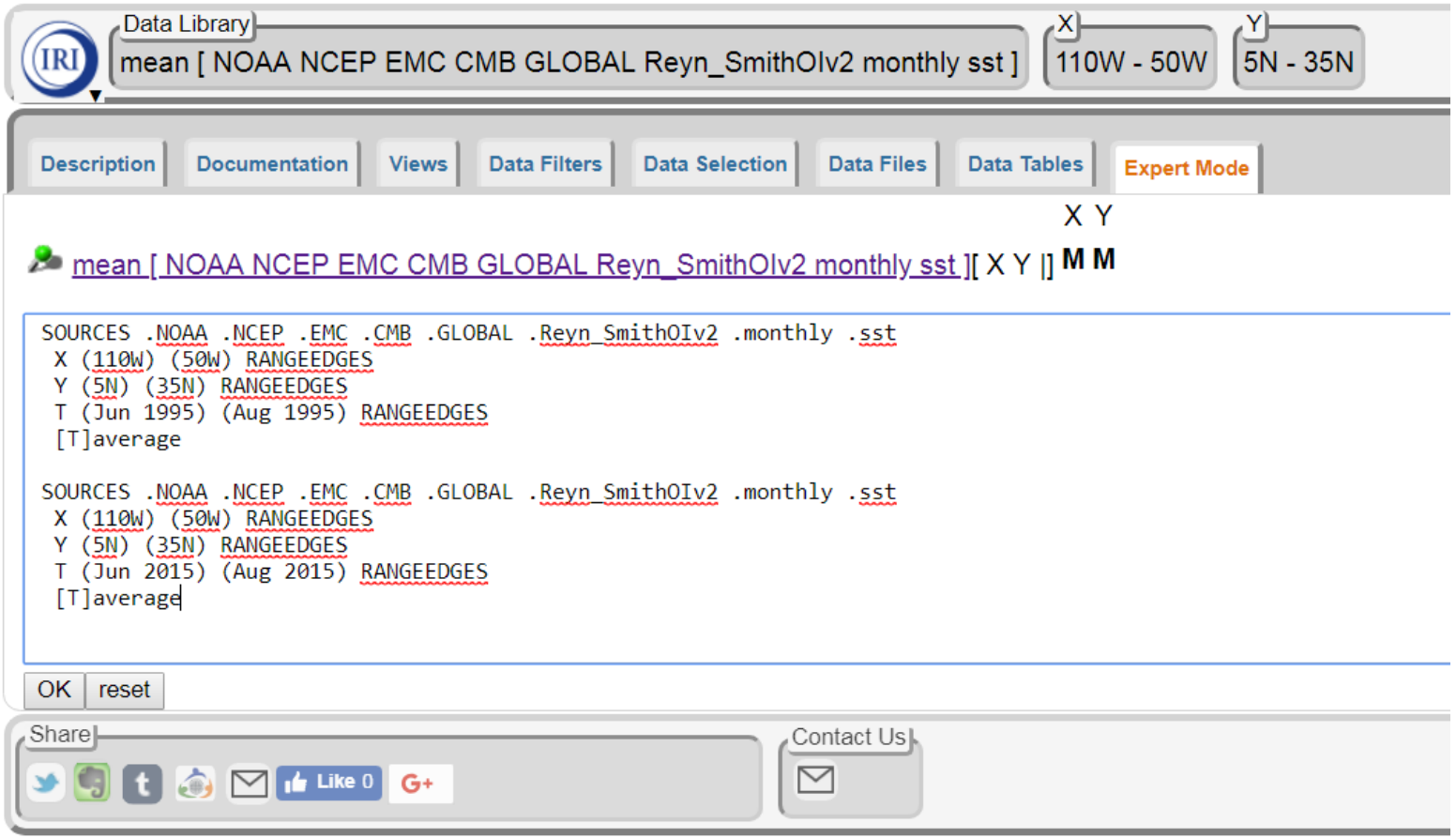


Copied these 5 lines

pasted these 5 lines

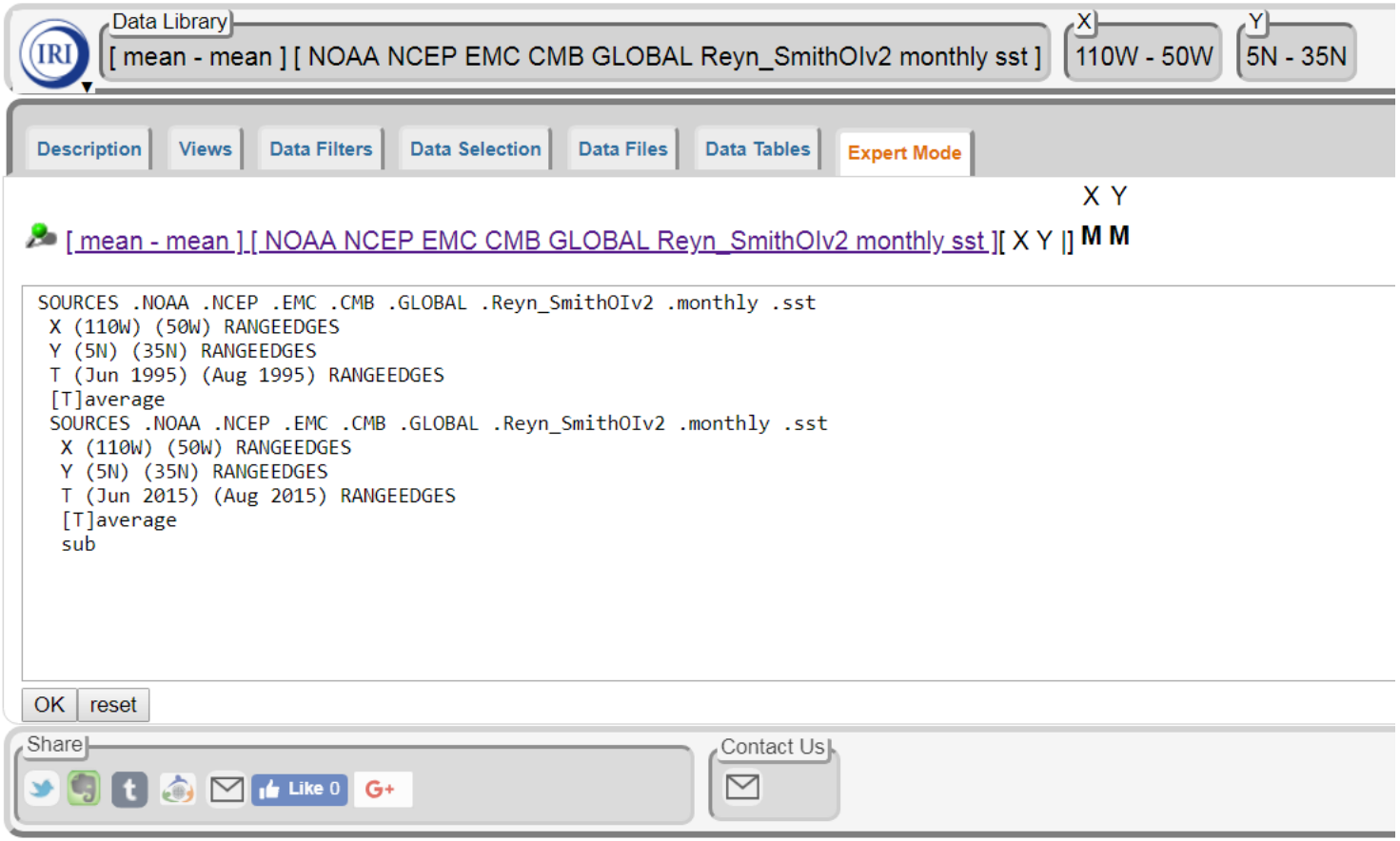
11. Now, change the dates in the pasted rows for a NEW season. Before we had Jun-Aug 1995. Now we want Jun – Aug 2015 (PICK YOUR OWN DATES!). Simply change the dates as you would normal text.

12. The new codes should look like this now. NOTICE new dates in the second section of lines. You must type them EXACTLY as above, don't forget the space between the month and year!



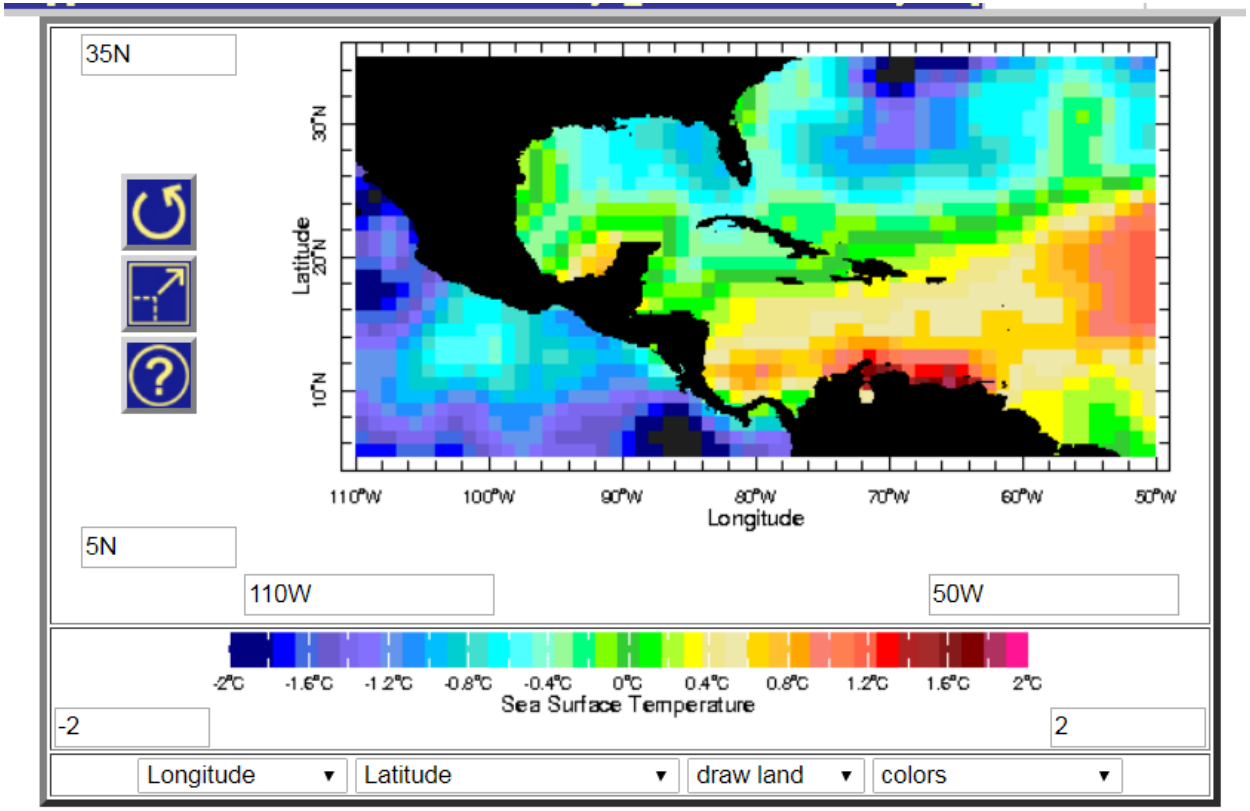
13. Click **OK** near the bottom

14. Now simply write the word, **sub** on a new line at the bottom of the lines of code. It should look like the below. The sub keyword calculates the difference between the two seasons.



15. Click **OK** at the bottom
16. Click on **Views** tab from the above, the select the **Colors with Land** option.

17. Now you should have a map that looks like this. Be sure to adjust the color scale values so that 0 is in the middle. In this example, I entered -2 and 2.



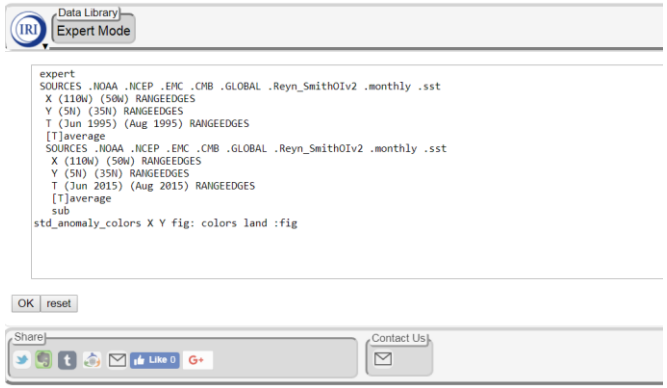
18. ***There is one thing I do not like about the map above***. The greens are both positive and negative values. It is hard to tell where is positive and where is negative. To fix this, I add a different color bar.

19. I added a new line at the bottom of the lines of code to add a new color bar! The new line is:
std_anomaly_colors X Y fig: colors land :fig

20. The new code is below. NOTICE THE **NEW LINE AT THE BOTTOM**. Be sure to copy and past this line at the bottom of your code.

```
SOURCES .NOAA .NCEP .EMC .CMB .GLOBAL .Reyn_SmithOIv2 .monthly .sst
 X (110W) (50W) RANGEEDGES
 Y (5N) (35N) RANGEEDGES
 T (Jun 1995) (Aug 1995) RANGEEDGES
 [T]average
 SOURCES .NOAA .NCEP .EMC .CMB .GLOBAL .Reyn_SmithOIv2 .monthly .sst
  X (110W) (50W) RANGEEDGES
  Y (5N) (35N) RANGEEDGES
  T (Jun 2015) (Aug 2015) RANGEEDGES
  [T]average
  sub
std_anomaly_colors X Y fig: colors land :fig
```

21. Now what I do is copy all of the lines from above and paste them into a new “expert window”
22. Type this code into a web browser:
https://iridl.ldeo.columbia.edu/expert/
23. Now, paste all of the lines above including the new final line into the blank window. It should now look like this below. Select **OK**



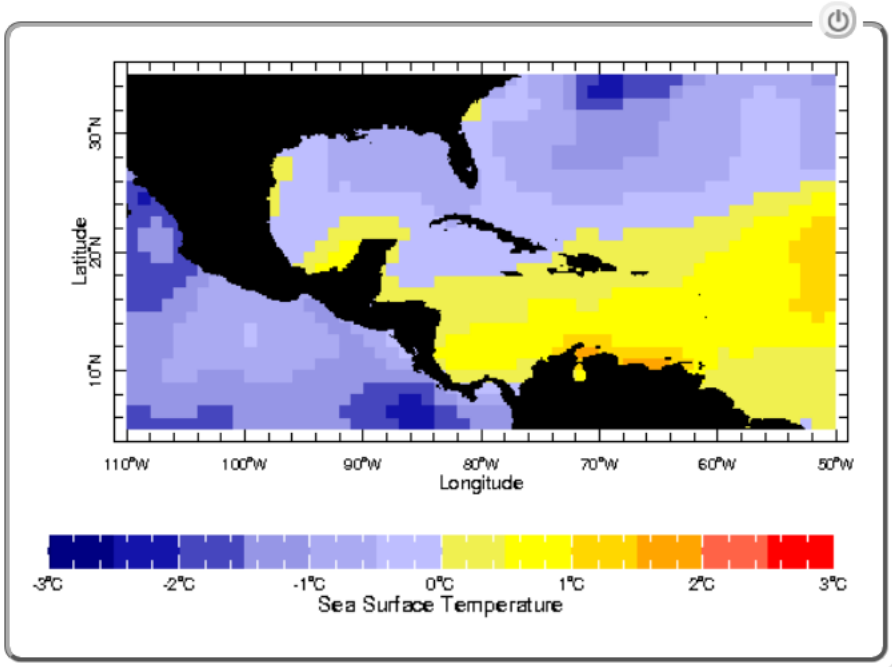
24. Your difference map should look like the below now. It is easy to tell where the positive and negative values are. Blues are negative and yellow / red is positive.

[mean - mean] [NOAA NCEP EMC CMB GLOBAL Reyn_SmithOIv2 monthly sst]

mean [NOAA NCEP EMC CMB GLOBAL Reyn_SmithOIv2 monthly sst],Averaged over T[Jun 1995, Aug 1995],mean [NOAA NCEP EMC CMB GLOBAL Reyn_SmithOIv2 monthly sst],Averaged over T[Jun 2015, Aug 2015]

Last updated: *Mon, 05 Nov 2018 08:02:20 GMT*

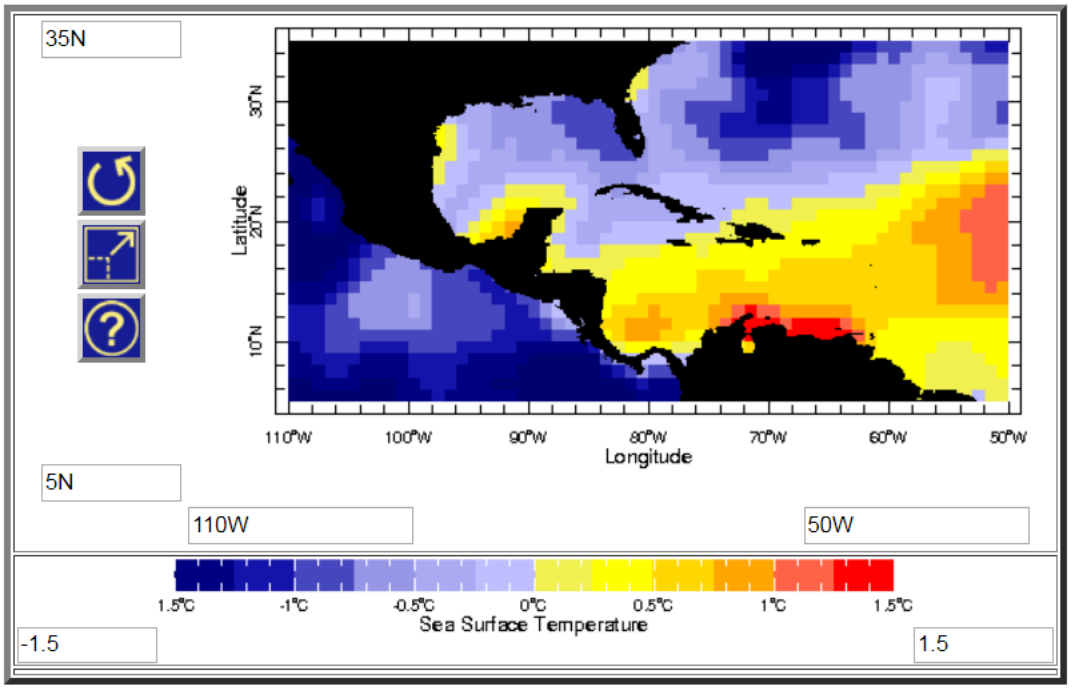
Expires: *Mon, 03 Dec 2018 00:00:00 GMT*



Share Like 0 G+ Contact Us IRI

25. If you want, you can now click on the **Options** tab, then select **Viewer.** Now you can fine tune your color range values if necessary.

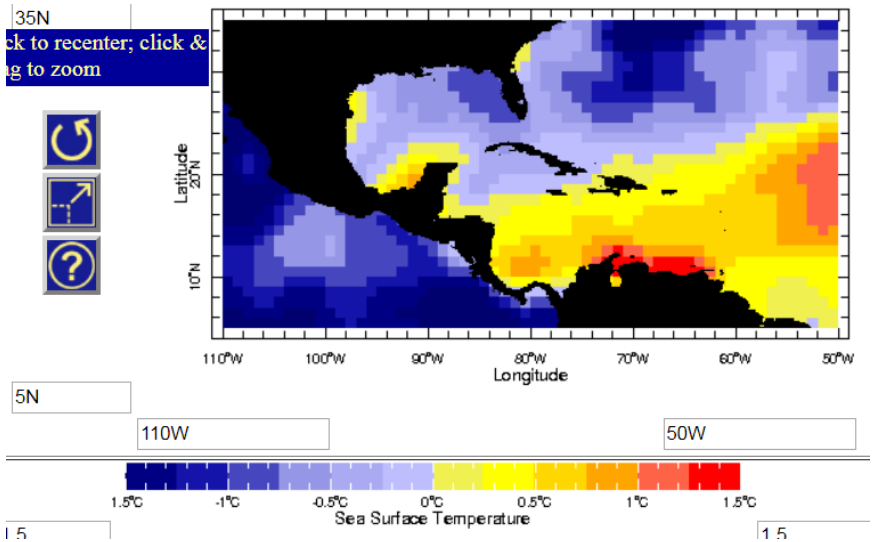
26. I changed the range from -3 to 3 for a new smaller range of -1.5 to 1.5.



Get Data			Export		Edit plot
Page Formats	documented page	plain page	linked pdf	cut and paste link	more options

27. Compare the new map with the old one. Same data, just different color scale. You can see much more variation with the smaller scale. Can you maximize your variation?

INTERPRETATION



In order to properly interpret your **SST seasonal difference map**, you MUST know what season was subtracted from the other. Recall that I first entered summer 1995 and then entered summer 2015. So in my case, everything that is positive shows where it was warmer in 1995 compared to 2015. *(If you don't believe me, try a simple made up test. Pretend summer 1995 was 30C and summer 2015 was 20C, then 30-20 is POSITIVE, which means that 1995 was greater, or warmer and will be yellow or red. Positive values indicate that the first season was greater or warmer than the second season. This is VERY important. Please understand this. Failure to understand this concept may cause you to interpret your results incorrectly!)* Everywhere that is negative shows where it was cooler in 1995 compared to 2015. Also know, the blues mean that 1995 was cooler, which is the same thing as 2015 was warmer where the blues are. Reds / yellow means 1995 was warmer or 2015 was cooler….SAME THING!

WHAT YOU NEED TO INCLUDE IN THE ASSIGNMENT:

1. Your entire lines of code (1pt)

```
SOURCES .NOAA .NCEP .EMC .CMB .GLOBAL .Reyn_SmithOIv2 .monthly .sst
 X (110W) (50W) RANGEEDGES
 Y (5N) (35N) RANGEEDGES
 T (Jun 1995) (Aug 1995) RANGEEDGES
 [T]average
 SOURCES .NOAA .NCEP .EMC .CMB .GLOBAL .Reyn_SmithOIv2 .monthly .sst
  X (110W) (50W) RANGEEDGES
  Y (5N) (35N) RANGEEDGES
  T (Jun 2015) (Aug 2015) RANGEEDGES
  [T]average
  sub
std_anomaly_colors X Y fig: colors land :fig
```

2. Your difference map (1pt). The map color scale MUST be centered on zero (1pt). Please understand why this is important for anomalies or differences!

3. Interpretation of your difference map (2pts). Tell me what season you picked and what years. Why did you pick them? Interpretation needs to include a few sentences that describe the variation. Where was warmer / cooler and when? DO NOT WRITE MORE THAN ONE PAGE, but you must write at least ½ page.