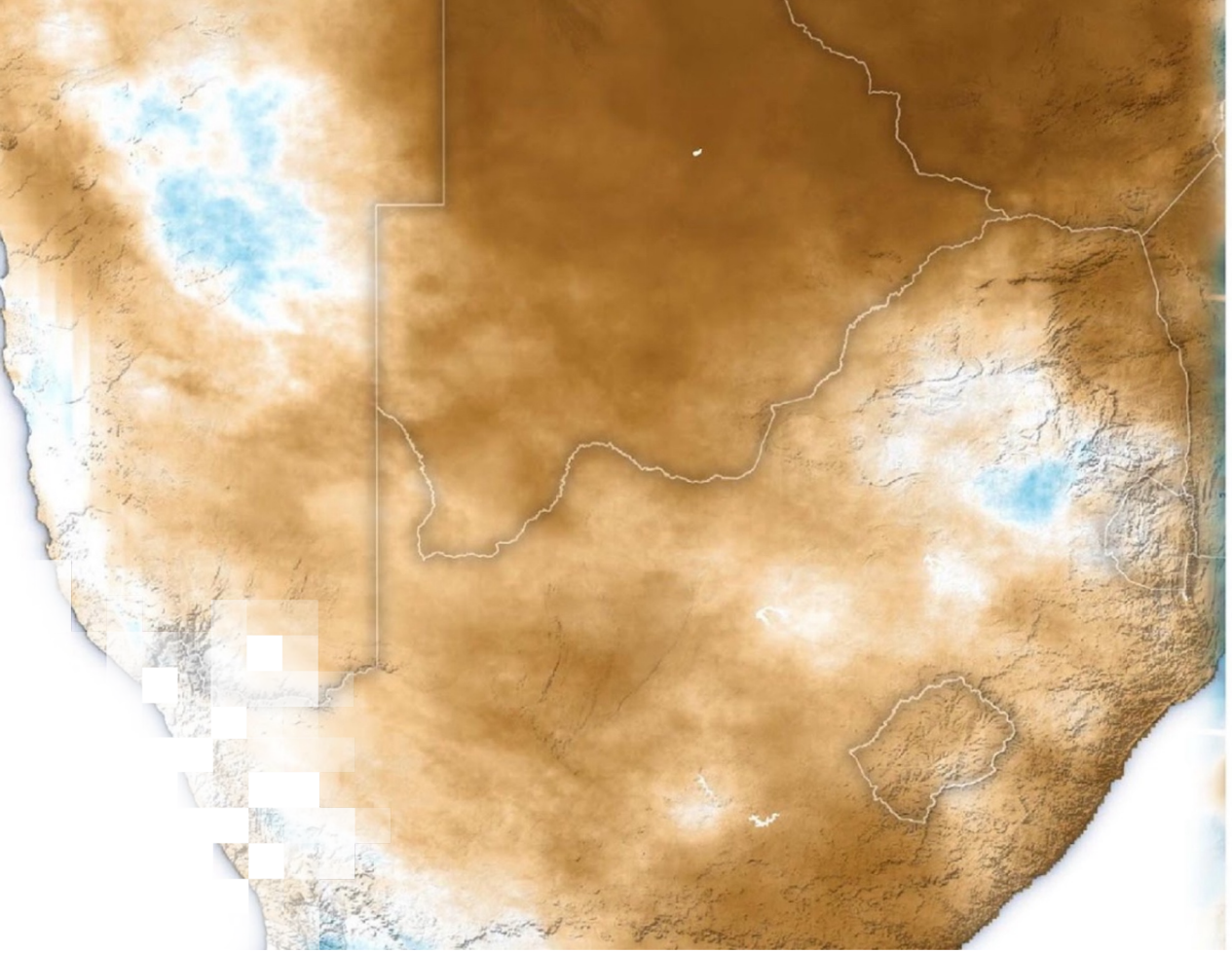
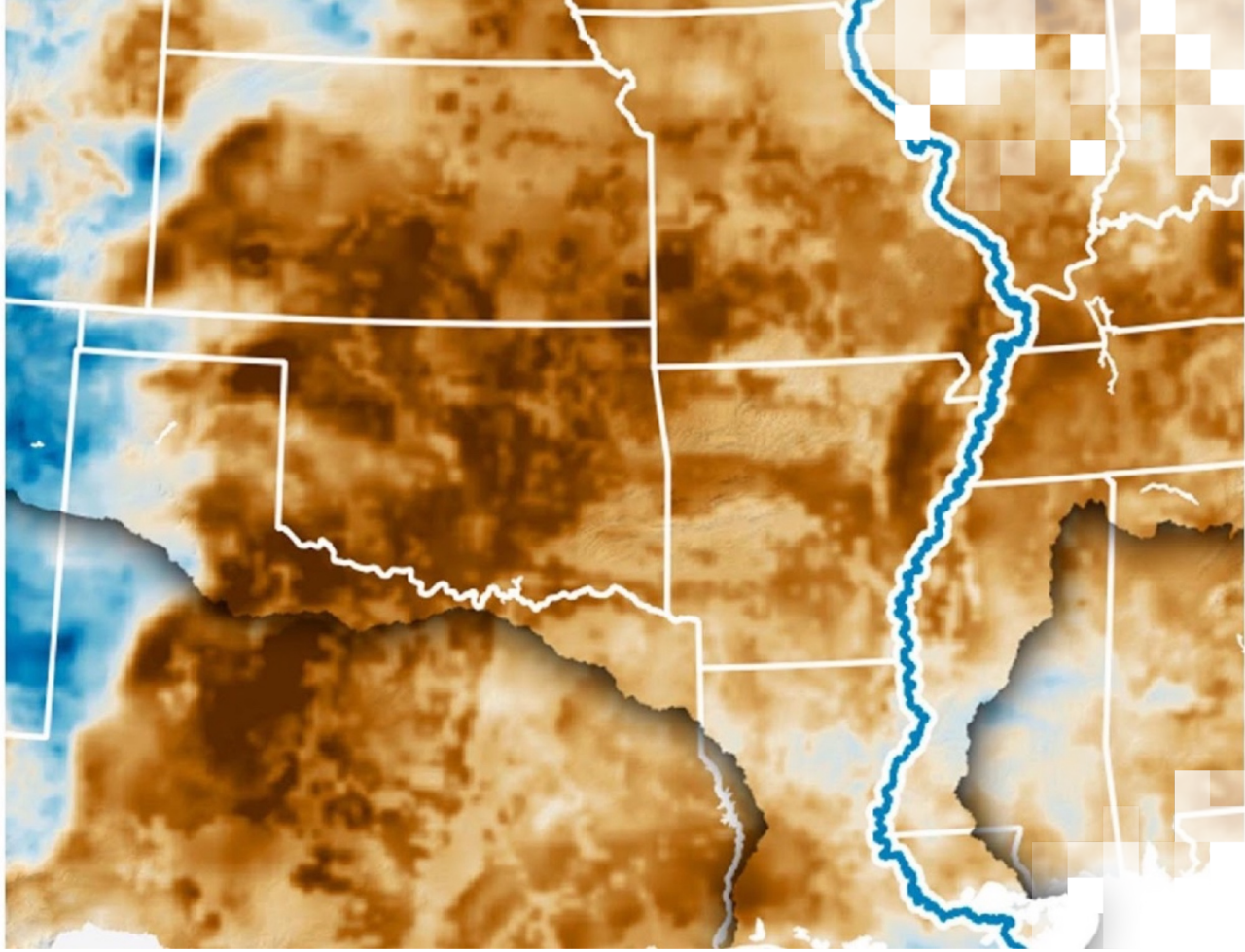




Exercise
Calculate Surface Temperature and Precipitation Anomalies

Introduction

Objective: Calculate and display surface temperature **(TS)** and precipitation **(PR)** anomalies using QGIS

Note: The demonstration exercise focused on July anomalies, this exercise will focus on calculations of August and September anomalies.

Data: Sub-seasonal to seasonal (S2S) ensemble forecast means for monthly TS and PR for July, August, and September of 2024

Data Format: NetCDF

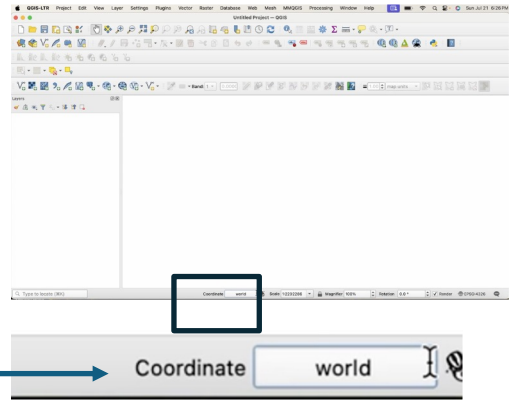
Download Data

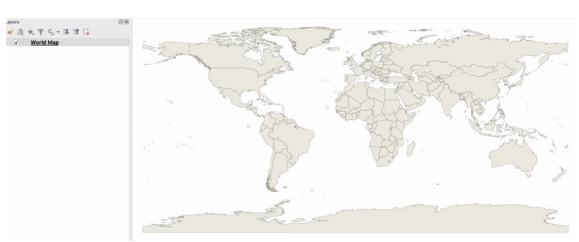
1. From the training webpage download the following S2S data files to your computer:

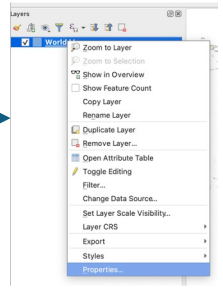
S2S Ensemble Mean		Precipitation Filenames Units: mm/day	Surface Temperature Filenames Units: Kelvin
Prediction	July 2024	PR2_Jul24.nc	TS2_Jul24.nc
	August 2024	PR2_Augl24.nc	TS2_Aug24.nc
	September 2024	PR2_Sep24.nc	TS2_Sep24.nc
Drift	July	PR2_drft_Jul.nc	TS2_drft_Jul.nc
	August	PR2_drft_Aug.nc	TS2_drft_Aug.nc
	September	PR2_drft_Sep.nc	TS2_drft_Sep.nc
Anomalies	July 2024	PRanom2_Jul24.nc	TSanom2_Jul24.nc
	August 2024	PRanom2_Aug24.nc	TSanom2_Aug24.nc
	September 2024	PRanom2_Sep24.nc	TSanom2_Sep24.nc

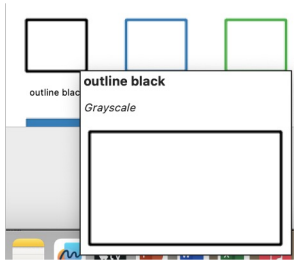
Open QGIS and Add the World Map

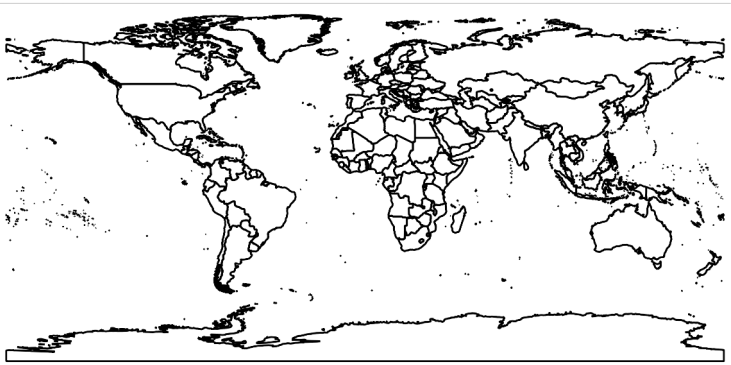
2. Open QGIS
   - In the **Coordinate** window enter **world**
   - You will get the shaded world map with country outline
   - Click on the World Map layer select **Properties**
   - Select **outline black** and click **OK** at the bottom right
   - You will get World Map with country outlines





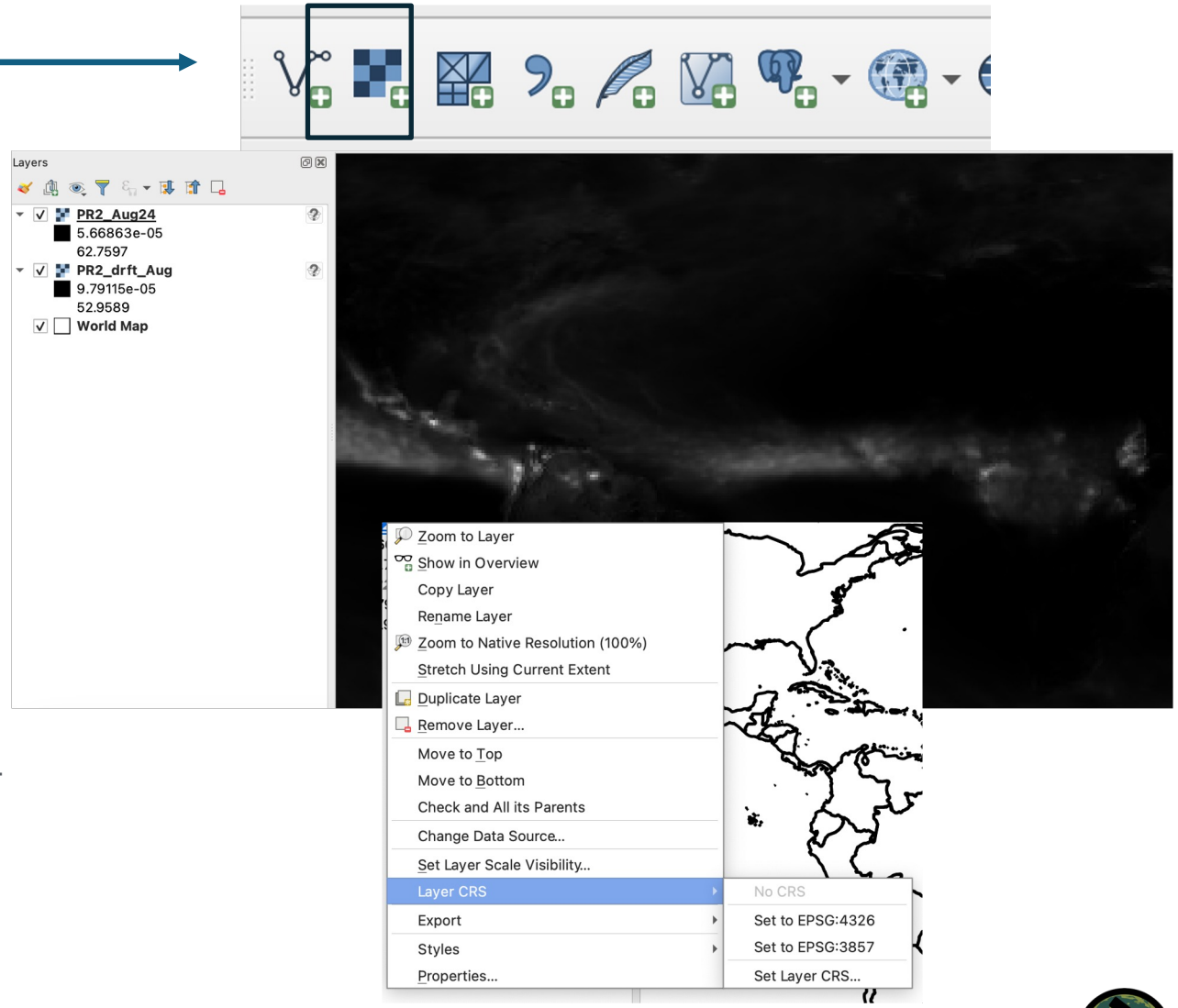






Load Precipitation Data in QGIS

3. Load the following rasters into QGIS
   - **Add** PR2_Aug24.nc from your computer
   - **Add** PR2_drft_Aug.nc from your computer



Note:

If the data rasters are not coincident with the World Map:

- From the layer window, select the layer
- Search and select **Layer CRS** □ **Set to EPSG:4326**
- Select the World Map layer and ensure that it has the same CRS

Display Precipitation Data in QGIS

4. Change Symbology:
   - In the layer window select layer **PR2_Aug24.nc**
   - Select:

     Properties □ Symbology

     Render Type: Singleband pseudocolor

     Min: 0.5 and **Max:** 50.0

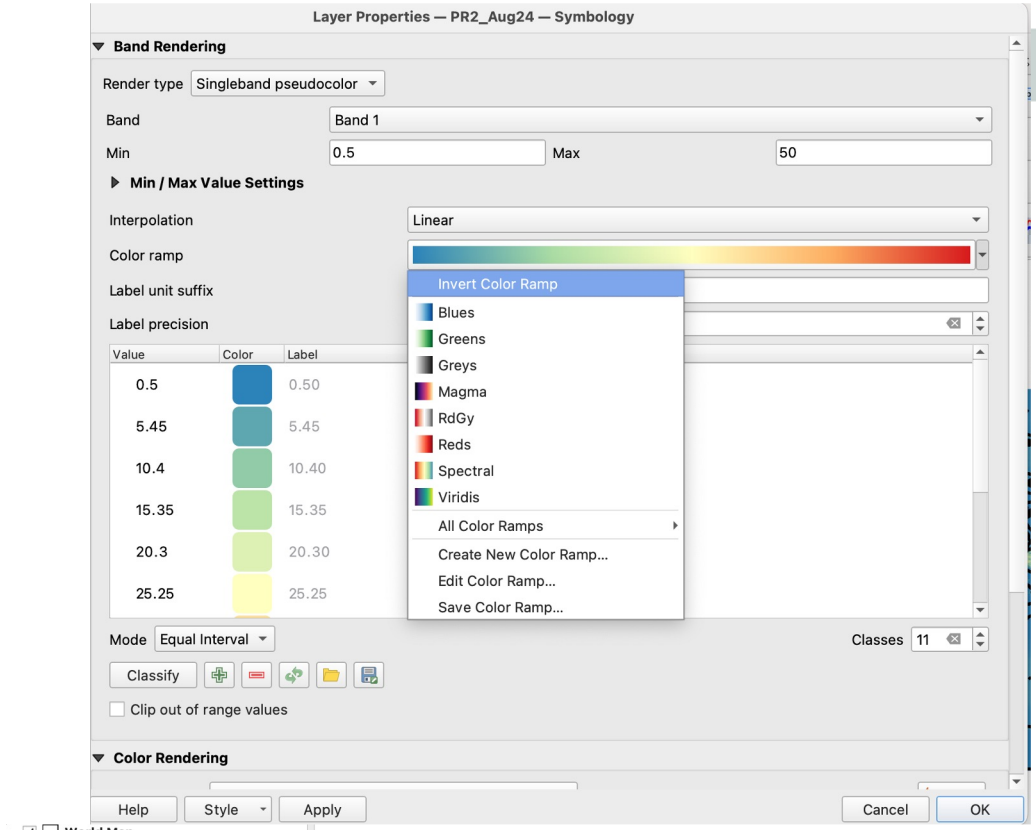
     Color ramp: Spectral & Invert Color Ramp

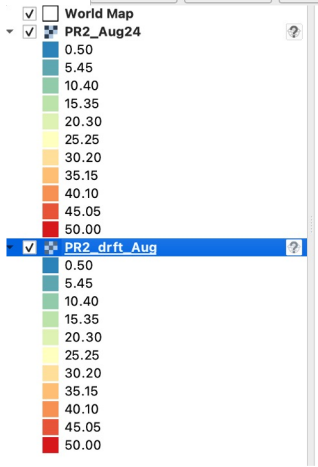
     Mode: Equal Interval & **Classes:** 11

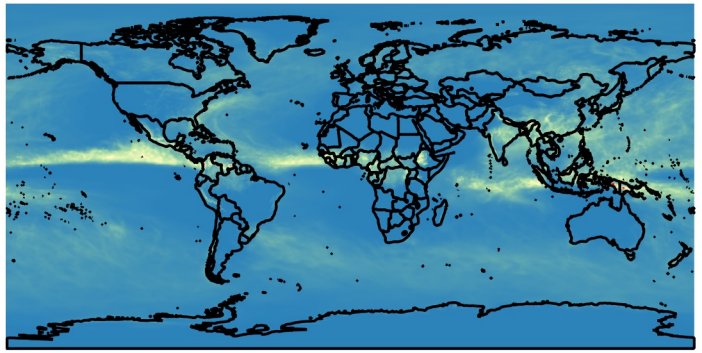
     Select OK

5. Repeat **Step 4** for **PR2_drft_Aug.nc**

   You will get the colored rasters

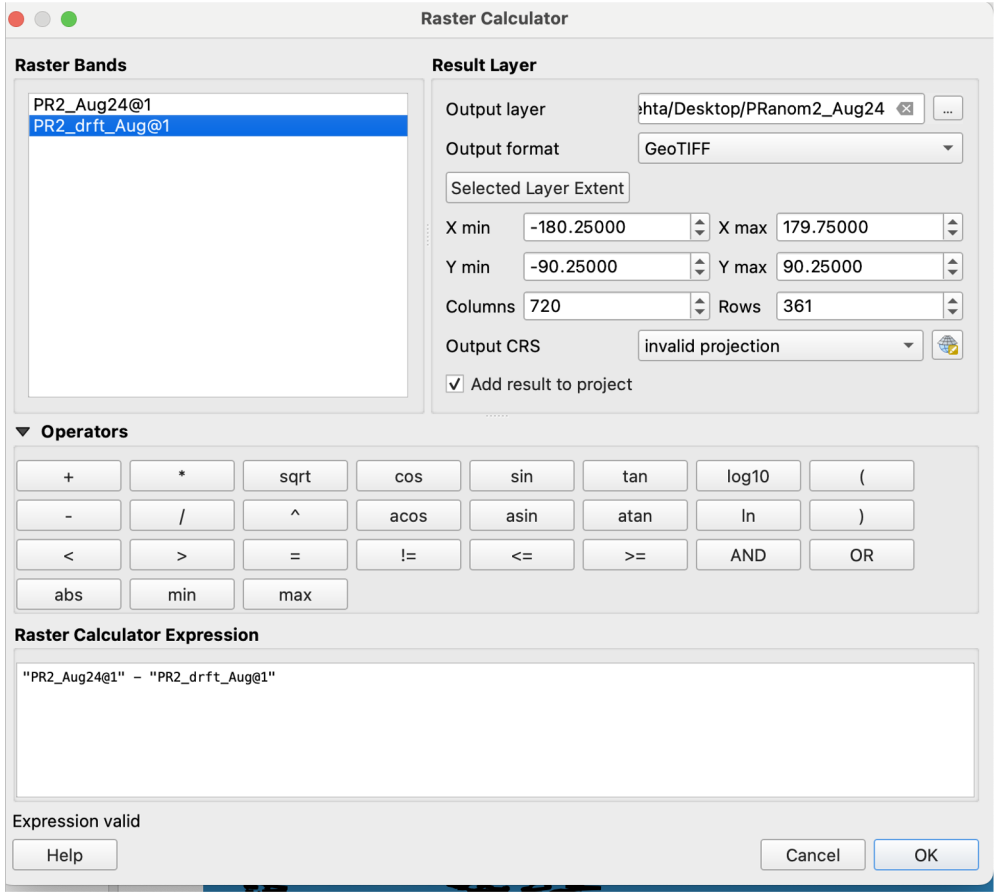






Calculate Precipitation Anomalies for August 2024

6. Calculate Anomalies:
   - Go to **Raster Calculator** from the top menu bar
   - Select and double click **PR2_Aug24.nc** from the **Raster Bands**, it will appear in the **Raster Calculator Expression** window
   - From the Operations select select subtraction sign (-) and select **PR_drft_AUG.nc** from the **Raster Bands**
   - Enter the name (I have chosen PR2anom_AUG24) in **Output Layer** and click OK at the bottom right of the Raster Calculator window
   - You will get a new raster showing precipitation anomalies for August 2024.
   - Follow **Step 4** to create symbology for the anomaly layer



Calculate Surface Temperature Anomalies for August 2024

7. Follow Steps 3 to 5 but use the surface temperature files saved on your computer: **TS2_Aug24.nc & TS2_drft_Aug.nc**
   - You will get TS anomalies
8. Zoom to the area of your interest and examine PR and TS anomalies (you may have to adjusts the layer symbology)

7. Repeat steps 3 to 7 but for the month of September

Question: Is the region of your interest developing drought-like conditions (dry/warm anomalies) between August and September?