Panoply Instructions for WRFV4

Updated: February 2023

Preliminaries

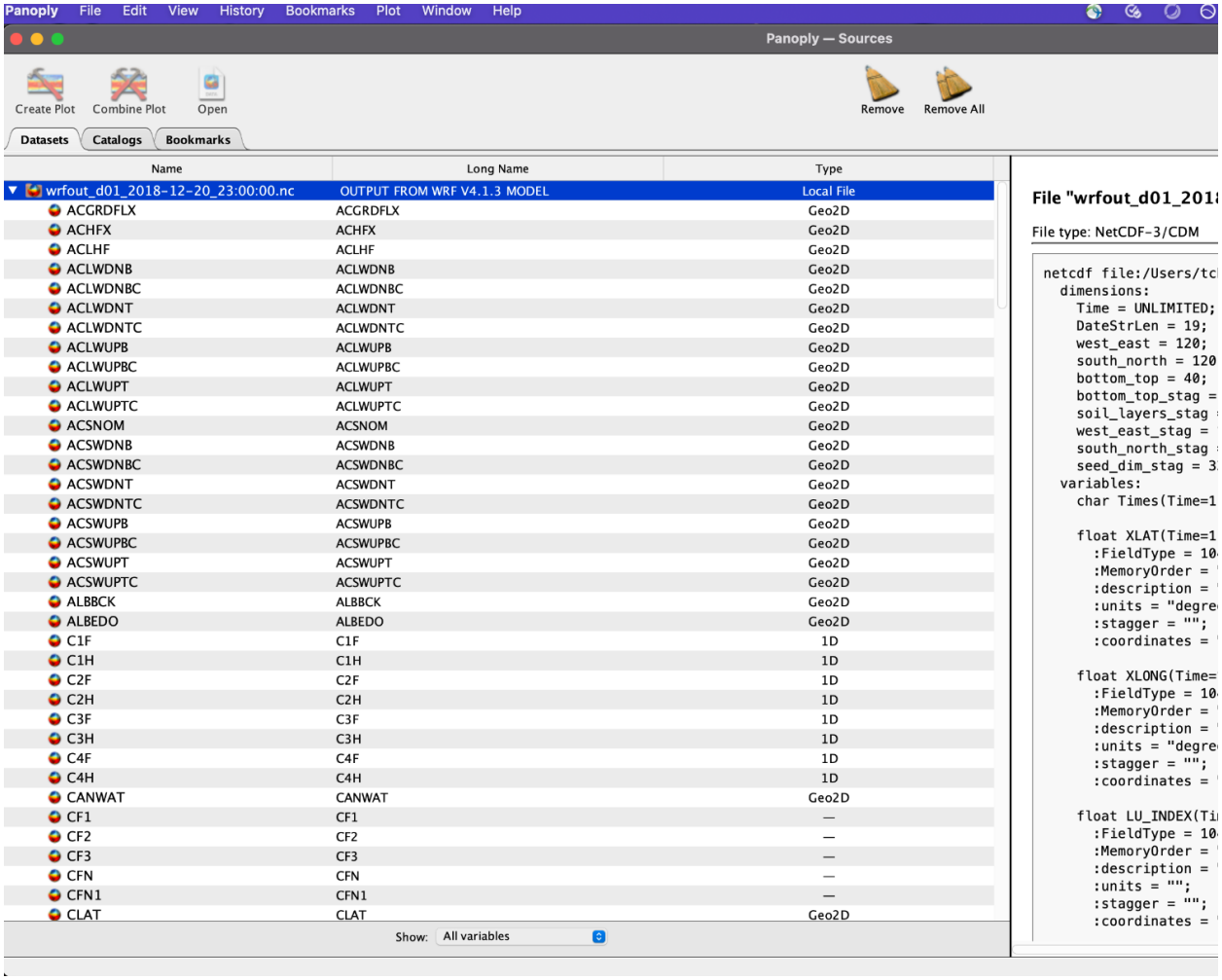
- Choose the appropriate version of Panoply for your OS; download and install by following the instructions: https://www.giss.nasa.gov/tools/panoply/download/
    - For Mac OS computers with Intel hardware, choose "use native filechooser"
    - If you are running a newer Mac OS computer with Apple M1/M2 chips, choose "requires M1/M2 Mac with ARM64 Java"

- Note that you may need to have Java 11 JRE/JDK installed for Panoply to work
    - However, as of this document, Panoply 5.2.3 is able to run on a Macbook Pro 2016, running macOS Monterrey and Java 8
    - The newest versions of Java can be found and downloaded from here: https://www.oracle.com/ca-en/java/technologies/downloads/#java19

- *****Panoply only recognizes files that are suffixed with expected file formats, i.e. NetCDF files suffixed with .nc**
    - By default, wrfout* files are NOT suffixed with .nc; consequently, Panoply won't be able to open them without renaming
    - Rename all wrfout files by adding ".nc" at the end, e.g.

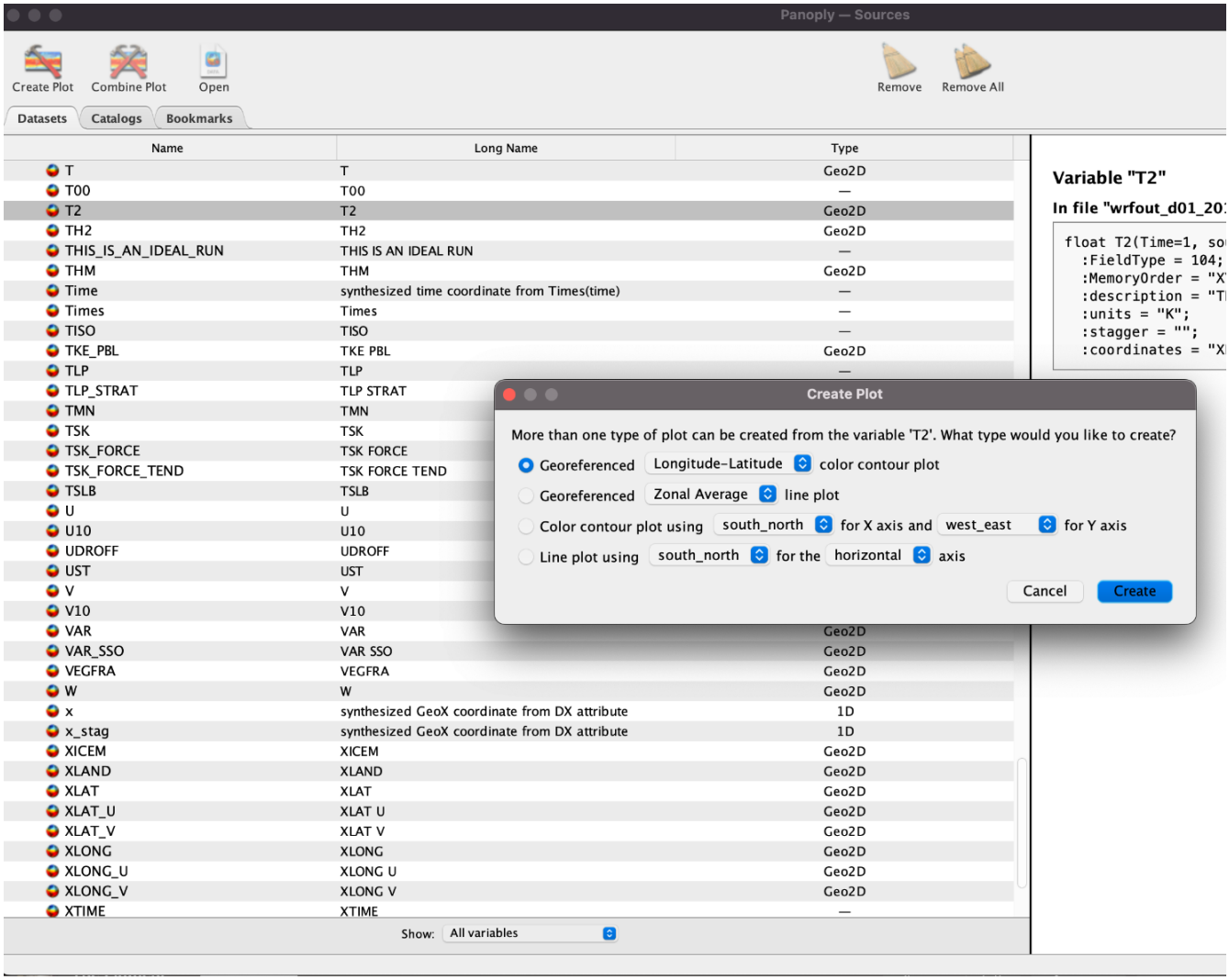
      mv wrfout_d01_2018-12-20_23:00:00 wrfout_d01_2018-12-20_23:00:00.nc

2D Contours and Configuring Plots

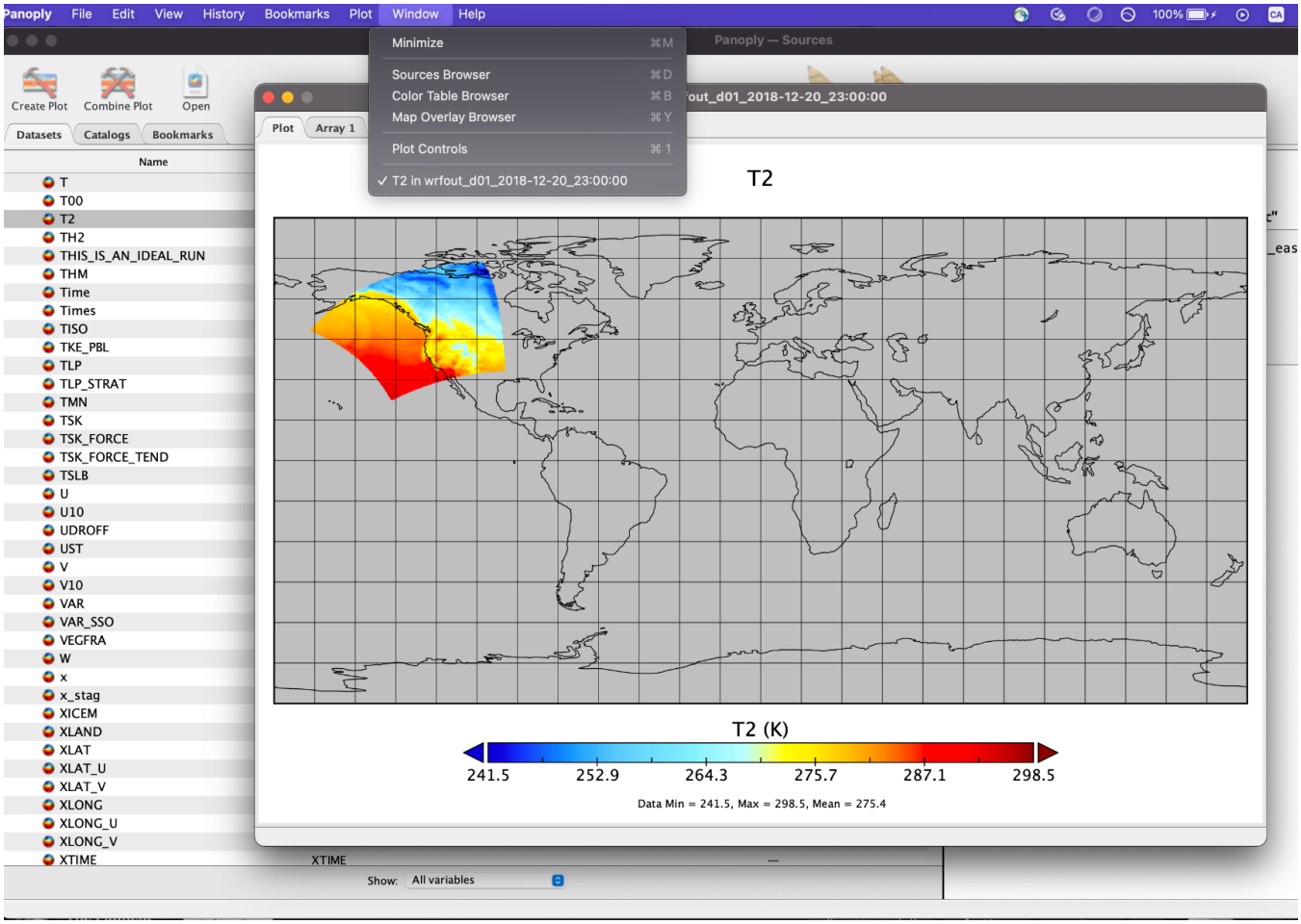


- Open up a wrfout file by running Panoply, and choosing a wrfout file to load; alternatively, once Panoply is opened, you can select your file by choosing **File > Open** (top left)

- You should see the listing of raw variable names associated with that file in the left panel, and a description of the netcdf file and variables on the right (i.e. what you would get by running **ncdump** on the file)

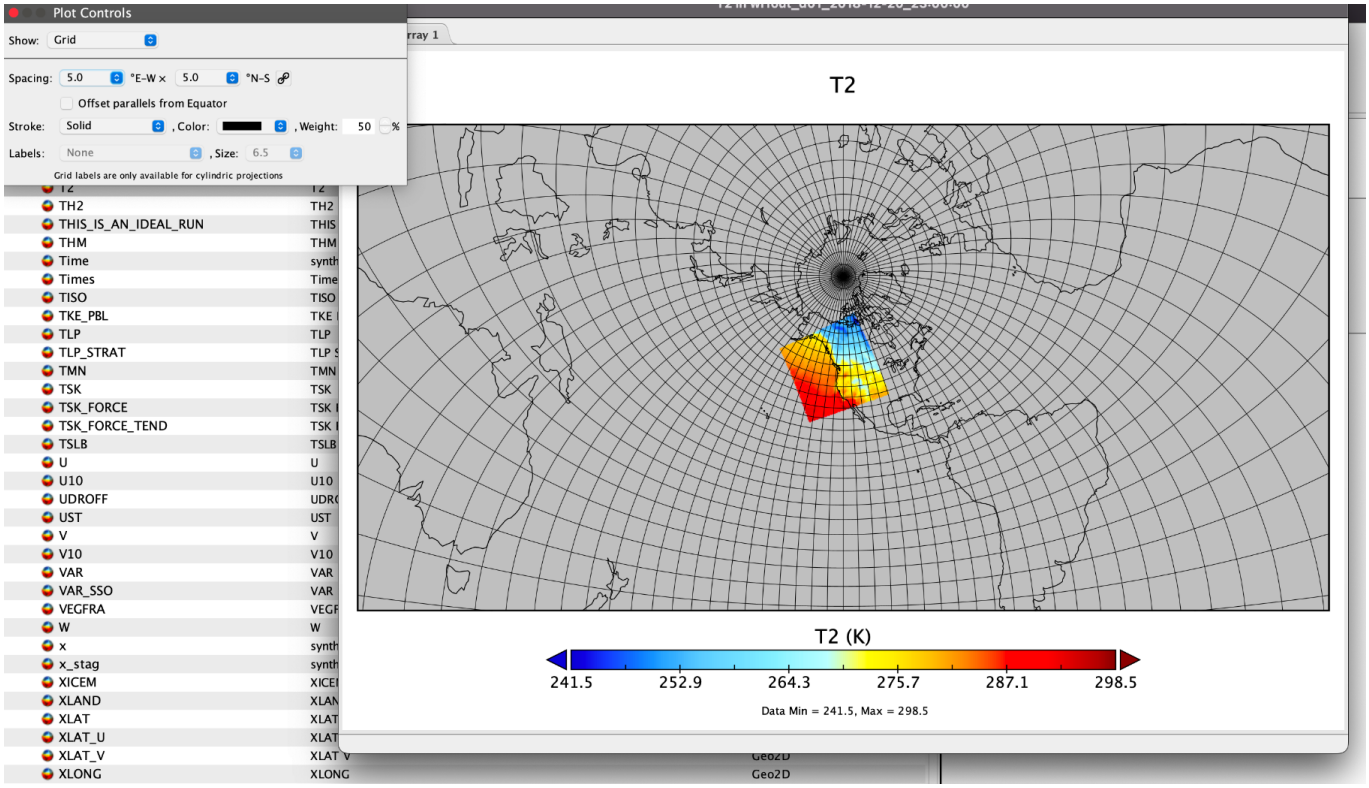


- Scroll down, and choose “T2” —> select the first option “Georeferenced Longitude-Latitude color contour plot”, and select Create



- You should now see your T2 color-filled contour plot appear, with the polar-stereographic domain projected onto an equirectangular map (hence the “tilt” of your domain)

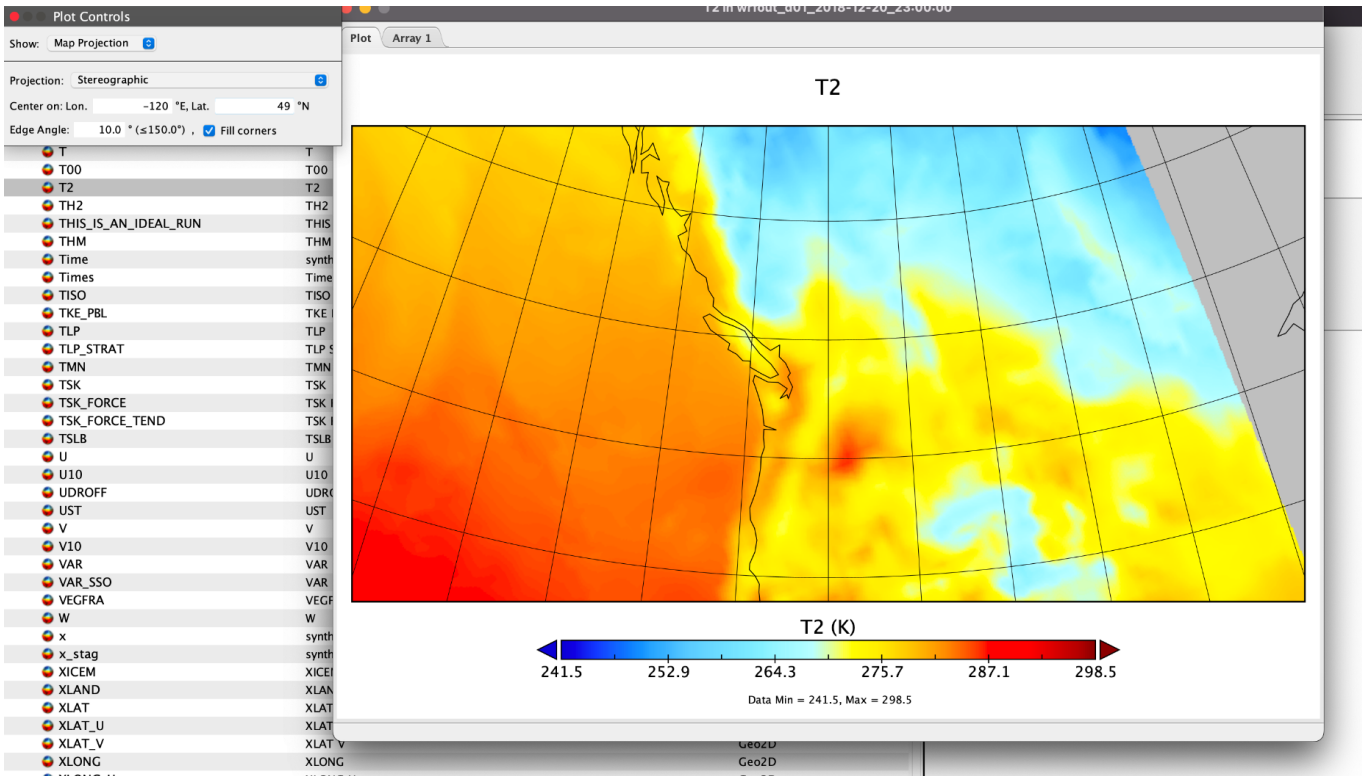
- At the top, select “Window > Plot Controls” to enable configurations for the plot



- With Plot Controls, you can configure what your plot looks like

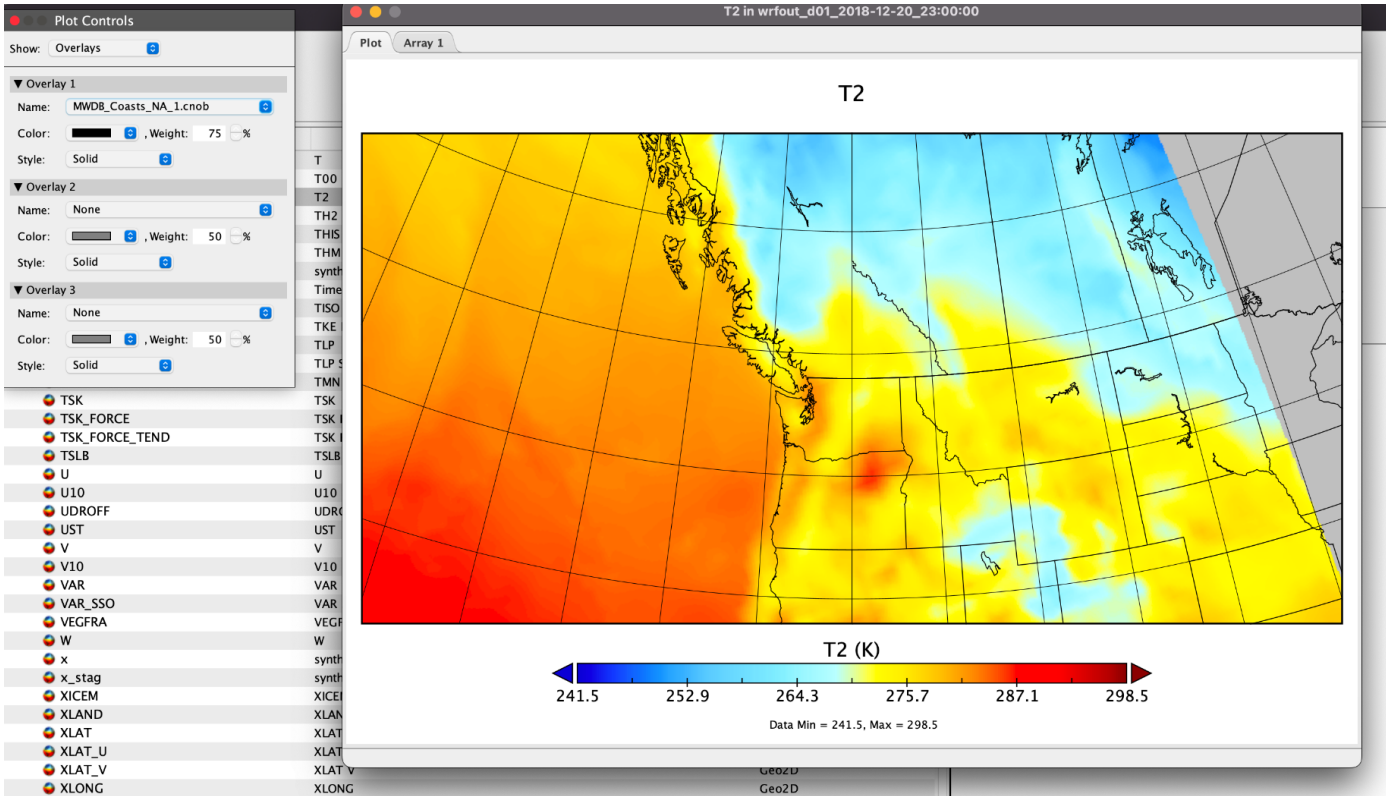
- The “Show” dropdown menu allows you to access different portions of the configuration

- The figure above shows the effects of selecting “Grid” and changing the “Spacing” of the latitude and longitude grid lines
    - Note that the plotted base projection was changed earlier (not shown) due to selecting the Stereographic projection under “Map Projection”
    - The next page shows the effects of changing the Map Projection and the zoom



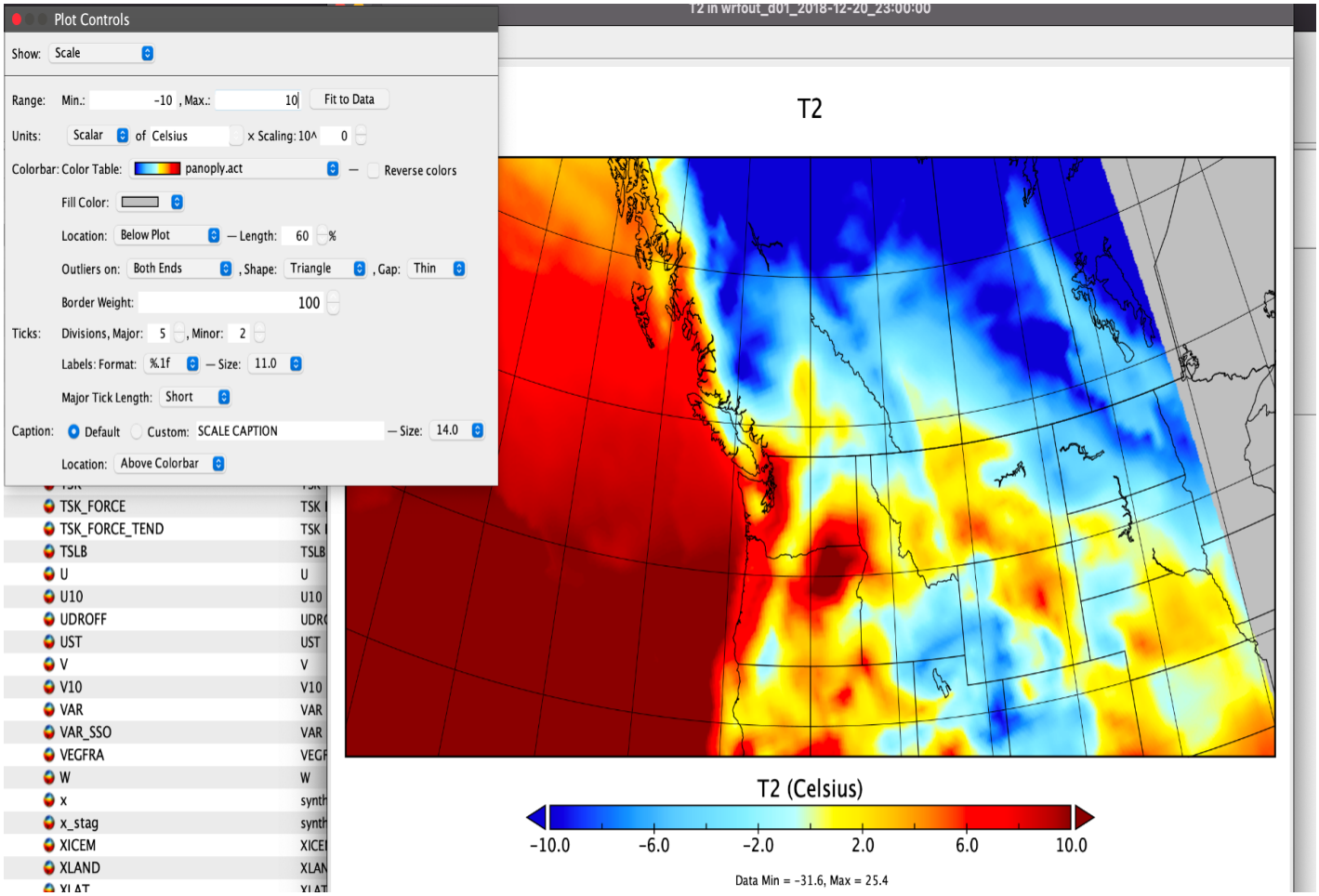
- Under Map Projection in the "Show" dropdown, you can change the Projection to Stereographic, and also define the center latitude and longitude of the map

- "Edge Angle" determines the zoom of the map…the **lower** the number, the **higher** the zoom



- You can add political boundaries and higher-res coastlines in the “Overlays” option of the “Show” dropdown

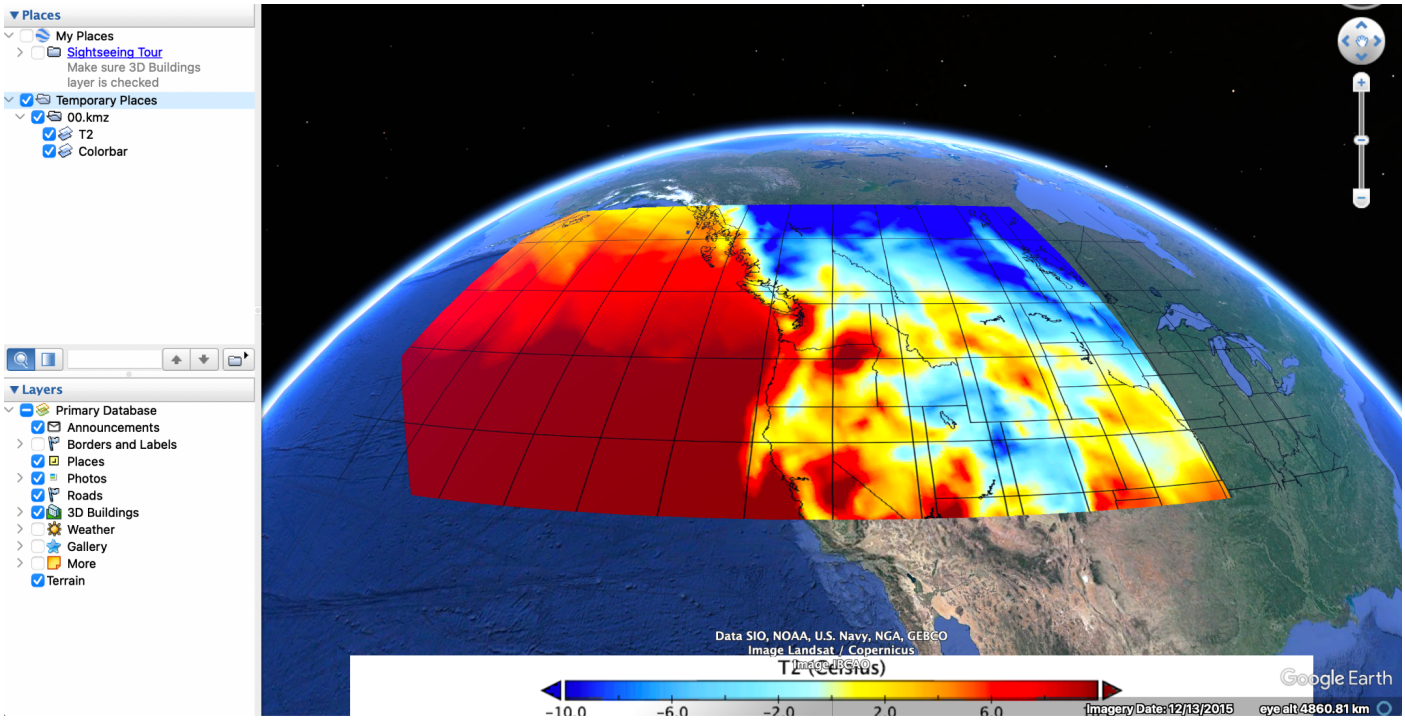
- In “Overlay 1”, in the “Name” dropdown, select “MWDB_Coasts_NA_1.cnob” —> this will produce the North American national and sub-national boundaries, as well as a better coastline



- To change the colormap and units of the variables, go to “Scale” in the “Show” dropdown

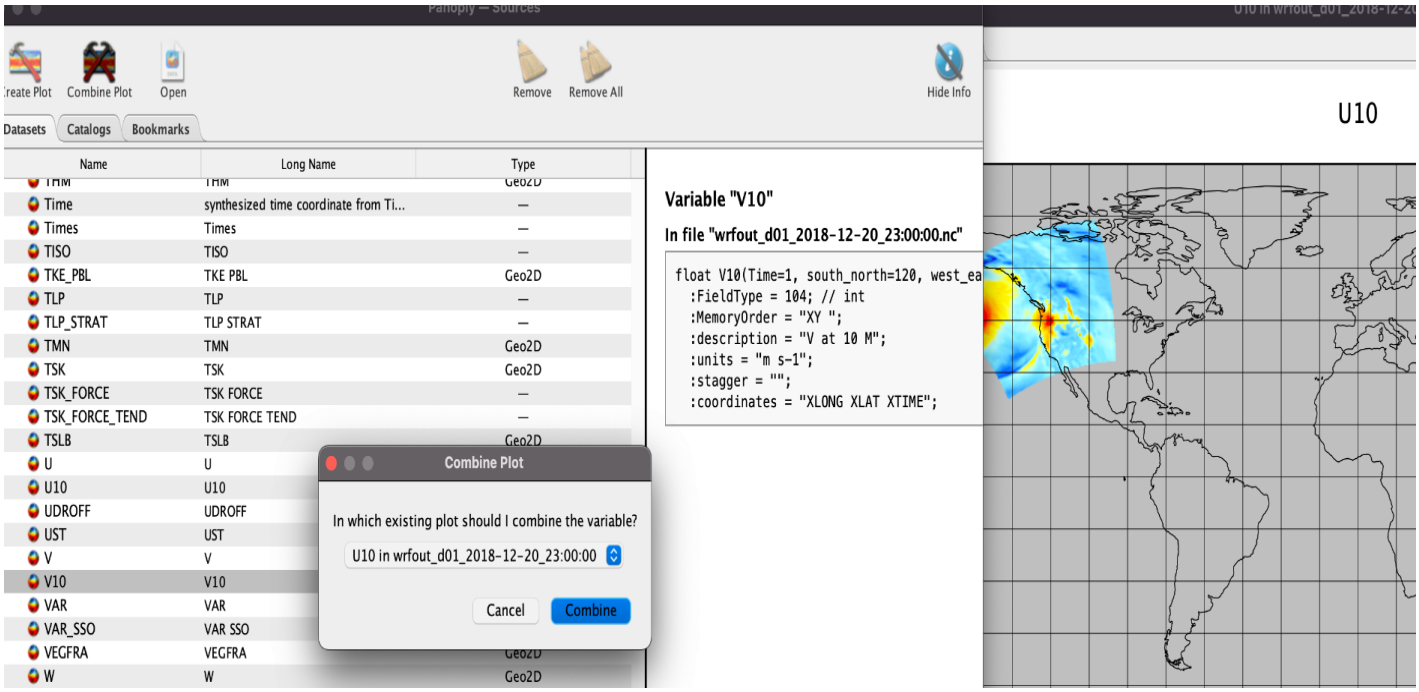
- Here, you can change the range of the data, as well as the units (e.g. click on the “K” next to “Units” and change to “Celsius”)
    - In regards to the data range, “Fit to Data” will automatically adjust the range to the minimum and maximum of the variable

- Note on animations: unlike IDV, Panoply will only support animation creation if multiple time steps are contained within a single netcdf file
    - To create an animation, in the top left, select File > Export Animation
    - The animation generation will use the configuration you provided when customizing your individual plots for all of the frames (i.e. projection, zoom, colormap, etc.)



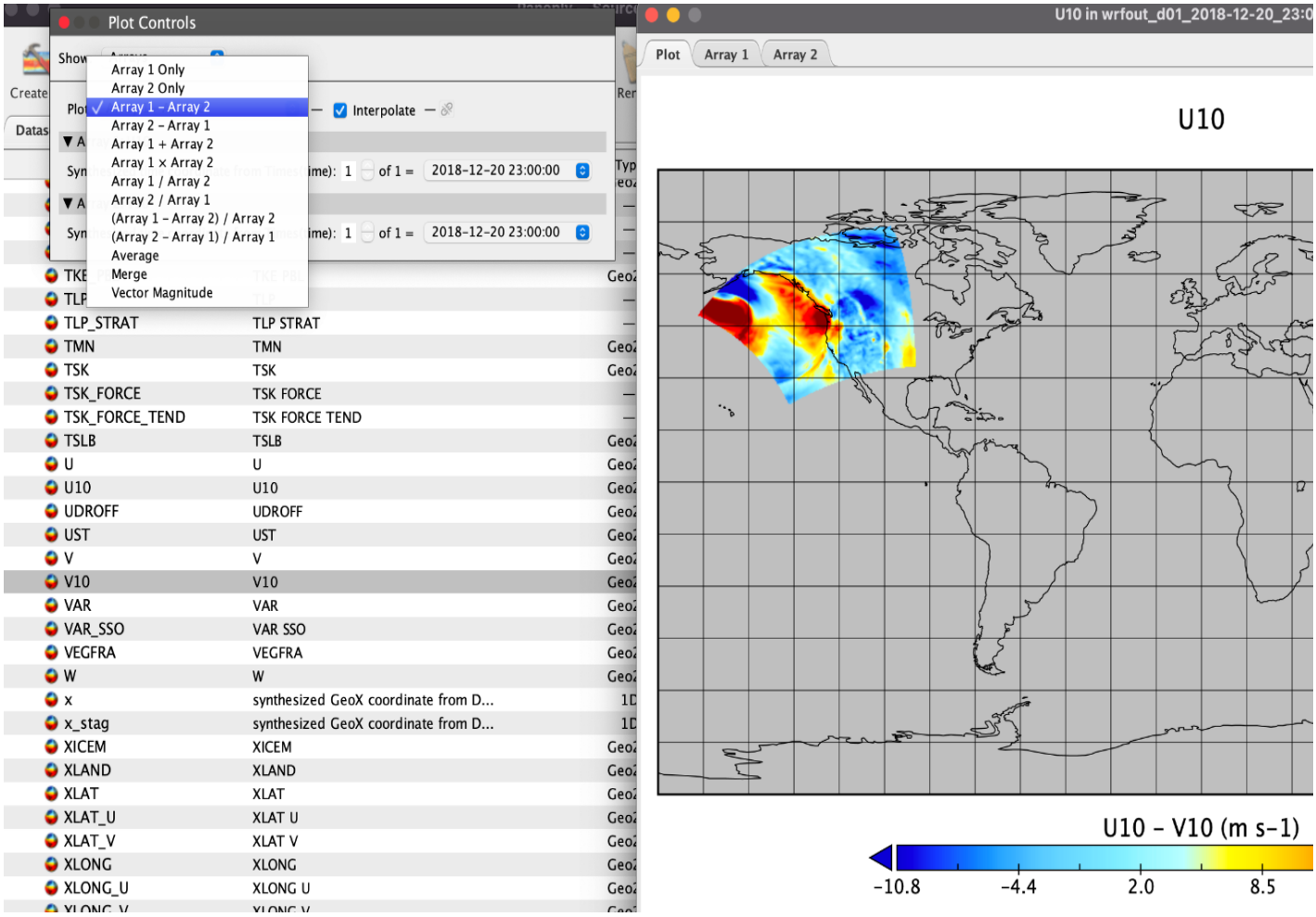
- You can also export your image as a .kmz (File > Export KMZ), and open with Google Earth…see what you get!

Plot Combinations and Vectors

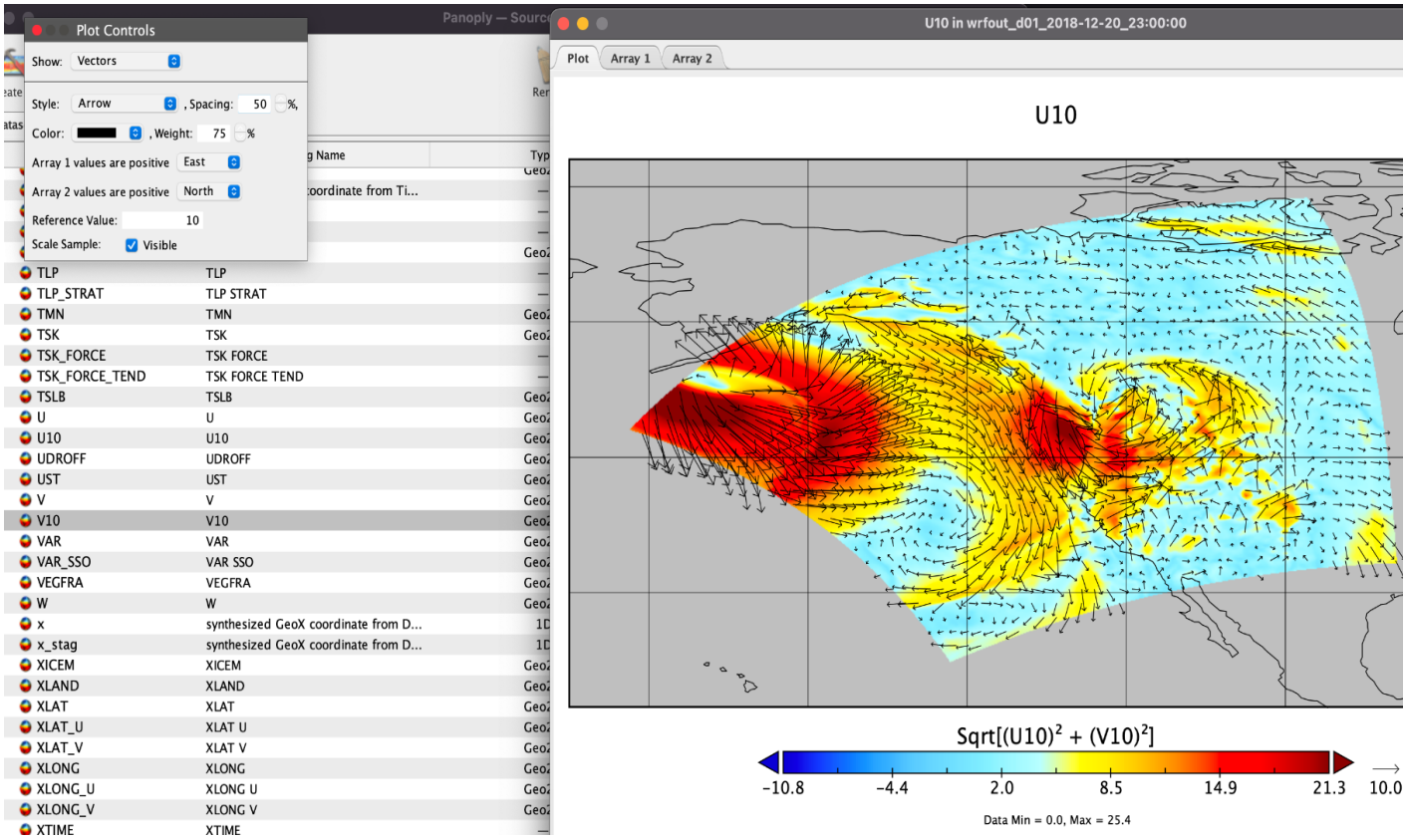


- To plot vectors of U10 and V10, first plot U10 as normal (like plotting T2)

- Then, select V10, but do not click “Create Plot” —> instead, select “Combine Plot”, and choose the shown option to merge the plot with U10



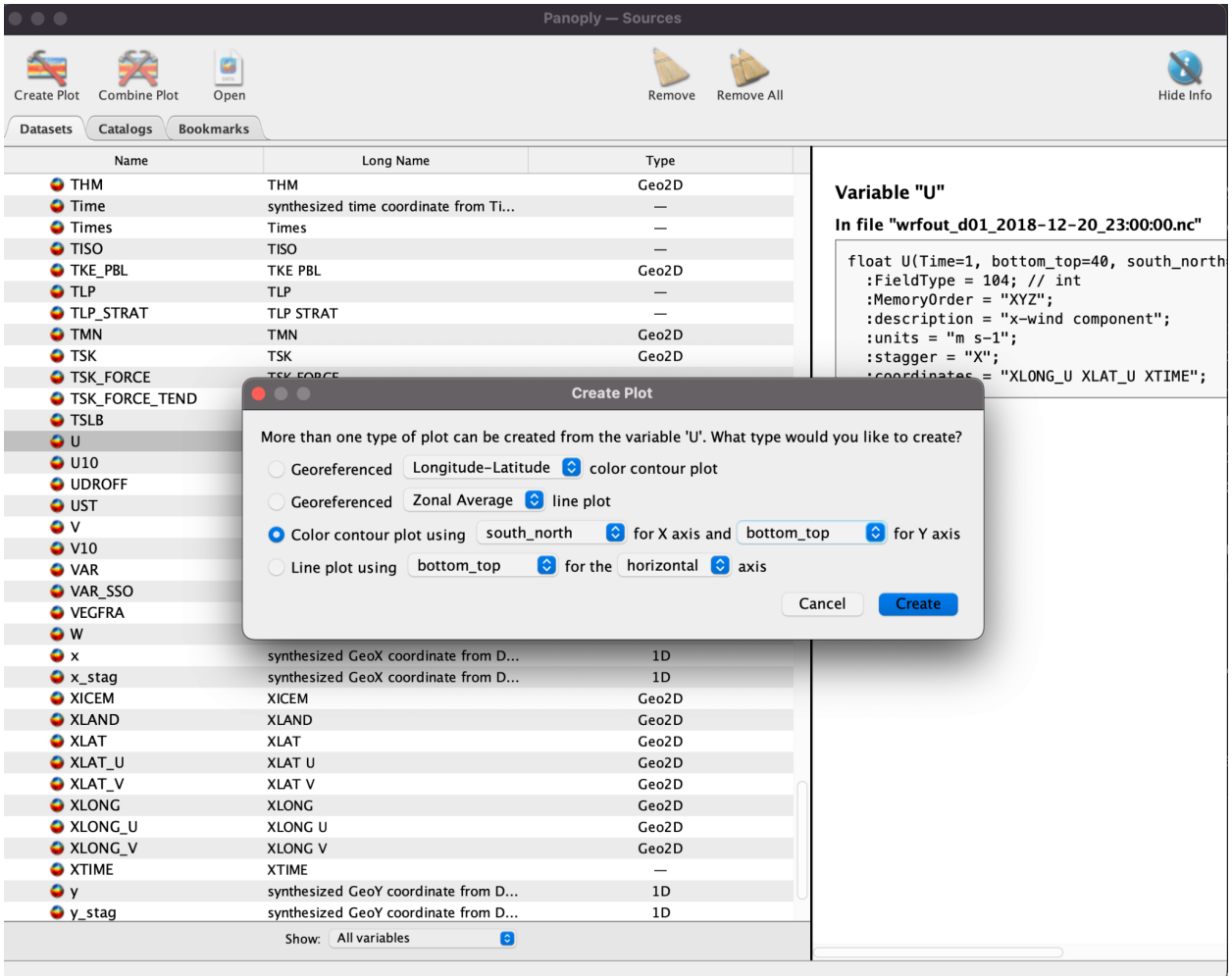
- By default, combining plots will subtract the two fields; instead, we want to compute vectors
    - In the “Show” dropdown of Plot Controls, select “Arrays”
    - Then under the “Plot” dropdown, choose “Vector Magnitude”
    - This will now change the plot to show wind vectors, as well as wind speed as a color-filled contour



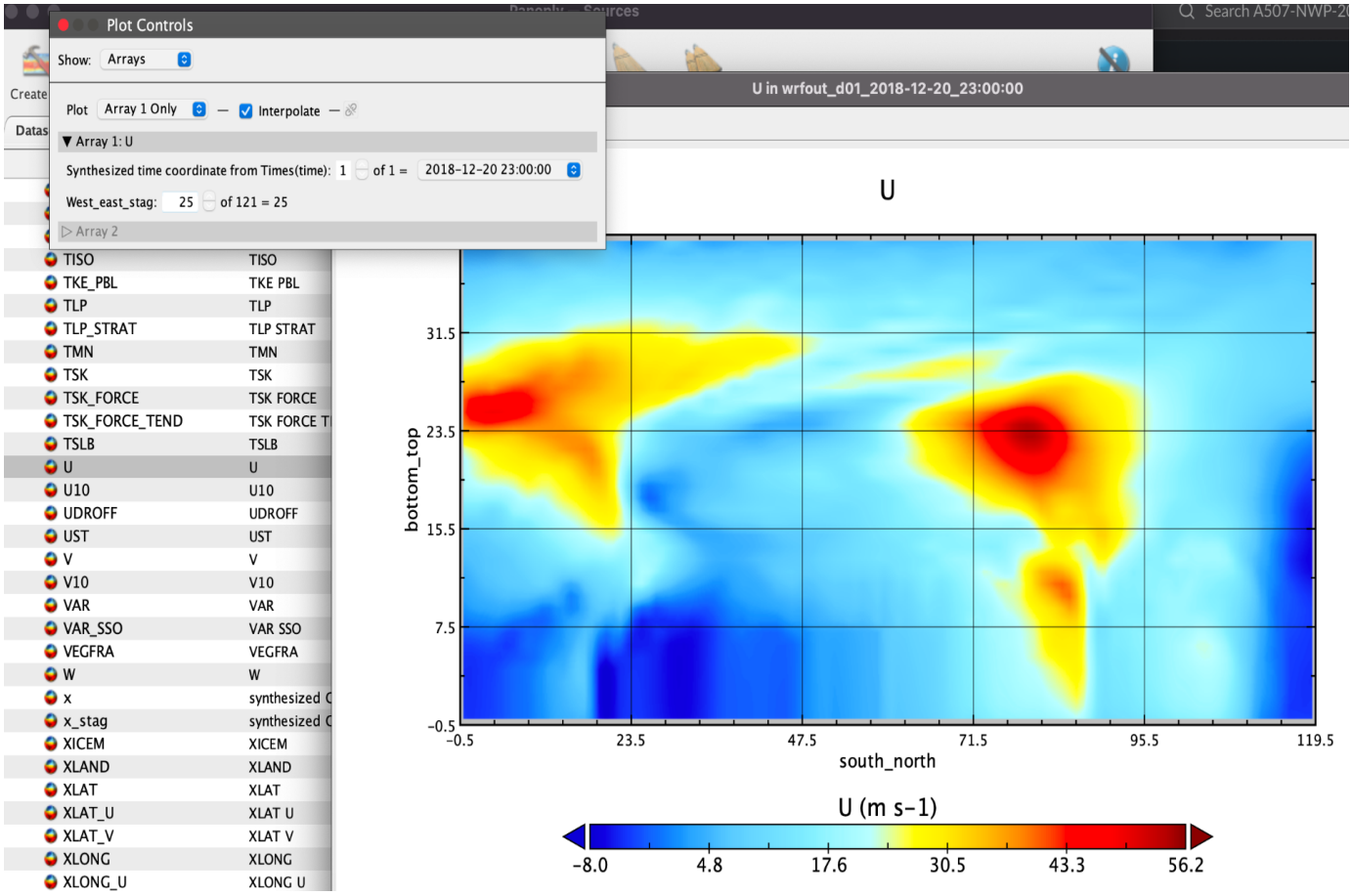
- The plot above was zoomed into the domain by holding right click on the mouse, and dragging it over the area of interest

- Under “Plot Controls” → “Show” —> “Vectors”, you can configure the vectors as you please
    - Try reducing “Spacing” to increase the density of plotted vectors, and “Reference Value” to change the base length of the vectors

Transects



- Select U in the variable list (3D U-wind), and create a “Color contour plot using…” —> but change set the X axis as “south_north” and Y axis as “bottom_top”



- We now get a color-filled contour of U along a vertical slice, across latitudes

- We can choose the longitudinal position of our slice by choosing “Arrays” in Plot Controls, and incrementing (or selecting) “West_east_stag”