Online Training Course

On

Visualization of Marine Met data (using FERRET)

Organized by

International Training Centre for Operational Oceanography (ITCOO)

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Getting Started

- To start the *Ferret* s/w we give the following command

  > Ferret and press enter

  yes? (Default prompt for ferret s/w)

- For every *Ferret* session, a log file stores the commands given. This is called the Ferret journal file. By default it is named *ferret.jnl*

  > If we don't want this log file then the command to be given is *ferret –nojnl* and press enter

- To call the file for visualization we use the command

  yes? use filename.nc (or)
  yes? set filename.nc

- In *Ferret* all variables are regarded as defined on grids. The grids tell *Ferret* how to locate the data in space and time
- To access a variable *Ferret* must know its name, data set and the region of its grid that is desired
- Using the LET command new variables may be created
- If component variables in an expression are on different grids, then regridding may be applied simply by naming the desired grid
- *Ferret* need explicit instruction sequence from start to end as:
  > specify the data set
  > specify the region
  > define the desired variable or expression (optional)
  > request the output

Ferret Grids

- All *Ferret* grids are 6-dimensional (Prior to Ferret v6.8, grids were 4-dimensional)
- Files when loaded into ferret displays the grids corresponding to the variables
  > Subscripts are specified by I=,J=,K=,L=, M=, N= for axes 1 through 6, respectively
  > World coordinates are specified by X=,Y=,Z=,T=, E=, F=
- In most cases the axes have the obvious interpretation of 3 space coordinates and time
- Two more to allow for e.g. an Ensemble dimension and Forecast-time dimension but sometimes the axes are abstract
- As the data set have different dimensions, to plot the data one need to freeze the dimensions that are not to be varied. That is we have longitude, latitude, depth and time varying we need to fix any of these dimensions as per our requirement

Plots Generation

- To start with *Ferret*; open terminal (and type) > *ferret (or ferret -nojnl)*
- Open dataset in Ferret say: *yes? USE filename.nc* (*by default:coads_climatology*)
- Ferret executes netCDF file and read; to see the data

yes? show data *(or sh d)* (provide all the details of .nc file)

currently SET data sets:
1> ./filename.nc (default)

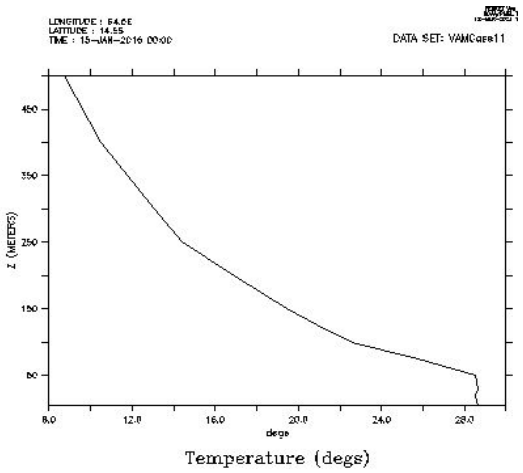
name	title	I	J	K	L
TEMP	Temperature	1:90	1:60	1:14	1:1
TERR	Temp relative Error	1:90	1:60	1:14	1:1
SAL	Salinity	1:90	1:60	1:14	1:1
SERR	Sal relative Error	1:90	1:60	1:14	1:1

NOTE: Open multiple .nc files simultaneously.

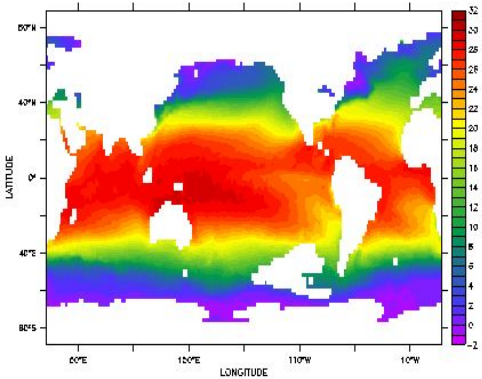
- To erase/delete the existing data (without quitting Ferret)
  yes? cancel data/all *(or can d/a)*
  yes? show data (output*: currently SET data sets*)

- *yes? quit* (to exit Ferret)

- Line plot:
  yes? use filaname.nc
  yes? show data
  yes? plot variable1[x_value=55, y_value=16]



- Spatial plot
  yes? use coads_climatology
  yes? fill sst[l=1]

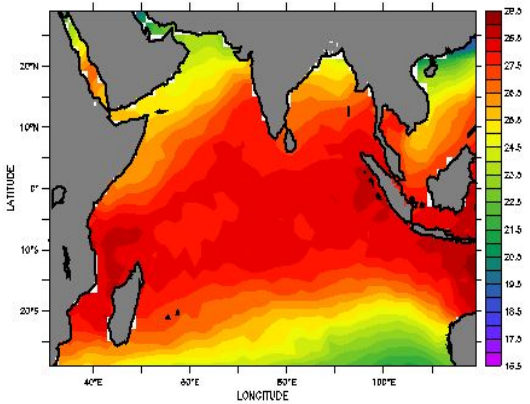


- Fill landmark on map:
  yes? go fland
- Provide land boundary on map
  yes? go land 7

Note*: 7 represent color (out of 18)

- Set your own region of interest

  yes? fill sst[x=30:120, y=-30:30, l=1]
  yes? go fland
  yes? go land 7

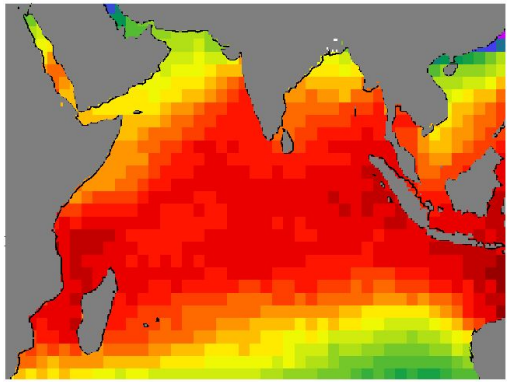


- *yes? cancel view* (or can view) (to wipe the existing plot)

Color & Pattern

- Remove Any/All labels from *Ferret* plot (No label, No axes, No colorbar)

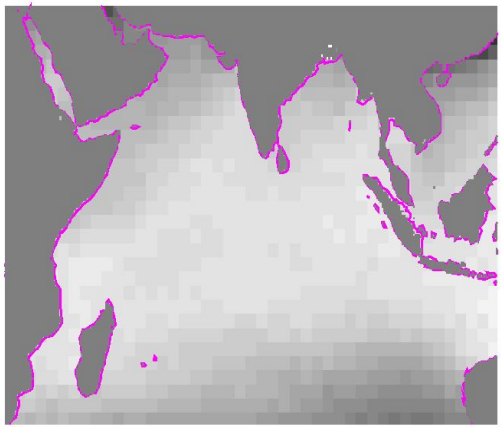
  yes? use coads_climatology
  yes? shade/x=30.5:119.5/y=-29.5:29.5/nolab sst[l=1]
  yes? shade/x=30.5:119.5/y=-29.5:29.5/nolab/noaxis sst[l=1]
  yes? shade/x=30.5:119.5/y=-29.5:29.5/nolab/noaxis/nokey sst[l=1]



- PALETTES in *Ferret*

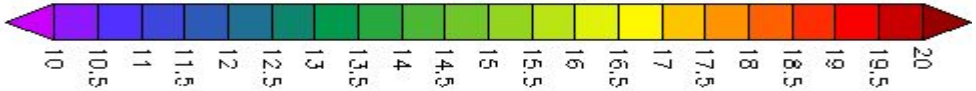
  > we put all commands together as

  yes? shade/x=30.5:119.5/y=-29.5:29.5/nolab/noaxis/nokey/
  PALETTE=greyscale sst[l=1]
  yes? go land 18; go fland



- Play with Key

  yes? shade /lev=(-inf)(0.0,2.0,0.2)(inf) airt[l=1]



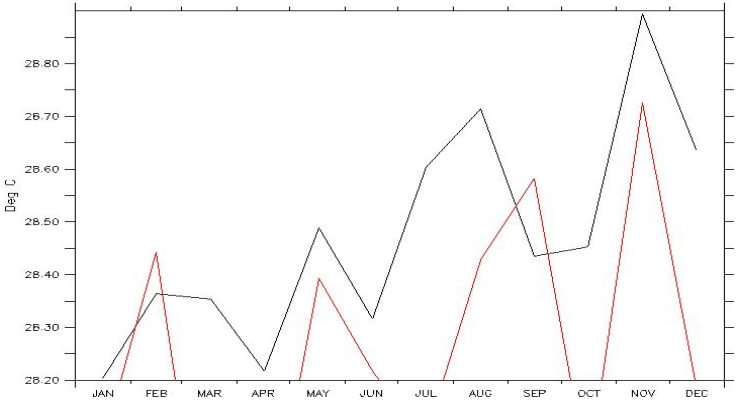
Overlay

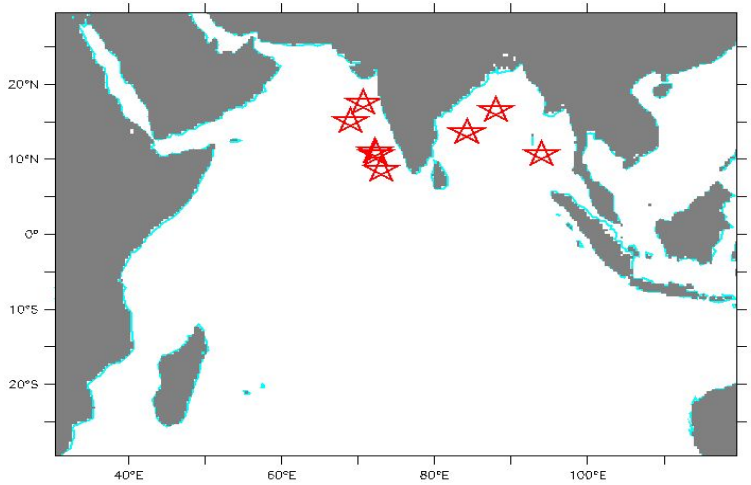
- Line Overlay

  yes? plot/x=180/y=0 sst
  yes? plot/over/x=180/y=1 sst

- lon = {69,73,72.3,72.2,70.7,94,84.2,88}
- lat = {15,8.5,10.6,10.9,17.4,10.5,13.5,16.4}
- Define lon, lat (variable)

  yes? let/units=degrees_east xlon =
  {69,73,72.3,72.2,70.7,94,84.2,88}
  yes? let/units=degrees_south-north ylat =
  {15,8.5,10.6,10.9,17.4,10.5,13.5,16.4}
  yes? plot/vs/over/sym=88/color=red/SIZE=0.35/
  thick xlon, ylat
  yes? go land 11;go fland

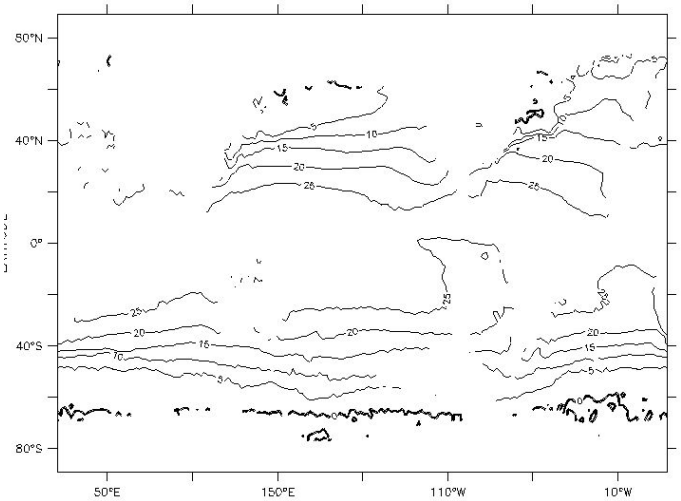


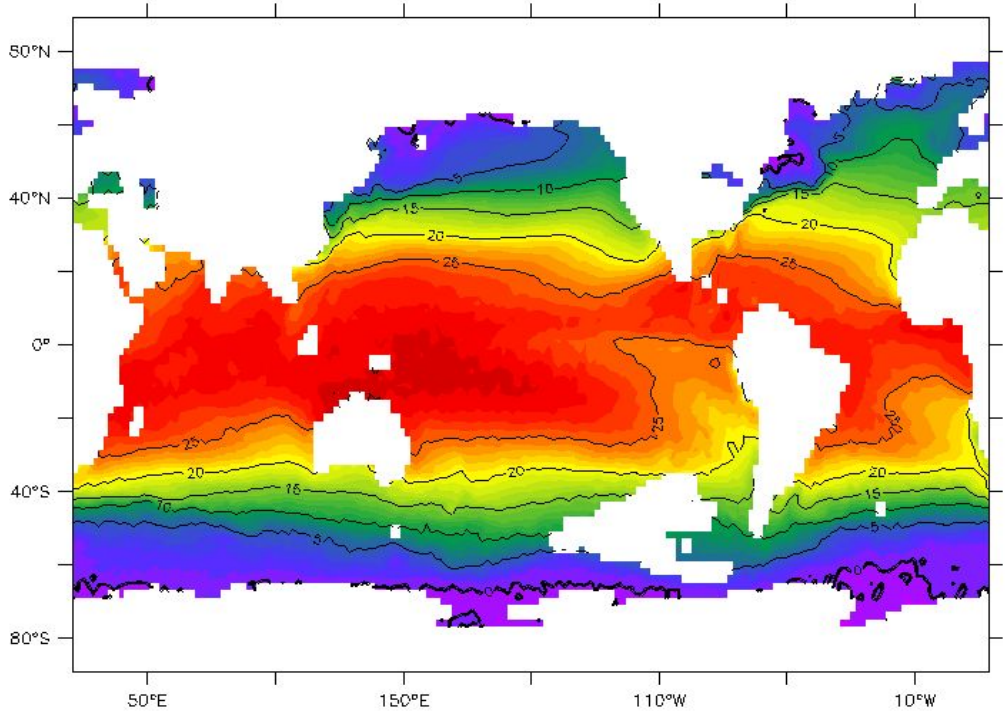


Contour Plot

- Contour command is used along with Fill/Shade to display line contours along with the filled contours

yes? use coads_climatology
yes? fill sst[l=1]
yes? contour/overlay sst[l=1]





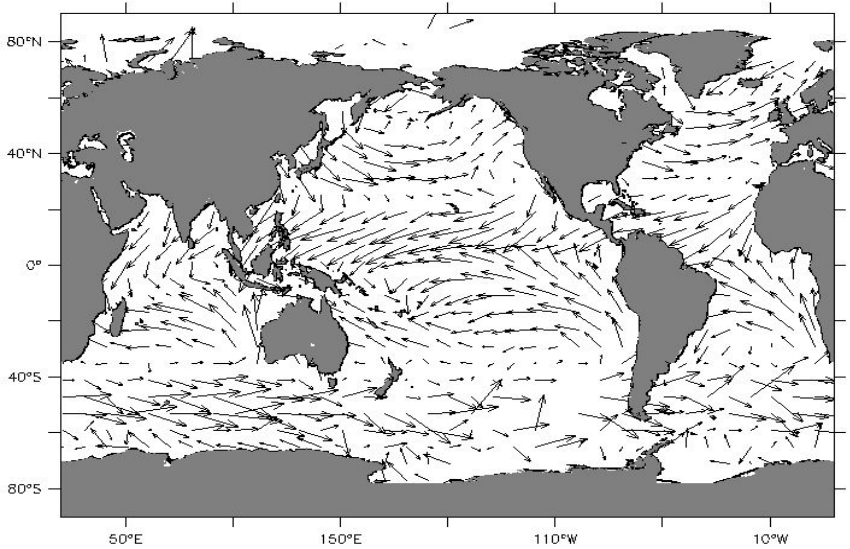
Wind/Vector Plots

• If we want to plot vector plots of stick plots from wind

yes? vector ucmp,vcmp (ucmp is zonal component and vcmp is meridional component of the wind)

• If we want to restrict the number of vector then we use the xskip and yskip commands to restrict them.

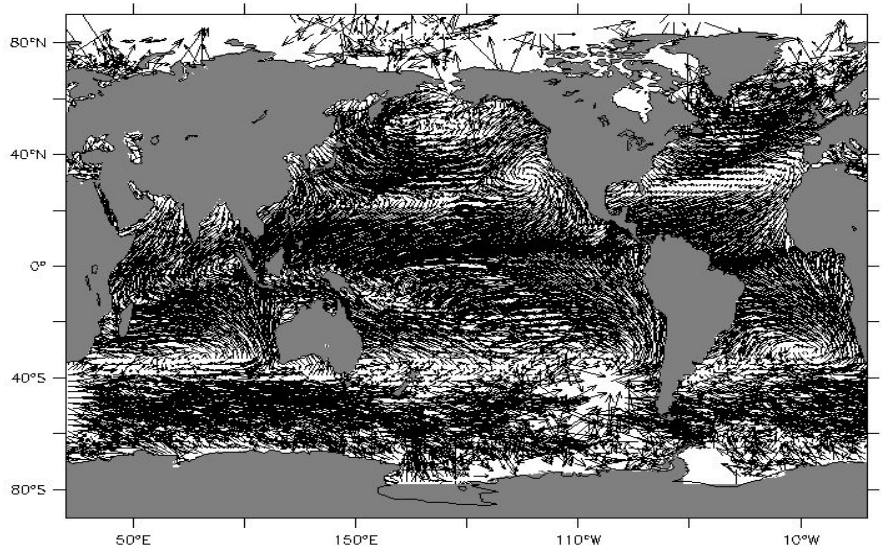
yes? yes? vector uwnd[l=1],vwnd[l=1]
Using every 5th vector in the X direction
Using every 3th vector in the Y direction
yes? go land 7; go fland

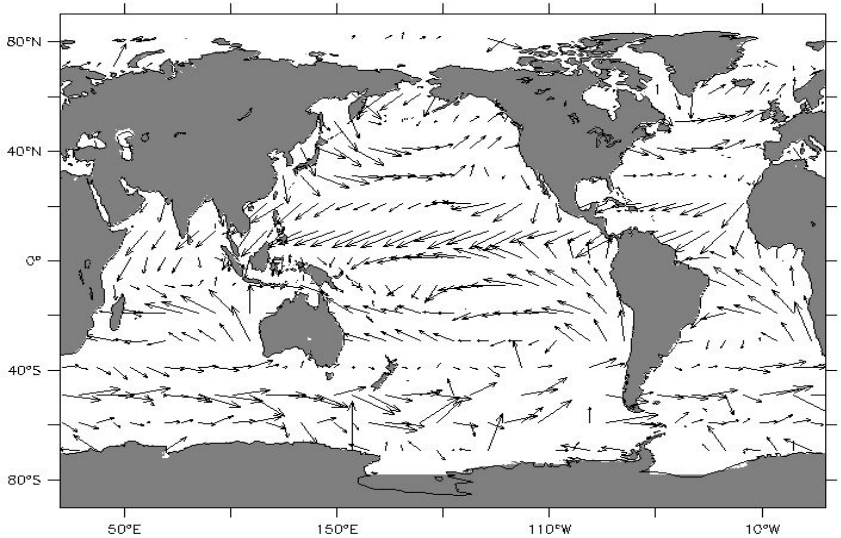


Multiple Plots

- To drwa/compare many plots, use options as:
  >create multiple windows
  >use viewports

yes? set window 2 (or set w 2) (2nd window)
yes? vector/xskip=1/yskip=1 uwnd[l=1],vwnd[l=1];go fland;go land
yes? set w 3 (3rd window)
yes? vector/xskip=4/yskip=5 uwnd[l=1],vwnd[l=1];go fland;go land

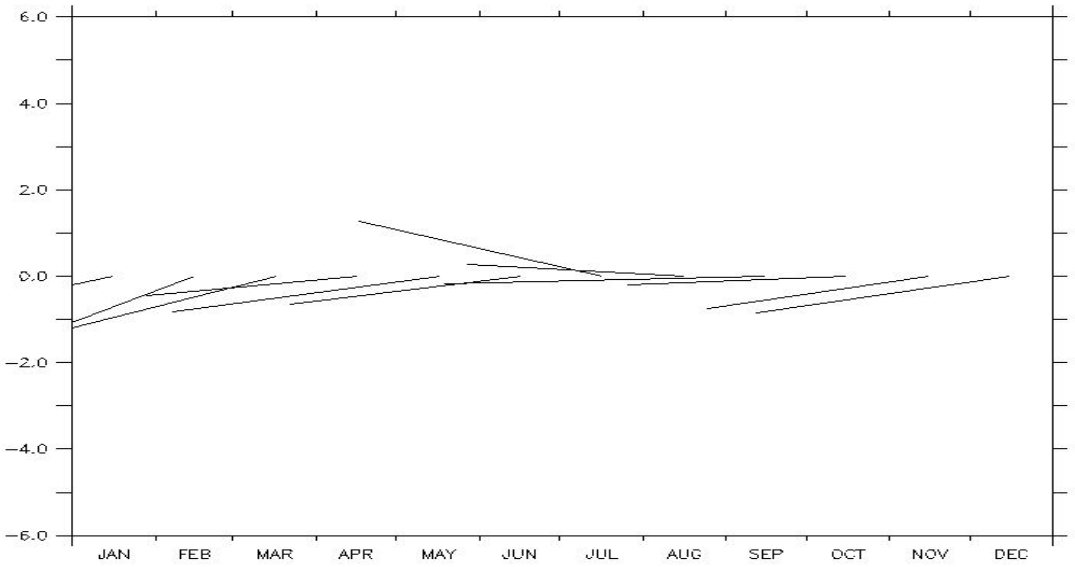




- The command PPL can then be used to make changes to the plot prior to producing output with the PPL CONTOUR command
- PlotUV is used for plotting the stick plots using ppl command

    yes? PLOT/SET/X=180/Y=0 uwnd, vwnd

    yes? ppl plotuv



Viewport

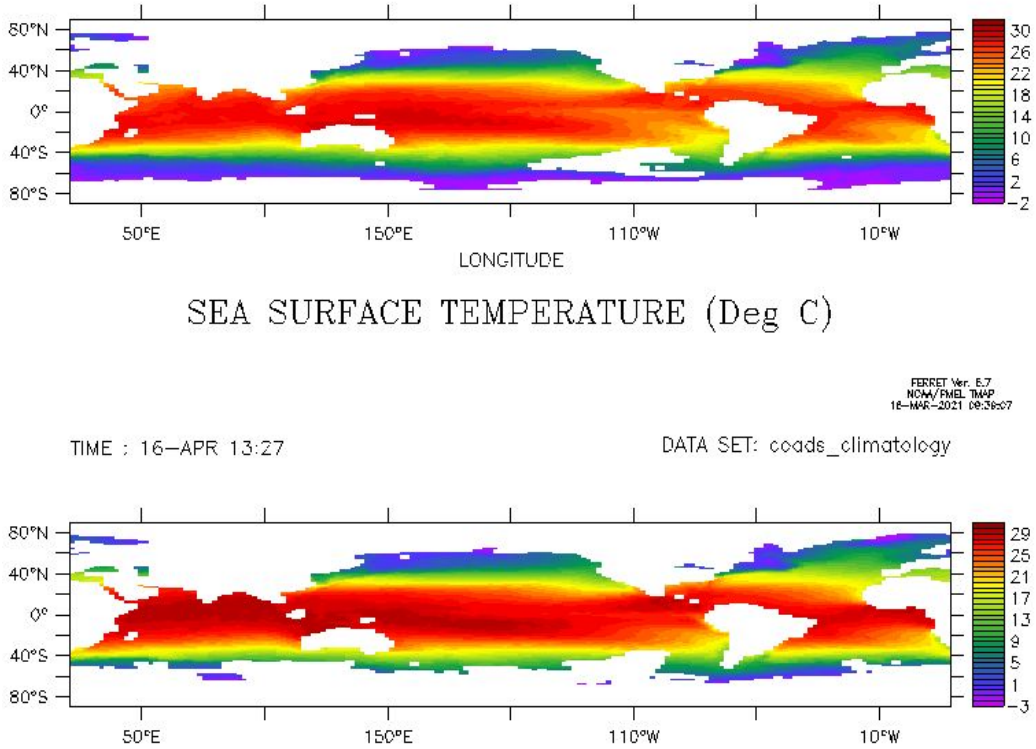
- Viewports divide the space in the window into multiple canvases
  > Set viewport “name”
  > One can use the build in viewport options or create own

- Viewports divide the space in the window into multiple canvases

- There are two build in viewports which one can use directly by taking their name

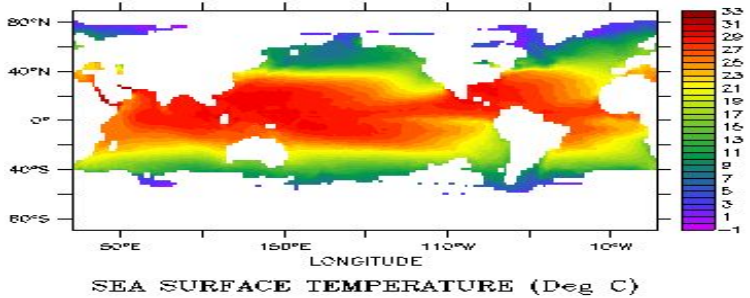
  > For simultaneously plotting two images the command is

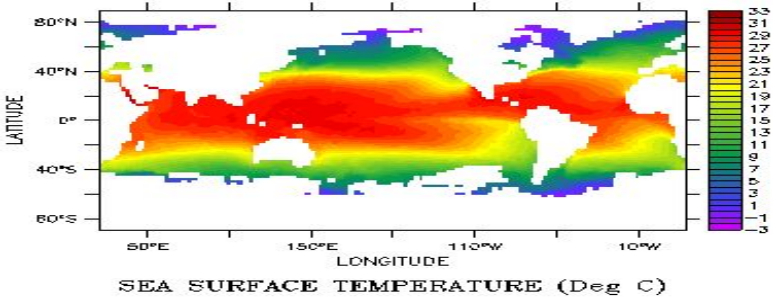
  yes? set viewport upper
  yes? set viewport lower

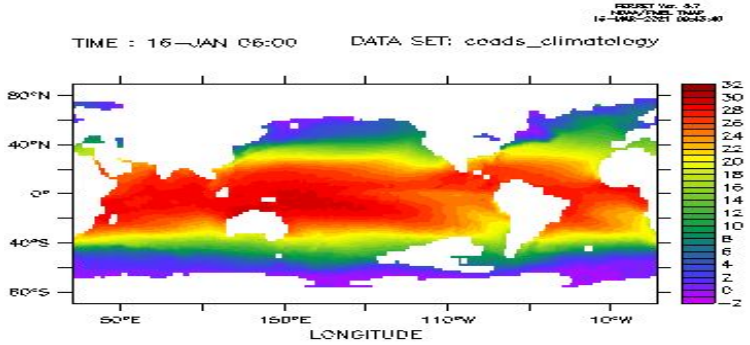


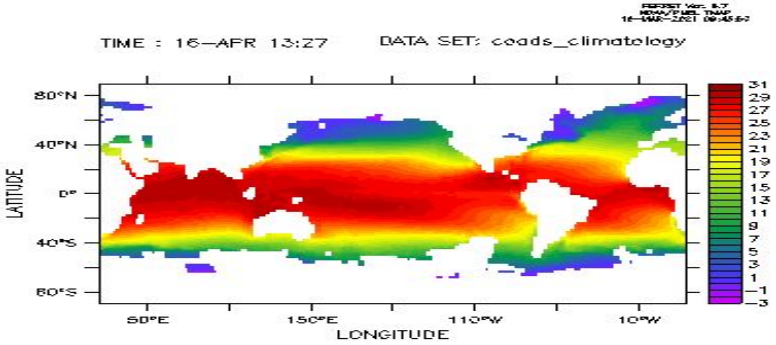
- For simultaneously plotting four images the commands are as:

  yes? set viewport ll (meaning lower left)
  yes? set viewport lr (meaning lower right)
  yes? set viewport ul (meaning upper left)
  yes? set viewport ur (meaning upper right)





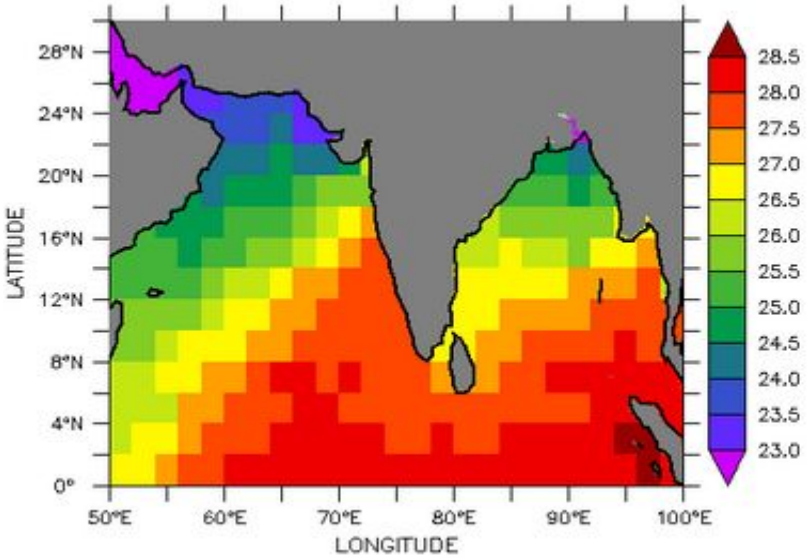




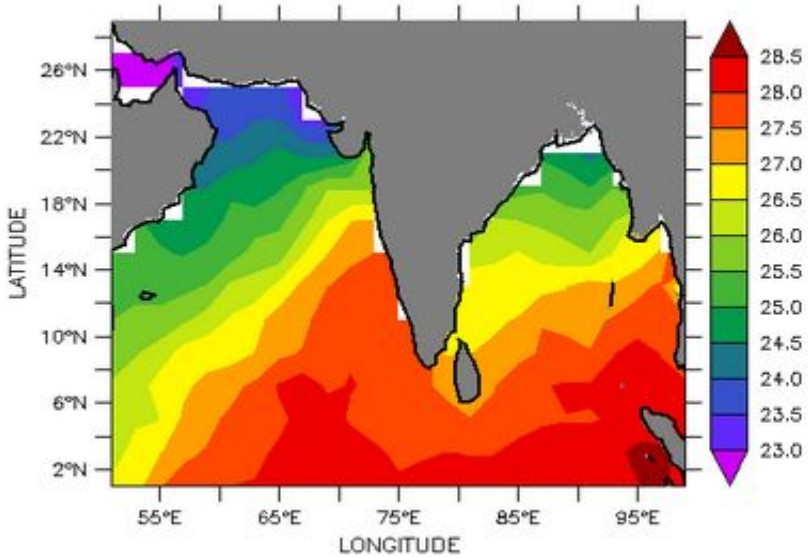
Fill & Shade

- Fill interpolates data linearly resulting smoothness
- Shade covers the entire grid points within the domain

Fill



Shade



- To save the *Ferret* plot

  yes ? frame/file=name.gif

THANK YOU!!