Getting Started

I. Interface Overview
II. Choosing a dataset
III. Selecting a region
IV. Map buttons
V. Time Range
VI. Types of Plots
VII. Main Menu Command buttons
   a. Update Plot
   b. Set plot options
   c. Animate
   d. Compare
   e. Google Earth
   f. Show Values
   g. Export to Desktop Application
   h. Save As
   i. Link To
   j. Print
References:
For a general overview with video tutorials, please see the official LAS pages: http://ferret.pmel.noaa.gov/LAS/documentation/introduction/las-v7-video-tutorials

In this Quick Start Guide, we will go through the LAS interface in the way a user typically sets up a data plot and analysis: selecting a data set, selecting a region, giving a time range and type of plot to create, and then looking at options for changing how the data is displayed, saving the data, and other main menu functions.

I. Interface Overview

![Main Menu Tool Bar]

![Mini-map & Map buttons]

![Plot type, Time range, Analysis]

![Main Map & Plot Display]

Fig. 1: Layout and Control Panels of LAS

The main menu tool bar contains functions and options for saving a data selection or particular analysis. The mini-map and map buttons control the display and area selection of the data set, while the sidebar for plot and time range selection controls what type of analysis over what range of time.

II. Choosing a Dataset
Fig. 2: When first arriving at the LAS site, all main menu buttons are grayed out except for Choose Dataset. Click this button to open up the list of datasets.

PO.DAAC’s LAS is hierarchically organized in this order:

1) Parameter (ie, Ocean Temperature, Ocean Winds, Sea Surface Salinity
2) Satellite or group (ie, MODIS, GHRSSST, QuikSCAT)
3) Individual datasets (MODIS Aqua Level 3 Thermal IR Daily 4km Daytime)
4) Variable (ie, analyzed sea surface temperature, estimated error std, etc)

Drill down the hierarchy for the parameter and dataset of interest and then select the radial button for the desired dataset’s variable. LAS will automatically load the map on the first available granule for the dataset. If it doesn’t start loading in a few sections, hit the Update Plot button.
Fig. 3: The interactive hierarchy is displayed. Here, we have chosen Sea Surface Temperature -> GHR SST -> Level 4 AVHRR_OI -> individual datasets.

III. Selecting a region

Region

LAS has two methods for selecting a region: select ‘n’ drag a box using the mouse via Map button controls associated with the mini-map, or type in the lat/lon bounding coordinates on the left side, under the mini-map.
Fig. 4: Selecting a region by click’n’drag – see upper left mini-map and mini-map buttons.

To select via mouse drag, click the button depicting a rectangle in the mini-map region, then drag the box over the desired region. The main map will not update until you click the “Update Plot” main menu button (or check the box inside “Update Plot” to have LAS automatically update the plot after every selection).
Fig. 5: To pan around the mini-map, select the hand icon.

To reset to the original full map, click the “reload” Map Button, and then click “Update Plot”.

*To have the map automatically load after a selection, tick the small box inside the “Update Plot” button.*

Clicking on the rectangle icon button switches to drawing regions with the mouse.

IV. Map Buttons

Above the mini-map on the left are a set of nine buttons, starting with the “?” button on the far left. Clicking the “?” button brings up a “How to Use the Map” and a built-in tutorial of the Map buttons.

From left to right, the buttons are “?” for Help, restart (reset the map to defaults), the arrow for modifying a selection, “hand” for pan (click and drag on map to move), “box” for drawing a new region, zoom in, re-center and zoom out, zoom out, and the down pointers for selecting a named, tagged region.
For more detail, please view the built-in tutorials from the “?” button.

V. Types of Plots

There are several places to set the type of plot in LAS. The first is directly under the mini-map, with radial buttons for Lat/Lon variable maps, Hovmoller Plots, Line Plots, and Scatter Plots. The second area is accessed by clicking the “Apply Analysis” text under the Date select dropdown box.

Clicking on “Apply Analysis” reveals two drop-down menus; “Analysis Type” and “Analysis Region Type”. Analysis Type has average, minimum, maximum, sum, and variance as possible actions. Analysis region type has area (lat/lon bounding box), latitude, longitude, and time.

Be aware that selecting an analysis type that doesn’t support a time range, or a bounding box area, will collapse to the beginning date or the center of the bounding box.

VI. Time Range

Under the plot types in the left-hand box under the mini-map is the Date Range pull-down menu. Under the default Lat-Lon map, the date is a single granule (depending on the dataset, this may be daily, monthly, or something else).

Selecting a plot that spans a range of time introduces a second date pull-down menu; this is for the end of the range.

Note: if you have selected a time range then select a plot type that does not support a time range (eg. mapped image), LAS defaults to the beginning time for the plot.

VII. Main Menu Command Buttons

a. Update Plot: click to have LAS update based on most recent selections. Ticking the small inset box will turn on auto-updating.

b. Set Plot Options: clicking this opens up a number of options, as shown
Fig. 6: The Set Plot Options menu

The “?” buttons to the right of the menu boxes pulls up a help option. For example, here is the help option for Evaluate Expression:
Fig. 7: Help box for “Evaluate Expression”.

The help buttons cover most options, but we expand on the most used options here.

**Evaluate Expression**: apply an equation to transform the selected variable (expressed as $). Eg. Convert SST from native Fahrenheit values to Degrees C. This does not include screening or filtering using $<$, $>$, $=$, or other logic operations; it solely applies transformation equations. The order of operations and interpretation of $()$ and $/,$*, and so forth can be picky – it’s better to use decimal instead of fractions if the transformation equation is more complex than converting C to Fahrenheit (as shown).

**Palette and Contour style buttons**: to show what LAS can do, here is a short before/after series. We want to use a color palette of reds to have a single color gradient represent the data, and we also want to have contour lines.
Initial plot:

Fig. 8: Starting region, before changing plotting options

Click on the Set Plot Option main menu button to pull up the options:
Fig. 9: Selecting new Palette and new Contour styles

Now select “Range of Reds” for the palette, and “Color filled and lines” for contour style, click okay, and update the plot:
Fig. 10: Plotting with color palette only reds, and adding contour lines, color filled with lines.

Using “Link To” and “Print” allows for immediate sharing.

Color Fill: to change the min and max range of the map, use Color Fill.
Set the fill levels of the plot. Fill levels are described using Ferret syntax. The number of levels is approximate, and may be changed as the algorithm rounds off the values. Examples:

- \((0, 100, 10)\) Bands of color starting at 0, ending at 100, with an interval of 10
- 25 Draw 25 levels
- 10C Draw 10 levels centered at 0
- 60V Draw 60 levels using the default open-ended color level calculation
- \((-\infty, -10, 10, 0.25, \infty)\) Bands of color between -10 and 10 with an additional color at each end of the spectrum representing all values below (-inf) or above (inf)
- \((-100, -10, 10, 0.25), 100)\) Bands of color between -10 and 10 with an additional bands for all outlying values up to +/- 100.

Detailed info is available in the Ferret User’s Guide, see Levels at http://ferret.pmel.ncoa.gov/Ferret/documentation/users-guide/customizing-plots/CONTOURING#_VPINDEXENTRY_853

Fig. 11: Help box for Color Fill levels

Be aware that specifying too many bands (the 3rd designation, ie, a very small interval between different colored bands) will cause LAS to be unable to finish the request.

Contour Levels: much like Color Fill, the syntax is the same, as is the caveat about intervals too small to distinguish in the plot.
Here is an example of a blue palette, contour levels (286, 293, 0.05) – min value 286 K, max 293 K, contour level every 0.05 K – a very fine resolution of contours, as seen by areas that are nearly black with lines:
c. **Animate Plot**
   Select a time range, and the interval of granules (ie, every one, skip two, and so on).

   Animate currently is limited by the size of the dataset; it can only handle a few granules of higher resolution data, but can handle longer stretches of granules on lower resolution.

   **d. Compare Plots**
   Compare plots allows the user to compare four different data files, in a separate window, from either the same or different data sets. Time series can be compared in different panels, as can other plots. The more intensive analysis options from LAS’s main page are not available in Compare.

   Compare plots has many of the same function buttons as LAS itself: it has the full suite of region and plotting options, set plot options, and includes a difference mode where panels 2-4 are the difference between the first data file and the data files set in panels 2, 3, & 4.
Fig. 14: Compare plots- the plot on the left has blue palette with contour lines, and the plot on the right is differenced from the next day's data

Plots over a time range can be done in Compare Plots, as well.

Comparison does not have the same analysis capabilities as LAS itself; it cannot compare a time series averaged over area, for example.

**Comparing granules from different datasets**

In the panels 2-4, next to the “i” button, there is a “Settings” button. Click this to open up a new set of tabs; the available tabs are type of plot, data sets, and plot options. Click on data sets.
Fig. 15: Opening the 2nd panel’s “Setting” options
Fig. 16: Selecting a different data set in the “data set” tab in the “Settings” options.

Then select the date desired, and click “Update Plots” in the upper left main suite of buttons (NOTE: having previously checked Update plots on the main menu will not be invoked in Compare mode where only manual updating of display scene is possible). Lat/Lon coordinates may need adjusting to match.
Fig. 17: Displaying the second data set in panel 2, for the same date and whole Earth.

e. Google Earth
A selected region in LAS can be saved as a KLM file via the Google Earth button, and then opened in Google Earth for viewing:
Fig. 18: Displaying saved KLM file in Google Earth

f. Show Values: outputs the image values onscreen to a table, and is similar to the option of Save As -> ASCII table. Useful for immediate verification. One can also copy the values in the new browser window, and paste them into Excel or a text file to import into a different program.
Fig. 19: Example image, before “Show Values”

Gives:

Table of Values

Fig. 20: Show Values for the image in Fig. 19.

g. Export to Desktop Application: produces scripts to import the selected region into Ferret (which supports LAS visualization), GrADS, and Matlab via netCDF-Java Toolbox or loaddods. The two Matlab add-on packages are unfortunately not directly supported at this time.
The OPeNDAP URL to your selected variables:


These OPeNDAP links can be viewed in a browser to get more information about these data:

INFO (Information)
DAS (Data Attribute Structure)
DDS (Data Description Structure)

The following commands can be used to open this OPeNDAP URL in the desktop application:

`curl http://thredds.pmel.noaa.gov/thredds/dodsC/ largelyGHSHST_EUR-L4HRnod-OLOB-OYSISEA_TIMEAOG_aggregate__ghsset_EUR-L4HRnod-OLOB-OYSISEA.ncml` (command line)

**Fig. 21:** The scripts appear in a new browser window.

**h.** Save As: currently supports four options, which are NetCDF, ASCII (same as Show Values), Comma Separated Values (CSV), and arcGRID. If you are saving a time range, the time range needs to be specified once more in the Save As pop-up, as values from the main LAS page do not carry over. Currently there is an error in the NetCDF where it does not save the Offset value. LAS support is aware of this and is working on it.
To save as an image, either use a screen grab/print, or Print as a PDF, or right-click and save as an html page, and then save out the image from there.

i. **Link To**: provides a long and specific URL link to the exact results. This link can be sent to other users, to swiftly give them the exact analysis done. The link is to a static request – ie, any time changes are made to the plot, the link needs to be regenerated by clicking “Link To” again, because the link contains every instruction to LAS’s back end plotting function needed to make the plot. Links to previous results are not permanent, lasting only as long as the results are stored in LAS’s cache. To preserve a permanent record, use Save As and Print.
Fig. 23: The link provided by “Link To”.

j. Print: brings up the standard print options for webpages; print to a printer, or to PDF.
Fig. 24: Print options.

In order to save as an image, either take a screen grab, or Print as PDF, or right-click to save page as html and then save an image copy from the html.