Earth System Data Exploration using the Live Access Server

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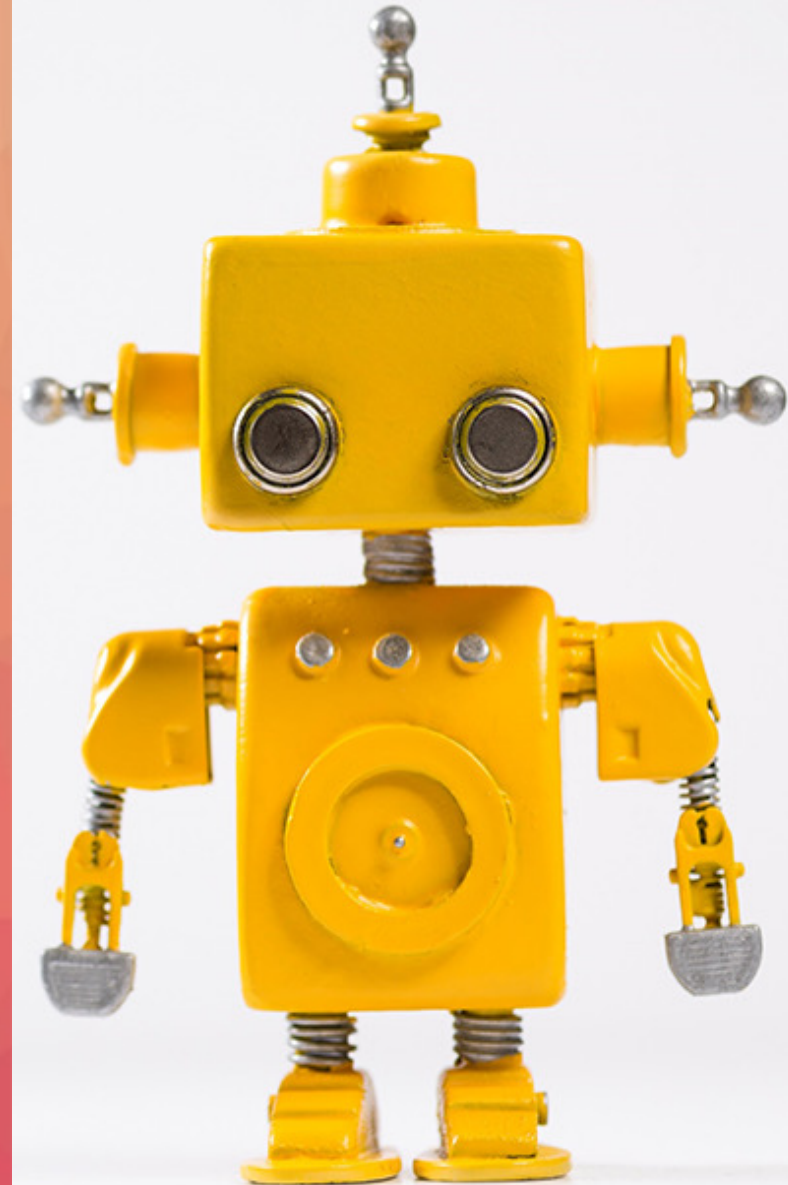THE CYPRUS INSTITUTE
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NIXOS

Main Menu

General Information

Introducing Live Access Server and its features

NIXOS

What is the Live Access Server?

- The **Live Access Server (LAS)** is a highly configurable server designed to provide flexible access to geo-referenced scientific data.

- It can present distributed data sets as a unified virtual data base through the use of DODS networking.

- Ferret is the default visualization application used by LAS, though other applications (Matlab, IDL, GrADS etc) can also be used

Aims

- Introduce participants to Live Access Server and its capabilities

- Describe how users you can use the Live Access Server with examples

- Outline the steps required for installing the Live Access Server on your computer, and importing data for visualisation

LAS capabilities

- The LAS enables the data provider to:
  - unify access to multiple types of data in a single interface,
  - create thematic data servers from distributed data sources, and
  - offer derived products on the fly.

LAS landing page
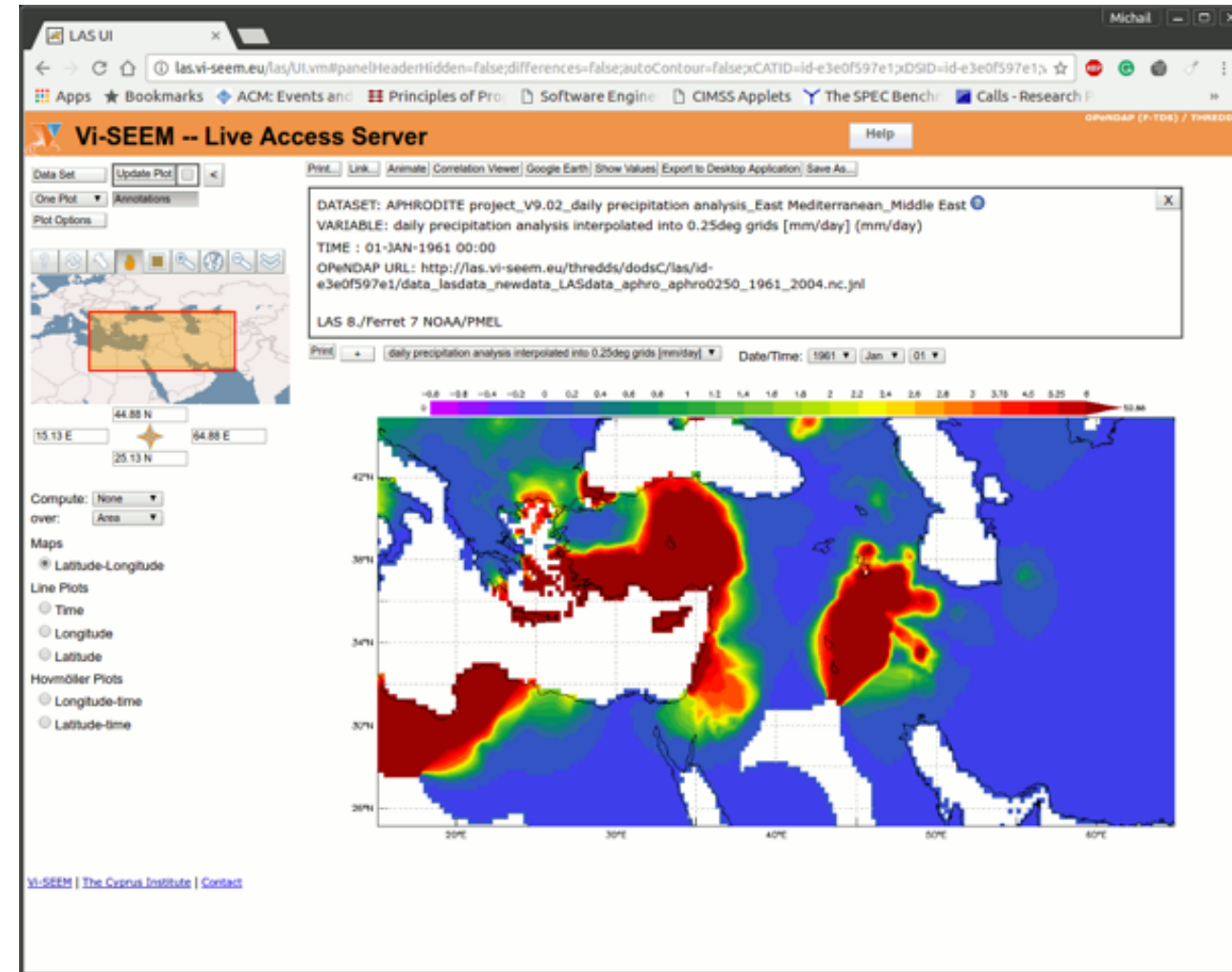
- Using the zoom and pan reference map, the user may refine the latitude and longitude used to create the image or download data.

- The output images are interactive, allowing the user to click and drag to zoom into a particular region on the map.

- **The user is now free to begin interacting with LAS.**

Selecting LAS Datasets
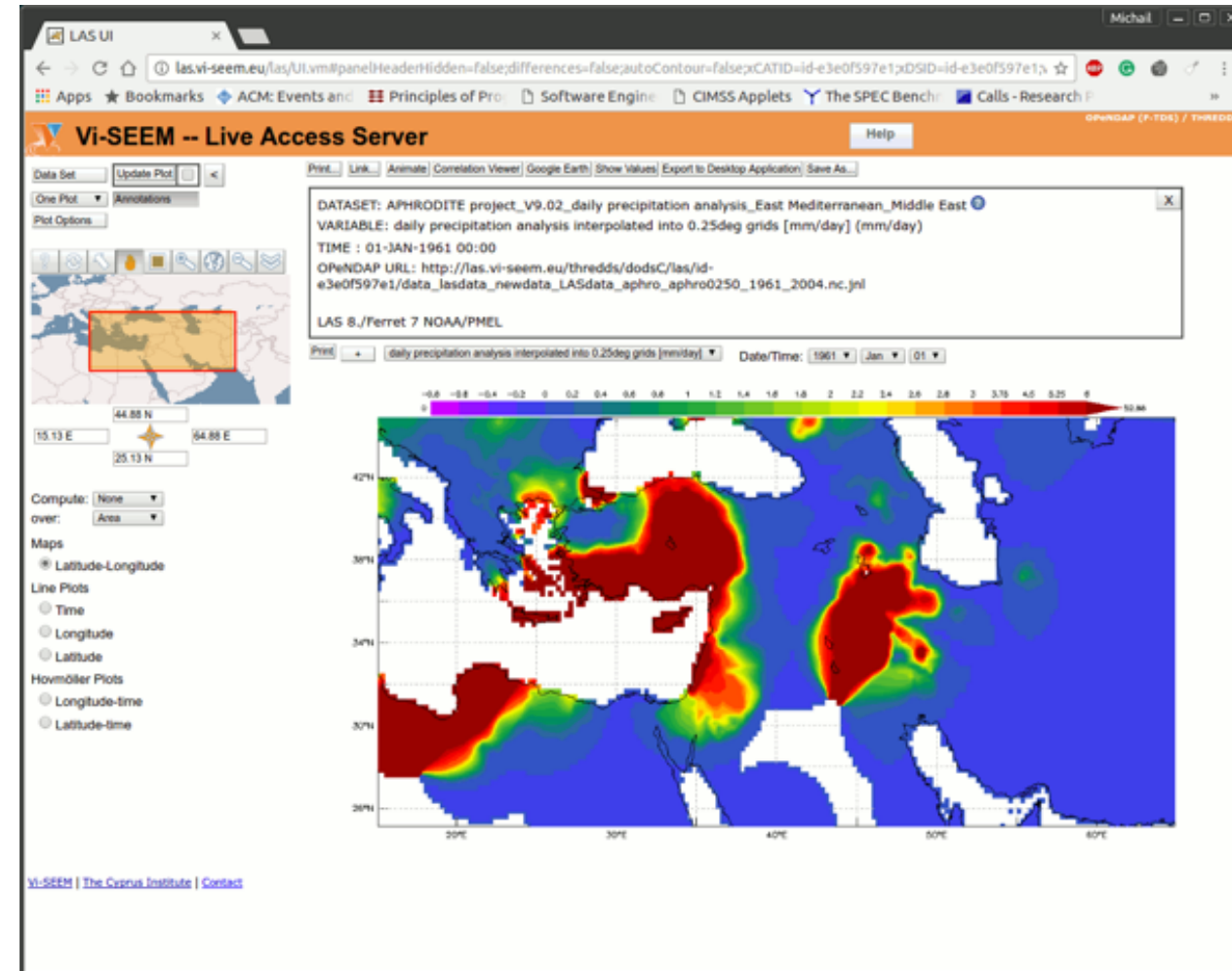
- In the initial window screen, **the user can select a new dataset** using the "Data Set" button on the top left of the webpage:
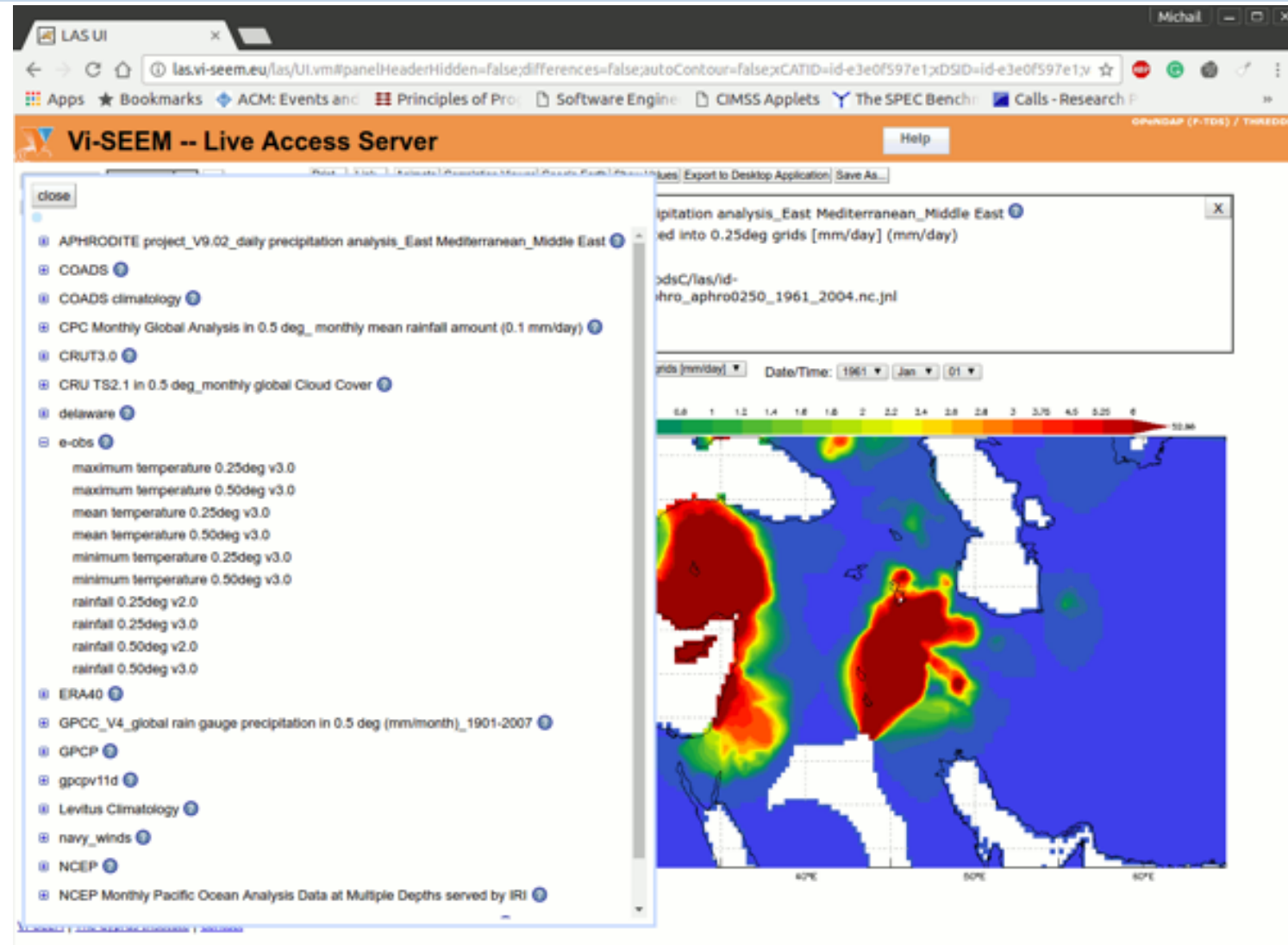
1.Main screen of the Live Access Server: Below is a roadmap to the main screen of the LAS. Each of these important components will be useful when creating a map. When each part of the main screen is referenced in the instructions below, an icon with the corresponding colour and number will be included for reference (Example: when **section 8** of the main screen is referenced, the icon 8 will appear).

Creating a map

Creating a map:
The benefit of the LAS is that data has already been cataloged and formatted, so that maps of the data can be easily plotted.
See the detailed instructions below to create a map.

1. Load the data.
A. Click on the '*DataSet*' button in the top left corner of the main page (in *section* 1). After clicking the *'Data Set'* button, a menu should appear.
2. Click on the plus-sign icon (+) next to the sphere from which you want to get your data. Another list should appear after clicking the plus-sign icon.
3. A list should appear: click '*All Data*' to see all of the data choices available.
4. A list of data categories should now appear.Click the plus-sign icon again to see the list of data sets available in the category.

close

⊖ Atmosphere
  ⊖ All Data
    ⊕ Aerosols ?
    ⊕ Albedo ?
    ⊕ Atmospheric Chemistry ?
    ⊖ Clouds
      ⊖ Cloud Cover ?
          Monthly High Cloud Coverage
          Monthly Low Cloud Coverage
          Monthly Middle Cloud Coverage
          Monthly Total Cloud Coverage
      ⊕ Cloud Properties ?
    ⊕ Longwave and Shortwave Radiation at Earth's Surface ?
    ⊕ Net Atmospheric Radiation ?
    ⊕ Temperatures ?
    ⊕ Tropical Cyclones ?
    ⊕ Water Vapor ?
    ⊕ Wind Speed and Vectors
  ⊕ Featured Phenomena
⊕ Biosphere
⊕ Cryosphere
⊕ Geosphere
⊕ Hydrosphere

2. Create the Map.

- Click on the data set you would like to use. After a few seconds, a map with your selected data plotted should appear in *section* 8 on the main screen.

- **Features of the map plot:**

  - Info box (*section* 6 in the main screen): This area contains the name of the data set and notes about the data. Notes (also seen as *'Annotations'*) describe the source of the data set, a description of what the data describe, and a description of the units.

  - Name of data set and Date/Time options (*section* 7 in main screen): This is the name of the data set from the menu. The date and time that you want to plot can be chosen in drop-down menus here. The entire time range that is covered by the data set and available is shown here. Note: If the data has no time component, then the date dropdowns do not appear.

- **Good to know:** You can select any other datasets listed in the subcategory in the drop-down menu with the name of the dataset. Make sure to click 'Update Plot' (in *section* 1 in the main screen) if you make any changes here.

  - Colorbar and Map (*section* 8 in the main screen): The colorbar for the map shows the relationship between the data and colors in the map. The numbers next to the end of the colorbar show the maximum and minimum of the data in the current map view.

Customising the Map

- *Sections **1**2**3** in the main screen*

- To choose the **area** that the map covers, use the mini-map in *section 2* in the main screen**.**
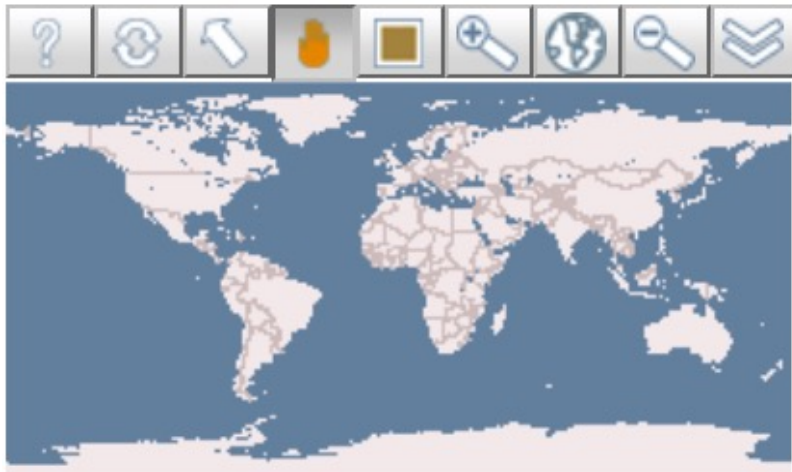
The mini-map shows the current extent of the data shown. If we want to change the extent of the data map, there are several tools in the small toolbar above the mini-map that will accomplish this. For all tools, the button will be depressed when the tool is selected. The area that will be shown in the new map will be highlighted by an orange box.

Tool Bar

Tool Bar:

■	**Box tool :** Select this tool to highlight an area in the mini-map over which you would like to plot your map.
🔍	**Plus-sign magnifying glass:** Zoom in the mini-map.
🌐	**Globe:** Return view to global view
🔍	**Minus-sign magnifying glass:** Zoom out mini-map.
⌄	**Double downward arrow:** Opens menu where you can choose predefined areas and automatically zoom your map to these areas.
🔄	**Double circular arrows:** Reset view to original default extent.

Remember: Once you are satisfied with the area chosen, select the 'Update Plot' button (in *section* ① of the main screen).

- To choose the **latitude and longitude boundaries** of map plotted, use the features in **section** 3 of the main screen.

- If a specific longitude and latitude range is desired, the range can be input in the four boxes below the mini-map. Latitudes are input in degrees North (example: 20.3 N) or degrees South (example: 31.2 S), and the values are put in the top and bottom boxes. Longitudes are input in degrees West (example: 123 W) or degrees East (example 17.6 E), and the values are put in the left and right boxes.

- **Good to Know:** When you select one of the predefined areas using the double-arrow tool, select your own area using the rectangle tool, the latitude and longitude bounds automatically update with the bounds of your selection.
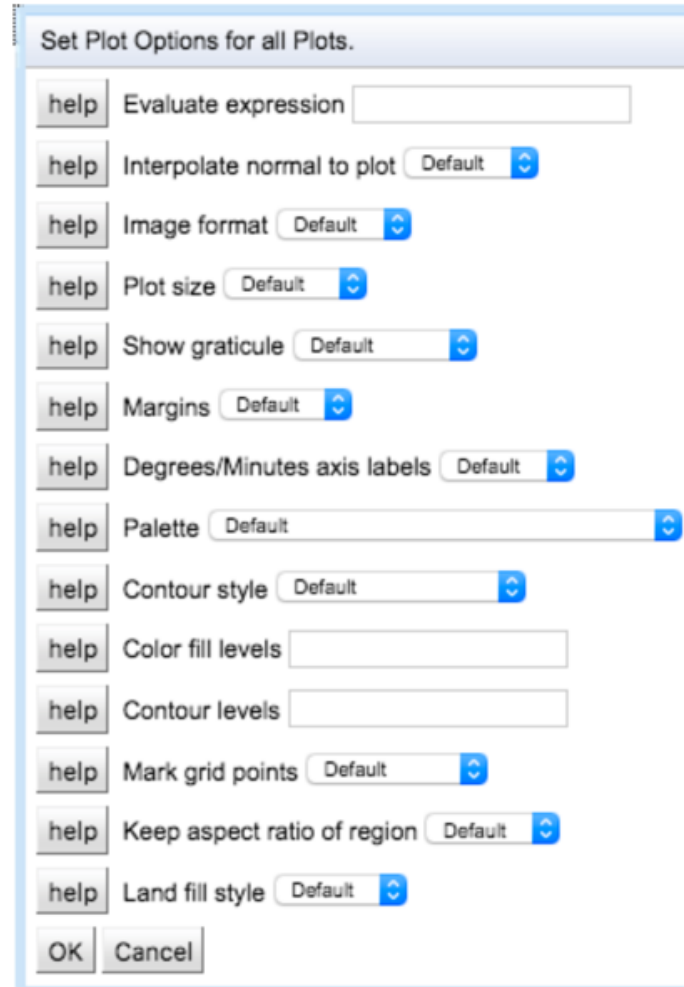
Changing Colorbar

To change the **colorbar**, select the 'Plot Options' button in *section* ① of the main screen. Selecting this will open a window with several plot options. The two most commonly used options are the 'Palette' and 'Color Fill Levels' options.

Figure 6. The Plot Options menu that appears when clicking the 'Plot Options' button. After making any changes, click the 'Update Plot' button in section ① of the main screen to apply the changes to the map or plot.

The dropdown menu next to the 'Palette' option contains many color maps that can be applied to the data map.

The 'Color Fill Levels' option sets the minimum, maximum, and the spacing within the color map. Each data set has default color levels to best fit a global view of the data. To set your own color bar range, type in (MIN,MAX,STEP) next to the option, with MIN a number for the minimum level desired, MAX a number for the maximum level desired, and STEP the desired color map spacing.

Set Plot Options for all Plots.

help	Evaluate expression	
help	Interpolate normal to plot	Default
help	Image format	Default
help	Plot size	Default
help	Show graticule	Default
help	Margins	Default
help	Degrees/Minutes axis labels	Default
help	Palette	Default
help	Contour style	Default
help	Color fill levels	
help	Contour levels	
help	Mark grid points	Default
help	Keep aspect ratio of region	Default
help	Land fill style	Default

OK Cancel

Line Plots

To create a line plot: At the bottom of the left-hand side of the main screen (in *section* 4), there are button options to choose the type of plot. Selecting any of the bottom three options results in a line plot.

Good to Know: Like the maps, the appearance of the line plots can be customized by selecting the 'Plot Options' button above the mini-map.

Good to Know: Like the maps, line plots can be downloaded and printed using the 'Print' button. See the 'Downloading and Printing' part of the Map section for instructions on how to download and print.
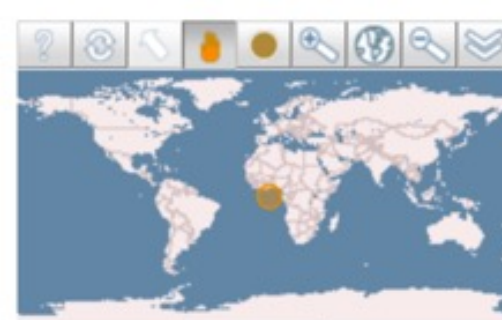
Time: This option creates a time series plot at any location on the mini-map above. The location can be chosen by entering the latitude and longitude coo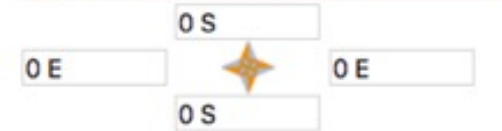rdinates below the mini-map, or by using the circle tool [icon] in the toolbar above the mini-map. The time range that the plot covers is also shown below the latitude and longitude coordinates.

Figure 8. The mini-map and options that appear when creating a line plot.

Longitude: This option creates a plot of values across all longitudes at a chosen latitude line. The latitude line can be chosen in the mini-map using the line tool [icon], or chosen by directly entering the latitude and longitude coordinates below the mini-map.

Figure 9. The mini-map and options that appear when creating a longitude plot.

Latitude: This plot is similar to the **Longitude** plot, but the values plotted are across all latitudes at a chosen longitude line.

Identical to the maps, a text box exists above the plot in *section* ⑥ with information about the plot and the data once the line plot is created.

Figure 10. The mini-map and options that appear when creating a latitude plot.

Visualising large and complex data
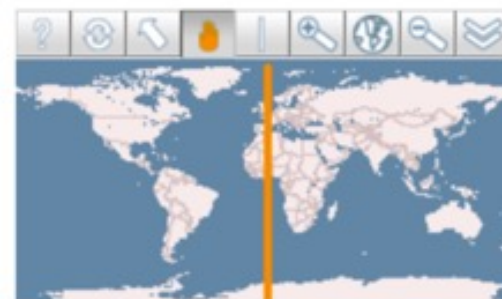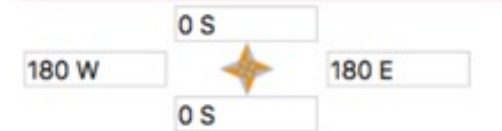
Note that in big datasets and complex requests, the visualization can take more than a few seconds to be generated, forcing the interface to display this message:

Your request has been processing for 6 seconds.
This panel will refresh automatically.
Cancel the request pending for this panel.

Cancel

The user either can wait for the dataset to visualized or cancel the request.

Selection of LAS visualization methods
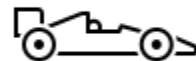
The user can select different visualization methods from the left column.

For example, selecting the time plot of the APHRODITE precipitation analysis dataset presents this graph:
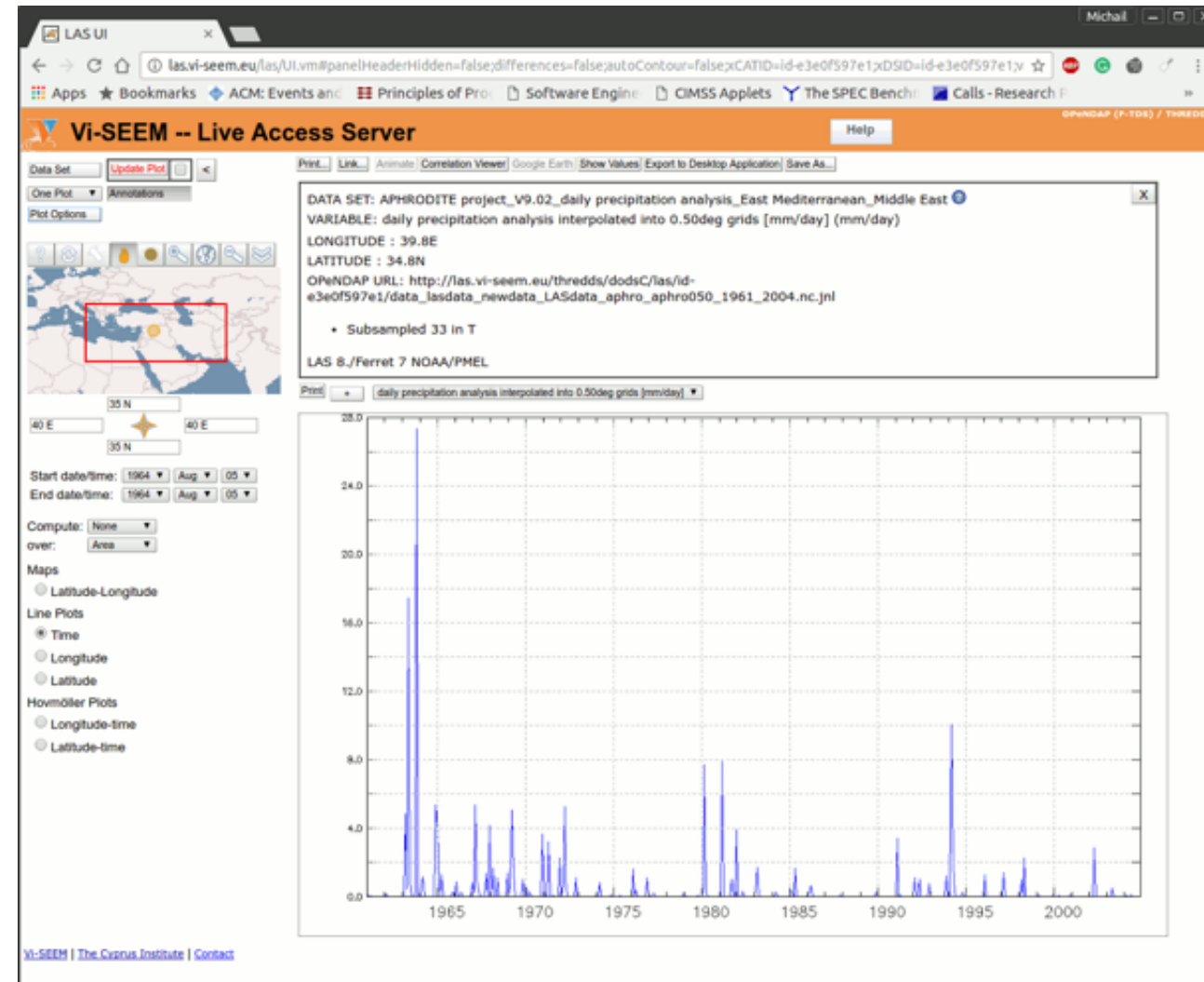
Customising LAS output graph

The user can fully customize the LAS output graph.

For example, the user can change the specified color pallet and eliminate the graticule lines.

The user should use the "Plot options" from the left column to customize the graphs. In the following example, the user changes the graticule lines to black and changed the color palette to pastel rainbow.

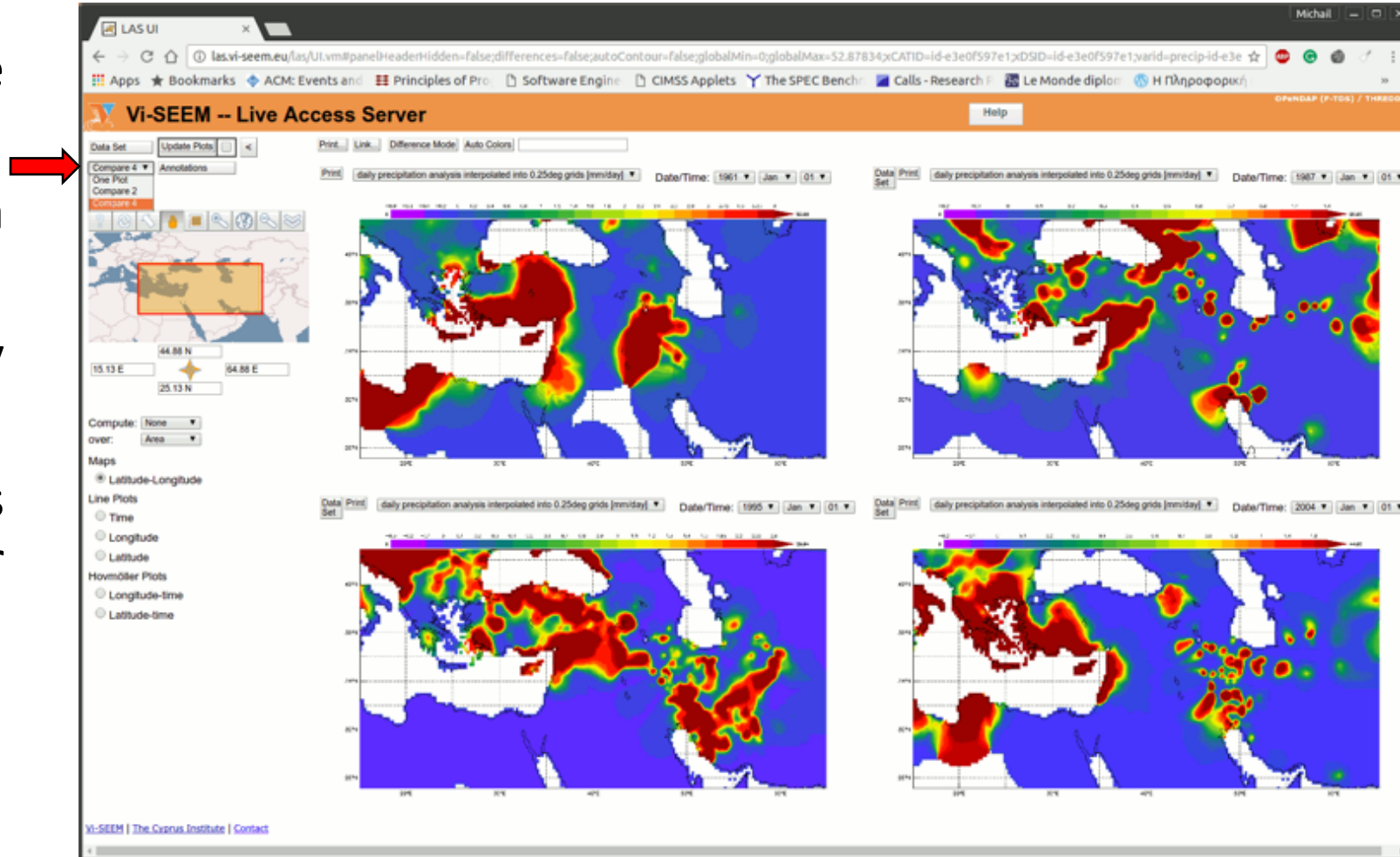Illustration of changing the palette colors of the graph:
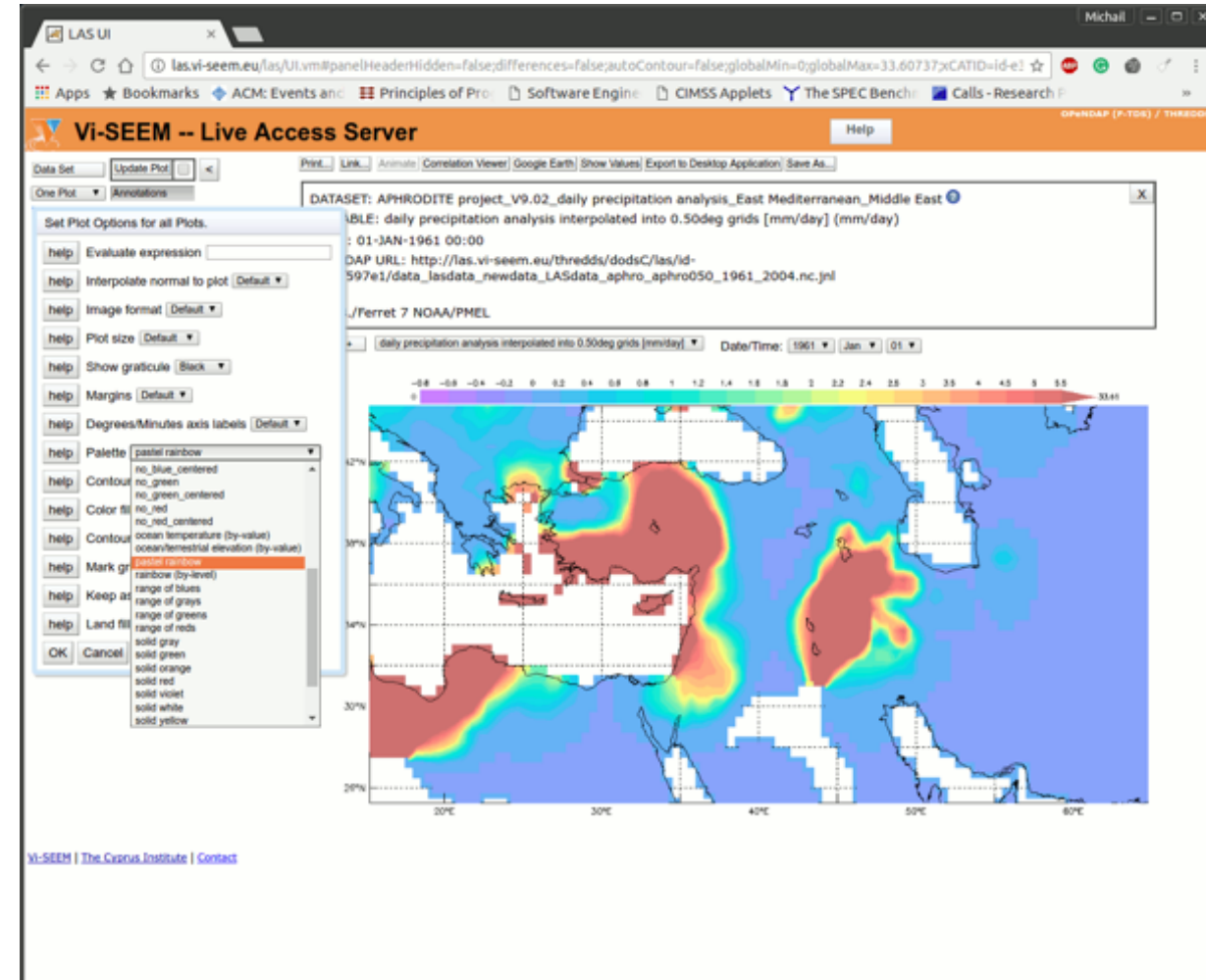
Comparing LAS Datasets

Finally, the user can compare variables using different datasets.

The user uses the drop down menu on the top left.

The default value is to show only one plot.

Currently, the interface supports up to 4 different graphs for comparison.

Creating New Live Access Server Instances

Directions on how to install the Live Access Server Virtual Image on your server

Installation Steps

1. Before starting the LAS installation, you should have some prerequisite libraries and enviroments.

2. First, you should install either the default Java SDK of your distribution or Oracle SDK

3. Next, you need to install Apache tomcat and the THREDDS data server

4. Finally, the visualisation backend should be installed (Ferret).

Detailed instructions: https://training.vi-seem.eu/index.php/domain-specific-software-and-tools/climate-software-and-tools?id=33

- Ferret is available at:

- https://ferret.pmel.noaa.gov/Ferret/downloads

- Step-by-step installation guide:

- http://ferret.pmel.noaa.gov/Ferret/downloads/ferret-installation-and-update-guide

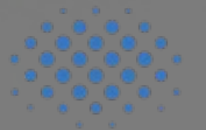- You can also download some example files to test if everything works fine.
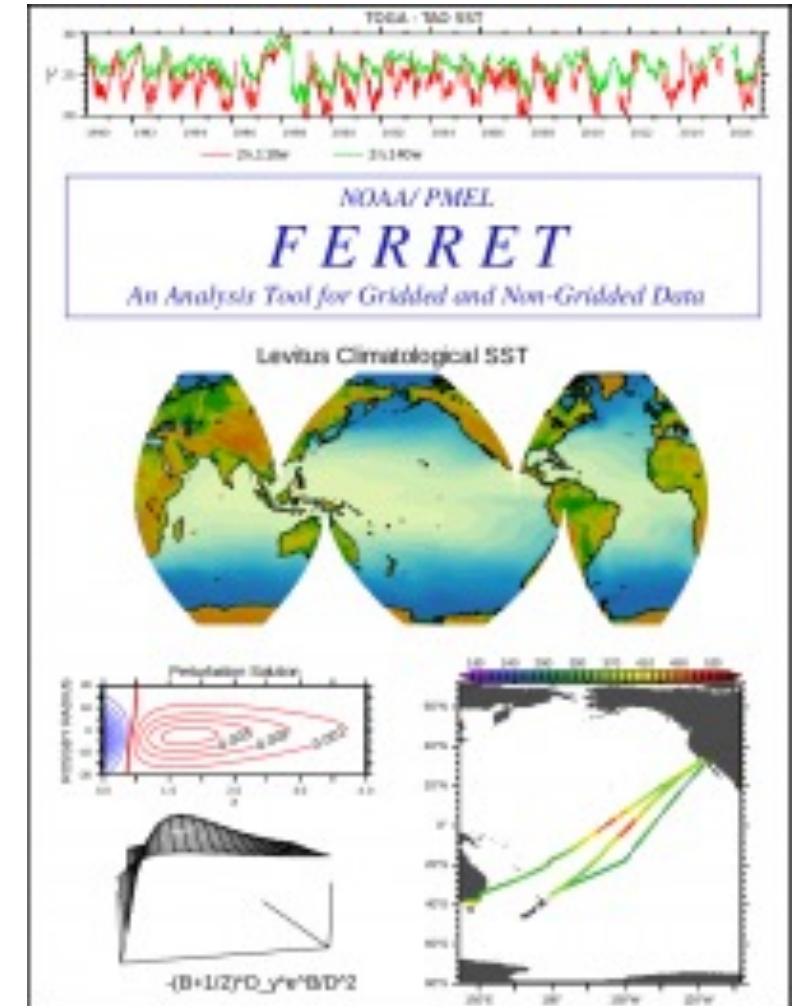
Populating the LAS datasets

Importing new netCDF files to LAS

Importing new NetCDF files to LAS

- To add a netCDF file to LAS, you have to use the addXML.sh that is placed in the las/bin directory. You have to use the tool after the installation of the LAS server, because it searches for certain paths.

- You can find more information about the tool here: http://ferret.pmel.noaa.gov/LAS/documentation/installer-documentation/adding-gridded-data/the-addxml-utility.

The THREDDS Data Server (TDS)

Provide scientific (meta)data access, using OPeNDAP, OGC WMS and WCS, HTTP, and other remote data access protocols.

- **The THREADDS service can serve data from the local installation of the LAS server to the global community.**

- To do so, you have to ensure that the THREADDS application is running on tomcat. To test it you have to use the addXML tool and the url provided by pressing the "?" button when selecting the dataset.

- Additional information about configuration can be found at: http://www.unidata.ucar.edu/software/thredds/current/tds/reference/ThreddsConfigXMLFile.html.

Customize Live Access Server Appearance

Customize the Logo and Branding on the Footer/Header of the LAS website:

To add your logo or change branding colours, you can edit the
V7UIFooter.vm and V7UIHeader.vm
files stored at the tomcat directory at

`webapps/las/productserver/templates/`