Session 3 - Wednesday pm - 13th September

Introduction

SeaDAS is the SeaWiFS Data Analysis Software.

SeaDAS has many functions and options. In these SeaDAS tutorials we will introduce some of the basic SeaDAS functions. We will introduce SeaDAS first through the GUI interface, then lead into command line processing. We will then use the command line processing capabilities of SeaDAS and some job control scripts to process some local SeaWiFS data.

SeaDAS structure

We will not be able to cover the complete SeaDAS package. You are directed to utilise the web site *http://seadas.gsfc.nasa.gov/* as a good starting point for information about SeaDAS.

SeaDAS-Beta was released in July 1994. Since then there have been 10 new releases, and 32 updates (*http://seadas.gsfc.nasa.gov/SeaDAS_history.html*).

SeaDAS has been installed on the machines here at the Institute for Marine Sciences.

The SGI machines have SeaDAS 3.3 and the LINUX machines have SeaDAS 4.0 installed.

To start our familiaristion with SeaDAS we will explore the directory structure and look at some of the important components within SeaDAS. The web site *http://seadas.gsfc.nasa.gov/sds_dirtree.html* contains a shematic of the SeaDAS directory structure.

- Type **env** to see the value of the environment variable SEADAS
- On your machine change directory to the SeaDAS directory.
- Look at the **config** directory and the **seadas.env** file.
- Have a look in the **data** directory. Meteorological and Ozone data files are stored here. The file **seawifs_table.dat** contains SeaWiFS sensor-specific atmospheric correction data. The file **seawifs_def_l2prod.dat** contains information to control the Level 2 products produced by SeaDAS. SeaDAS is able to process and/or display data from a number of different sensors. We are only concerned with SeaWiFS data for this course. In the **seawifs** directory are a number of data files and directories specific to SeaWiFS data processing. The **cal** directory contains calibration tables.
- Have a look at the **CAL_TABLES.doc** and **README** files. The **norad** directory has navigation data. This has to be updated on a regular basis. Another file involved in the navigation of SeaWiFS data is in the **nav** directory. This file is **elements.dat** and must also be updated on a regular basis.

  The seadas data directory also contains Meteorological and Ozone data files. These are climatological data files. SeaDAS is able to utilise near-

real-time (NRT) meteorological and ozone data. These data files are contained elsewhere.

Getting help with SeaDAS

Not only does information on SeaDAS exist on-line at the SeaDAS web site, SeaDAS comes with extensive documentation. The **$SEADAS/doc** directory contains html pages. Access to these help pages is simple once SeaDAS has been started. We will look at some of these help pages during the following sessions.

Starting SeaDAS

SeaDAS may be run in a few different modes. If you have an IDL development licence SeaDAS may be started by typing

seadas.

If you have an embedded IDL licence type

seadas -em.

- Start SeaDAS. You will see information pertaining to the version of IDL, the operating system and the version of SeaDAS. The SeaDAS main menu will appear.
- Click the **Help** button and select **Programs** to bring up the html help browser.
- Select **seadas** to see the help on how to run SeaDAS. We will not explore all the options in detail now however. You may move the help

browser out of the way for now.

- Select **Display - seadisp** (the general image and graphics display) from the SeaDAS main menu. The **Seadisp Main Menu** will appear.
- Select **Load - SeaWiFS**. The **Product Selection For SeaWiFS File** widget will appear.
- Use the **Select** button to find a level 2 SeaWiFS data file. Note, click only ONCE on each directory selection.
- Select a file and click the **Okay** button. The **Product Selection For SeaWiFS File** widget will expand and display attributes pertaining to the SeaWiFS data file. SeaWiFS data files are saved in HDF (Heirarchical Data Format).
- Have a look at the information displayed. This includes the file type, image dimensions, possible sample rates, and a list of selectable products.
- Use the sliders to select 5 pixels and 5 lines as the sampling rate.
- Select **nLw_555** and one other product.
- Select the **Load** button. A **Band List Selection** widget appears with the two products loaded as separate data bands. Product information is displayed below the band list.
- Select each of the bands from the list in turn and note the changes to the product information. The data is stored in "raw" form, and may be transformed to a geophysical product by rescaling. The slope and intercept provide the information for the rescaling.
- Select the nLw_555 products then select the **Display** button. Select the chlor product and display it as well. If you are using an embedded IDL licence there is a limitation on the number of colours able to be

displayed. The way in which the machine is set up will control the way in which the correct colour pallette may be applied.

Note that we selected a sub-sampling rate of one-in-five lines and pixels. The displayed images are 25 times smaller than the complete data set.

Image Functions menu

The default colour pallette is a grey scale. We will now look at the various features available in the **Functions** menu of each image window.

- Select **Colour LUT -> Load Colour** . Select a few colours from the list to see the effects.
- Select **Coastline**.
- Select **Colour Bar -> On**.
- Select **Cursor Position**. Mouse around in the image region to find the range of chlorophyll concentrations. What is the range of chlorophyll concentrations in this image (make a note of this!)? Experiment with the difference between **Mouse button** and **Interactive**.
- Make a note of the chlorophyll concentration of a specific pixel within the image. Make a note of the pixel and line location. Select **Spreadsheet -> GeoPhysical Data** and find the location of the pixel value you noted.
- Here we will look at ways of deciding on a better application of the colour pallette.
  - What range of concentrations does the colour bar cover?
  - What range of chlorophyll concentrations did you note earlier?

- How else could you determine the range of chlorophyll concentrations in the image?

  When the colour pallette is applied over a larger range than the data, small scale differences may not be apparent. Rescaling the image can help enhance these features. To rescale we need to select a sensible chlorophyll concentration range.

- Select **Histogram**. You will see the chlorophyll concentration range indicated here.

- Experiment with different bin sizes, different numbers of bins and different scale types to produce a "nice looking" histogram.

- Use the **plot** button to plot the histogram to the screen. Decide on a sensible range over which to rescale the image.

- Select **Rescale** and apply your new scale.

- Select **Grid**. We have looked at the SeaWiFS orbit using STK and talked about image distortion. Note the images loaded in this excercise have not been rectified.

- There is a second button in the image display window called **Setups**. This allows you to change the settings for a number of the image display functions. Under the **Setups** menu select **Grid**. Try making a few changes to the setup then select **Replace Graphics**. You will see the grid and coastline are both removed and replaced with the new grid. Reapply the coastline before trying the other **Apply Mode** options.

- Look at the **Coastline Setup**. Apply the low resolution (10 km) (**CIA DB Resolution**) coastline as an overlay. Also experiment with different sampling rates for the high resolution data base.

- Investigate the **Annotate/Blotch** functions.

- Investigate the **Zoom Window** (click in the zoom window to zoom in and out) and the **Roam Window**.

- Open the **Read and Profile** widget. You will see a cross in the main image window. You can move this cross by dragging the mouse (left button) in the **Read and Profile** window. You may also type a pixel/line or latitude/longitude position then click the **Move to lat/lon** or **Move to pixel/line** button.

- Try plotting row and column data. Use the **Profile plot setup** button to control the plot.

- Try the **Output box data** function. Note the valid data range and format controls associated with the box data. Try formats like **i8** and **f12.3** for example. Note you are able to save the block data as a text file.

  You are also able to output the geophysical data via the **Output** function. **Output** also gives you the ability to output the image data in a number of different formats.

- Select **Landmask**.

Exercise 1:

Load an image, select a region specified by us, use a zoom window to see the region and to produce an image with part of the grid label visible, rescale the image, add a colour bar, grid and coastline. Output a gif. Show us the image when it is complete.