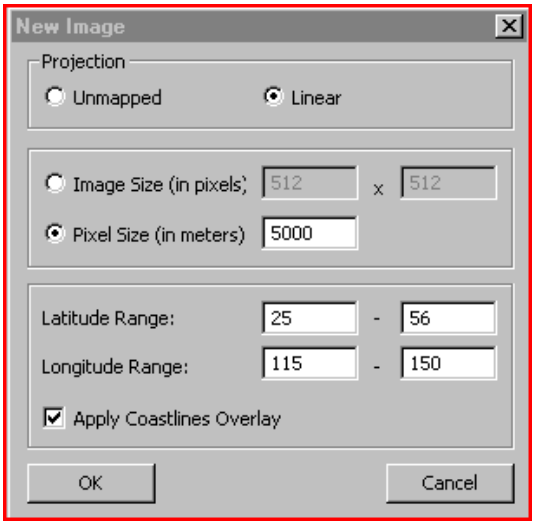
Creating Merged Full-Resolution Ocean Color/SST Time Series from Level-2 Datasets

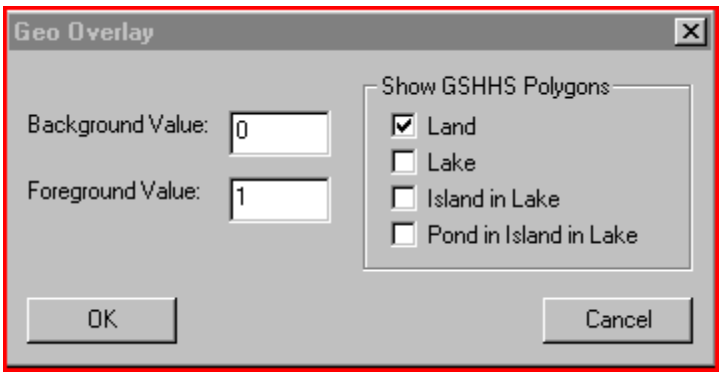
Appendix: For YOUR selected area

1 Create a standard map image

Decide what are the area limits that you are going to use, i.e. the latitude and longitude range. Remember to use negative values for the Southern and Western hemispheres. Create a standard map for your area in ***Linear*** projection using the *File-New* command in WIM (icon on the Toolbar).



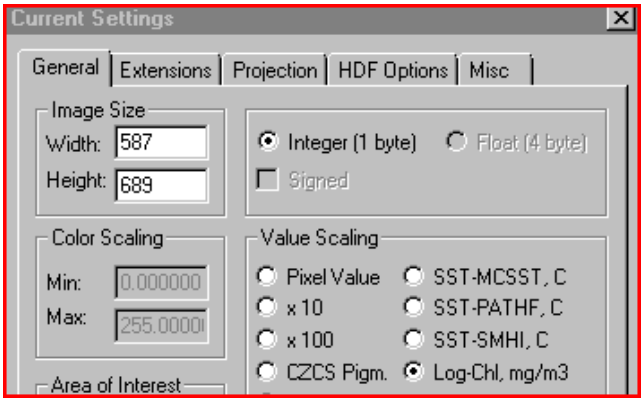
In the example above I have used *Latitude Range* 25-56 and *Longitude Range* 115-150 and pixel size 5000 m. This example is for the Sea of Japan - East Sea region and you should pick the area range **for your area of interest**. It is easiest to create a *Linear* projection map but for large areas other projections are better as they have less distortion. When using standard ocean color data use pixel size 1000 m or larger. Once you are satisfied with the area coverage, create full-resolution coastlines for your map with the *Geo-Get Map Overlay-coast_full.b* command (icon on the Toolbar) with pixel value **1** (will be **black** later).



Remember to use *Background Value* 0 and *Foreground Value* 1 and *coast_full.b*. Delete the previous image that has intermediate resolution coastlines. Fill land with pixel value 255 (white) in *Edit-Draw*.

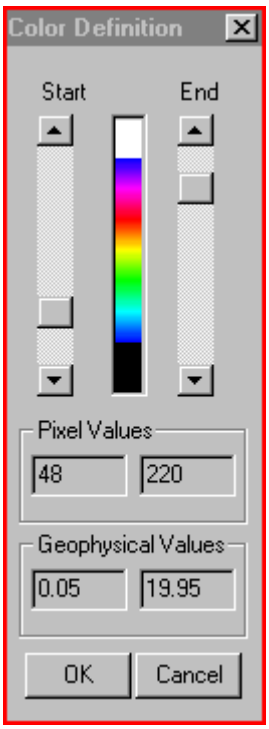
If the white color spills out of the land area, Undue it with the icon on Toolbar. Close the gaps at the intersections of the coastline and image boundaries with the *Brush* tool in *Edit-Draw* and try again to fill the land with white color. After the continents are white, you need to do the same for individual islands. Remember, to use the icon on Toolbar if you make a mistake. In the end you should have an image like that:

Save this image as HDF - not as HDF with Lat/Lon arrays! I save this sample as *NOWPAP_5km_land.hdf* . Now create annotated overlays for Chl and SST that have land in white (pixel value 255), coastlines with pixel value 1 and have a color scale (either Chl or for SST) embedded. To do that we need to set the appropriate *Value Scaling* for each image. For Chl, set the scaling to *Log-Chl* in *Current Settings* – the  icon on the Toolbar.



For SST use *SST-PATHF* scaling.

In this exercise we will create *NOWPAP_5km_chl_48_220.hdf* for Chl (pixel value range 48-220 corresponding to Chl-a concentration of 0.05-20 mg m^{-3}) and *NOWPAP_5km_sstl_48_220.hdf* for SST (pixel values 48-220 corresponding to SST 4.20-30.00 ˚C). After you have set the appropriate *Value Scaling*, use the  icon to stretch the scaling, i.e. for Chl use *Start*=48, *End*=220 (see below).



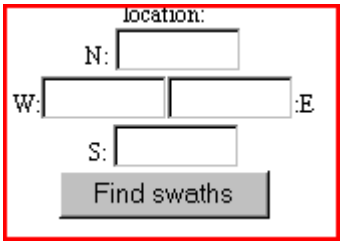
Now add color scale. To do that select a rectangular area where the color bar is going to be. Try to use land area or another area where you don't mind covering the pixels with the color bar. To create the color bar use *View-Annotate*. The last location is remembered, therefore you don't have to pick the area again if you are satisfied with the location. First use *Auto-generated Ticmarks*. You can then select your own ticmarks (separated by comma!), e.g. 0.05,0.1,0.2,0.5,1,2,5,10,20. The output is like that:

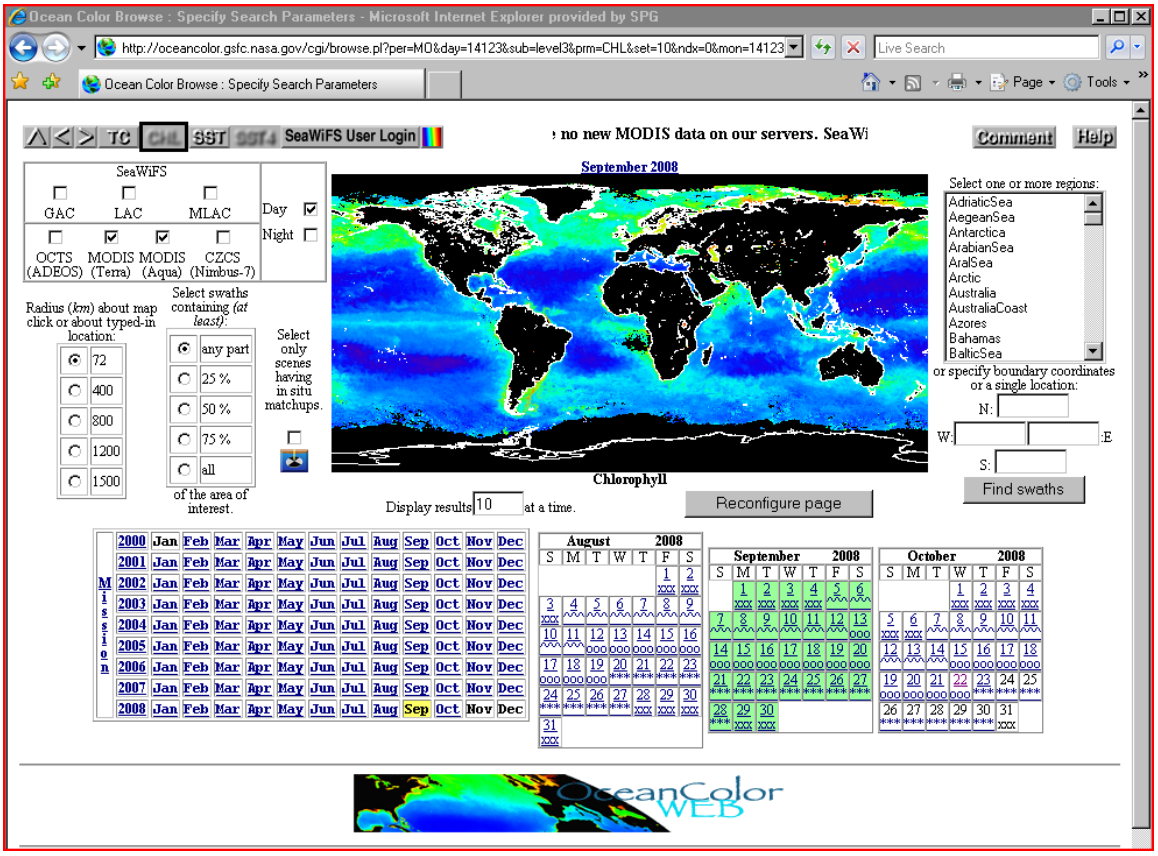
If you are satisfied with the result, save the file as HDF (not as HDF with Lat/Lon arrays). I save my results as *NOWPAP_5km_chl_48_220.hdf* for Chl (pixel value range 48-220 corresponding to Chl-a concentration of 0.05-20 mg m^{-3}) and *NOWPAP_5km_sstl_48_220.hdf* for SST (pixel values 48-220 corresponding to SST 4.2-30.0 ˚C). These files are in *Sat\MODISA\L2\JES* but you should create your own files.

2 Order the L2 data (skip if getting from DVD)

Order Aqua-MODIS level-2 data for 2008 in YOUR range of latitude and longitude from http://oceancolor.gsfc.nasa.gov/cgi/browse.pl?sen=am.

Select the sensor, e.g. MODIS (Aqua), the time period (e.g. any month) and the area of interest. It is better to specify a slightly larger area than are your map limits when ordering the data.





Click “Find Swaths” and follow the instructions. Respond immediately to email to confirm order. Wait for email about data being stored and then final email about “order is ready for pickup” email.

3 Download the L2 data (or get from DVD)

Make a directory structure and always follow the directory structure for your data! Use the following directory structure: *DISK:\sat\YourArea\2008\A2008*. For example, in this example I use *JES* as my *YourArea*. Under *JES* I have different years, e.g. 2007, 2008, etc. Under each year I have sensors, like *A2008* (Aqua), *S2008* (SeaWiFS), *T2008* (Terra), etc. *A2008_SST* for Aqua SST and *T2008_SST* for Terra SST. Under each of those I have directories 0, 1, 2, 3 for days 0-99, 100-199, 200-299, 300-366, respectively.

C:\Sat\JES\

2008\

A2008\2

A2008_SST\2

For example, download the compressed L2 data files to a directory *2008\A2008\2* and L2 SST files to a directory *2008\A2008_SST\2*. You can also download them to a temporary folder and then move to these folders. I assume here that my ordered files are for days 200-299 of year 2008; therefore I put them into separate folders named *2* under *A2008* and *A2008_SST*, respectively.

Uncompress with bzip2 (separately in both *A2008* and *A2008_SST* directories:

```
bzip2 –d  *.bz2
```

Run *wam_compress_hdf* (in both directories) to eliminate files with no useable data and internally compress the HDF files:

```
wam_compress_hdf  *.hdf
```

4 Remap and make daily composites

Map level-2 data to your standard map, e.g. *NOWPAP_5km_chl_48_220.hdf* for Chl-a:

```
wam_l2_map A2008\2\A2008*LAC.x.hdf  NOWPAP_5km_chl_48_220.hdf 10 18
```

For SST data:

```
wam_l2_map A2008_SST\2\A2008*LAC_SST.x.hdf NOWPAP_5km_sst_48_255.hdf 10 18
```

Make directories for the mapped Chl and SST data and move the mapped files:

```
cd 2008
mkdir A2008_chl_day
move A2008*chl_a_mapped.hdf A2008_chl_day

mkdir A2008_sst_day
move A2008*SST_mapped.hdf A2008_sst_day
```

If you have multiple sensors, do the same for each.

5 Merge multiple sensors (skip if you have 1 sensor)

If you have data from multiple sensors you need to merge multiple sensors to have better coverage. I consider SeaWiFS GAC and MLAC as separate sensors: MLAC has better resolution but less coverage whereas GAC gas better coverage but lower resolution. Therefore, *SeaWiFS* may be a merged from the GAC and LAC products. The following example assumes that you have Aqua and SeaWiFS 1-day mapped composites that you want to merge:

```
wam_composite_2sensors A2008_chl_day\A*mapped.hdf S2008_chl_day\S2*mapped.hdf
NOWPAP_5km_chl_48_220.hdf 10 18
```

6 Make higher level composites

Using daily mapped composites you can make any longer-period composites, e.g. 5-day or monthly composites.

wam_composite_2x A2008_chl_day\A*mapped.hdf 5 NOWPAP_5km_chl_48_220.hdf 10 18
wam_composite_month A2008_chl_day\A*mapped.hdf NOWPAP_5km_chl_48_220.hdf 10 18
or
wam_composite_month A2008_chl_day\A*mapped.hdf NOWPAP_5km_chl_48_220.hdf 10 18 chl1_white_end.lut 48 220
wam_composite_month A2008_sst_day\A*mapped.hdf NOWPAP_5km_sst_48_255.hdf 10 18 hsl256_black_white.lut 48 255

The results should look like below. Note that we use different LUT files for Chl and SST (*chl1_white_end.lut* for Chl and *hsl256_black_white.lut* for SST).