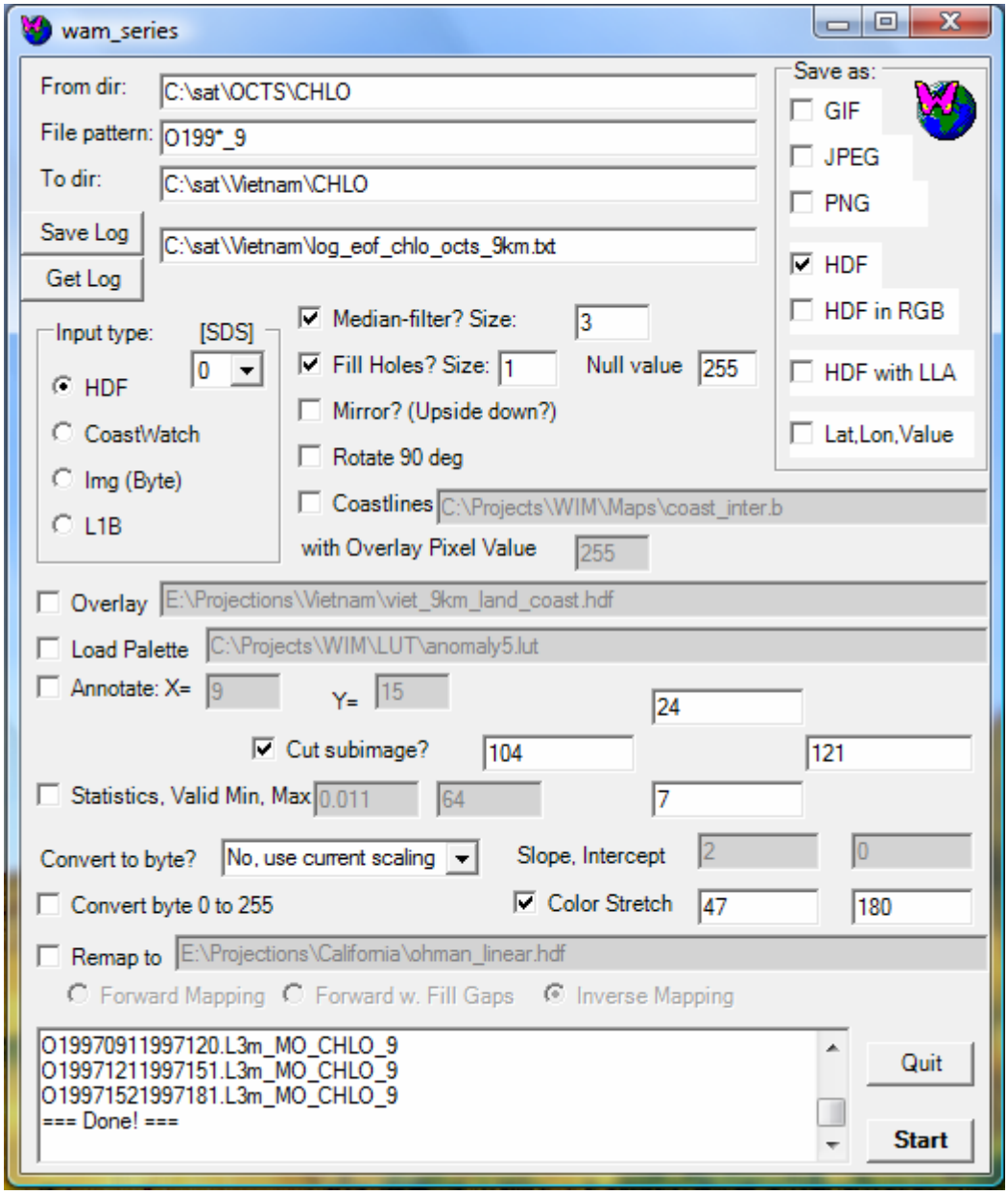
EOF (Empirical Orthogonal Function) and PCA (Principal Component) analysis with WAM

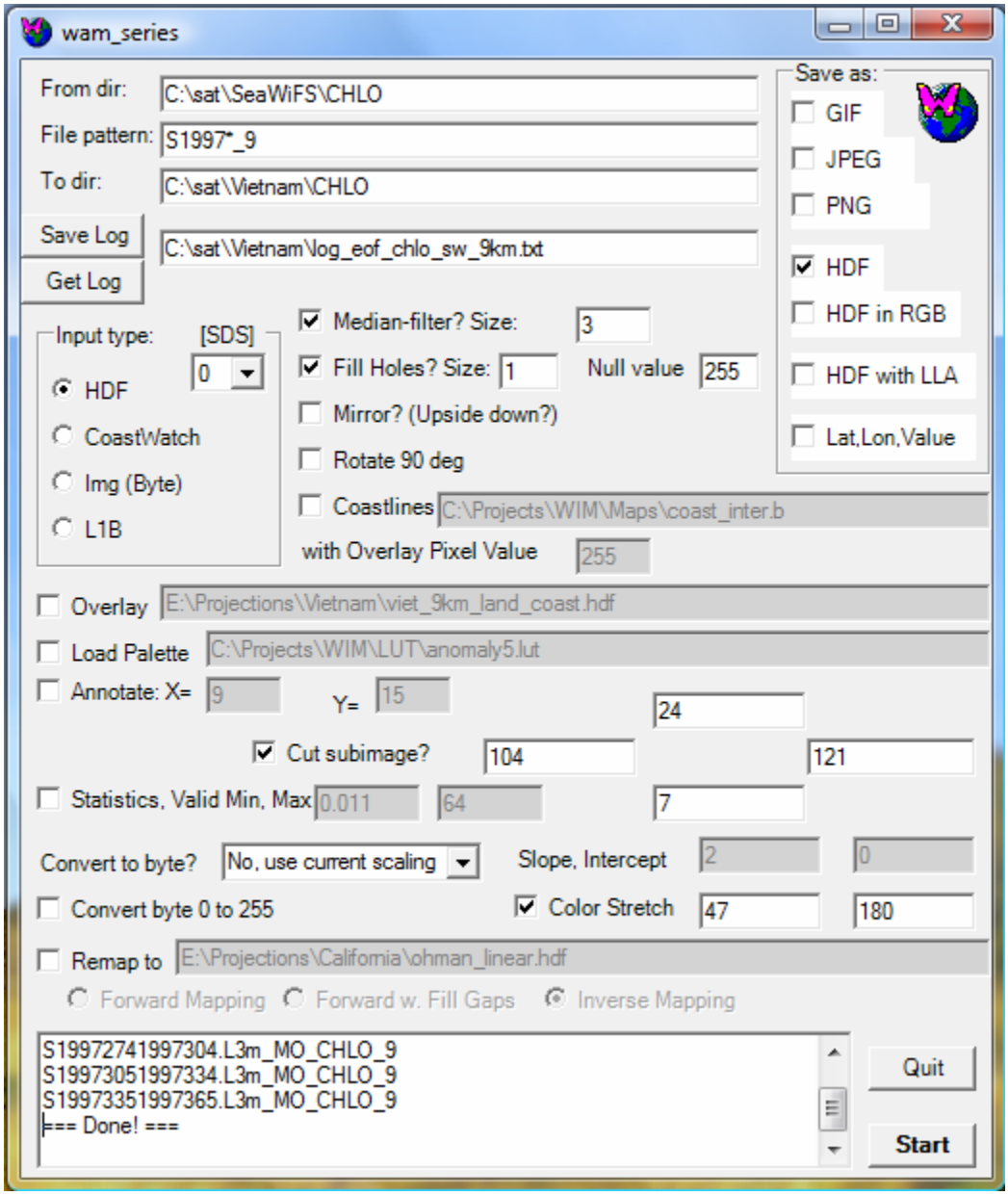
1 Appendix - Application to South China Sea

1. Using *wam_series* cut out subsets for the range 7-24 ˚ latitude and 104-121 ˚ longitude. Create a directory CHLO, move the created Cut files there.

a) OCTS Level-3 monthly data



b) SeaWiFS Level-3 monthly data



2. Create maps

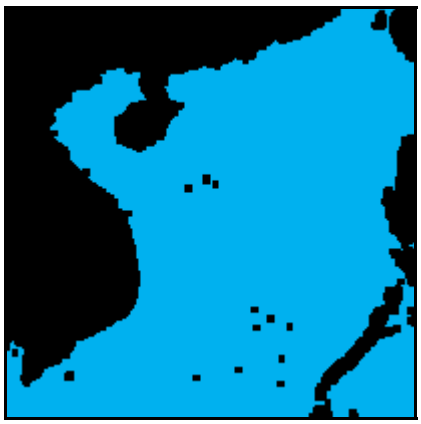
- Using one of the cut HDF images create coastlines with WIM (*Geo-Get Overlay-coast_full.b - backround*=0, *foreground*=255, land checked

- Fill land with pixel value 255 using *Edit-Draw-Fill*. Be careful with spilling of the masked pixels to outside of the contours. You can fill leaking areas with *Edit-Draw* brush. Save as *viet_9km_land.hdf*.

- Create land mask with coastlines: create coastlines with pixel value 1, overlay on top of *viet_9km_land_coast.hdf.*

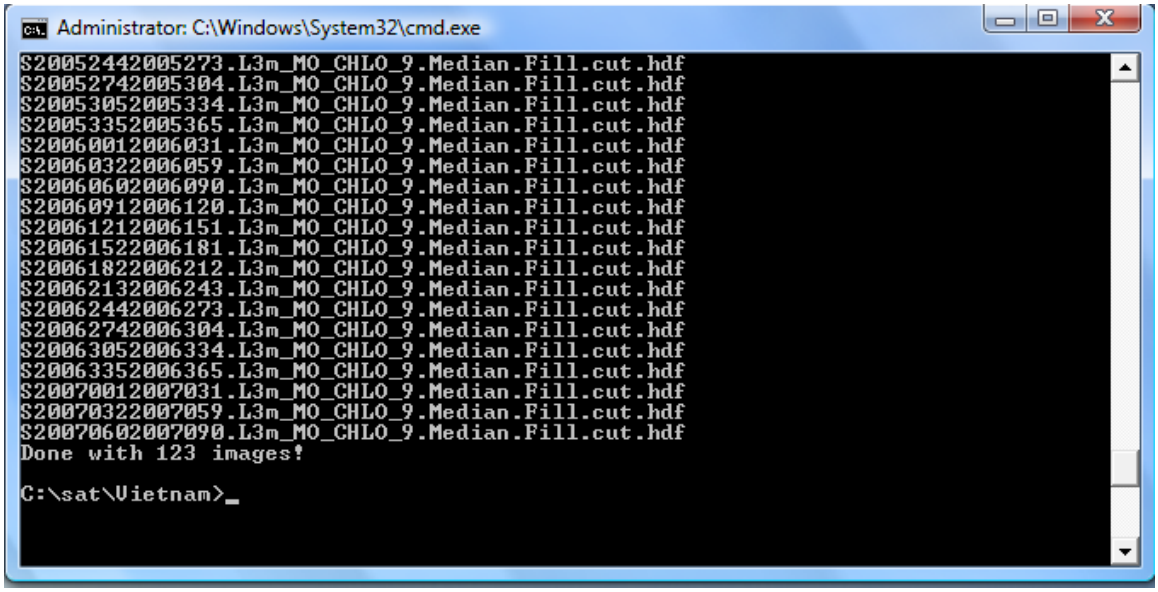
- Create dilated land-mask: use *Edge-Dilate*-1 on *viet_9km_land.hdf*, save as *viet_9km_land_dilated.hdf.*

- Create sea-mask: use *viet_9km_land_dilated.hdf*, replace pixels 0 to 0 with 1 (*Transf-Replace Values*) and replace pixels 255 to 255 with 0. Save as *viet_9km_sea.hdf.*



3. Run *wam_anomaly*; be careful to specify the location of your LUT file and *viet_9km_land_dilated.hdf* file. It is easiest if you copy the LUT files *anomaly5.lut* and *chl1_white_end.lut* to your working directory.

```
wam_anomaly CHLO\*.hdf 12 anomaly5.lut false viet_9km_land_dilated.hdf no 8 8
```



4. Create directory CHLO_Anomaly, move all anomaly files there

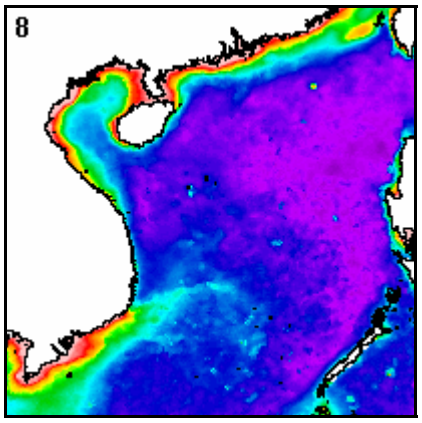
5. Rename *Means* and *ValidCounts* filenames

6. Make directory *CHLO_Means*, move *Means.hdf* and *ValidCounts.hdf* there.

7. Create annotated and overlaid monthly mean images

wam_overlay CHLO_Means\Means.hdf viet_9km_land_coast.hdf chl1_white_end.lut

August (month 8) image is shown below.



8. Run wam_eof

wam_eof CHLO_Anomaly*anomaly.hdf viet_9km_sea.hdf

9. Rename Eigenvalues.csv, Eigenvectors.csv, PC_anomaly.hdf; create a directory CHLO_EOF, move these files there

10. Create annotated and overlaid PC images

wam_overlay CHLO_EOF\PC_anomaly.hdf viet_9km_land_coast.hdf anomaly5.lut 1 255

Principal components 1 and 5 are shown below.