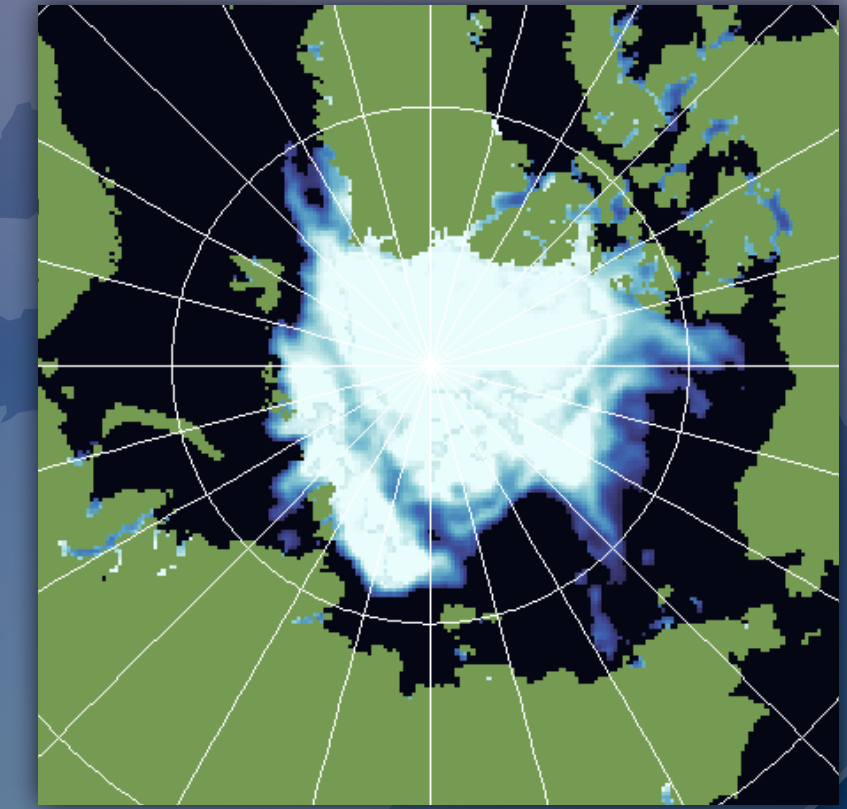
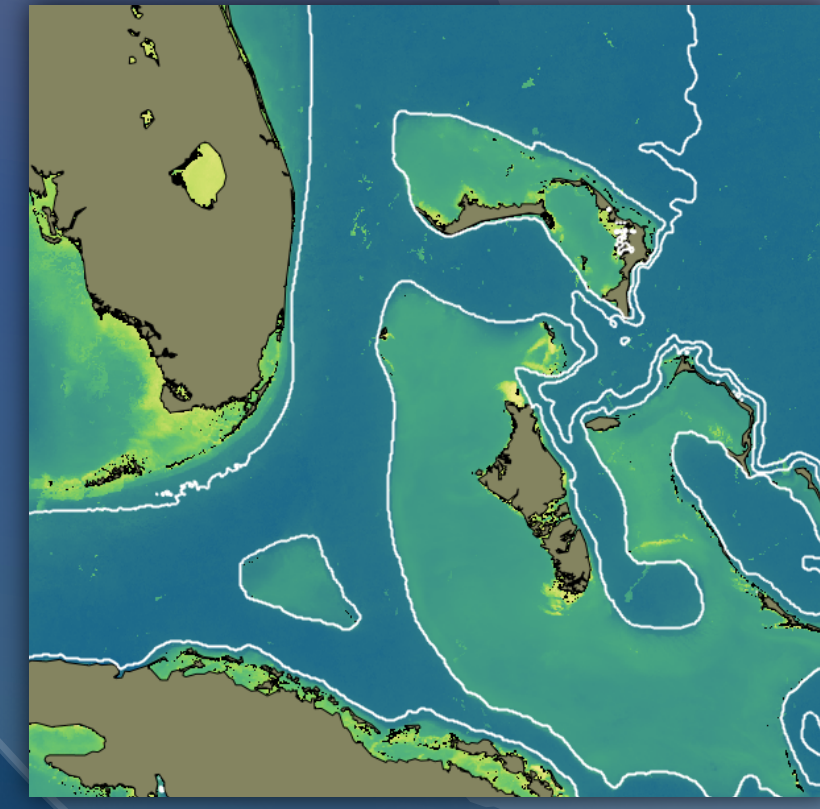
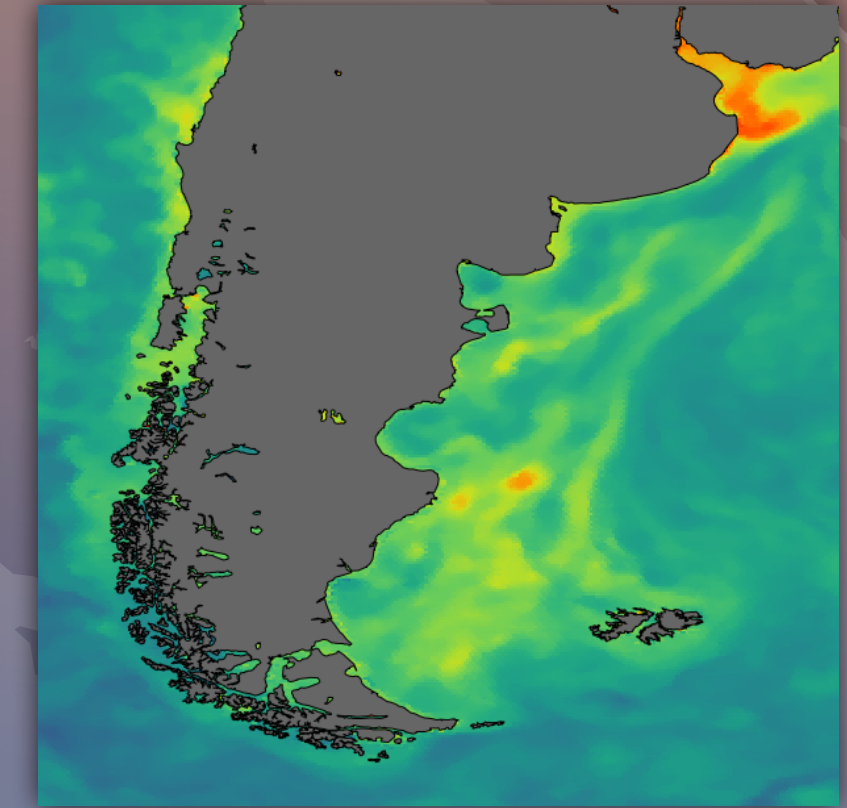
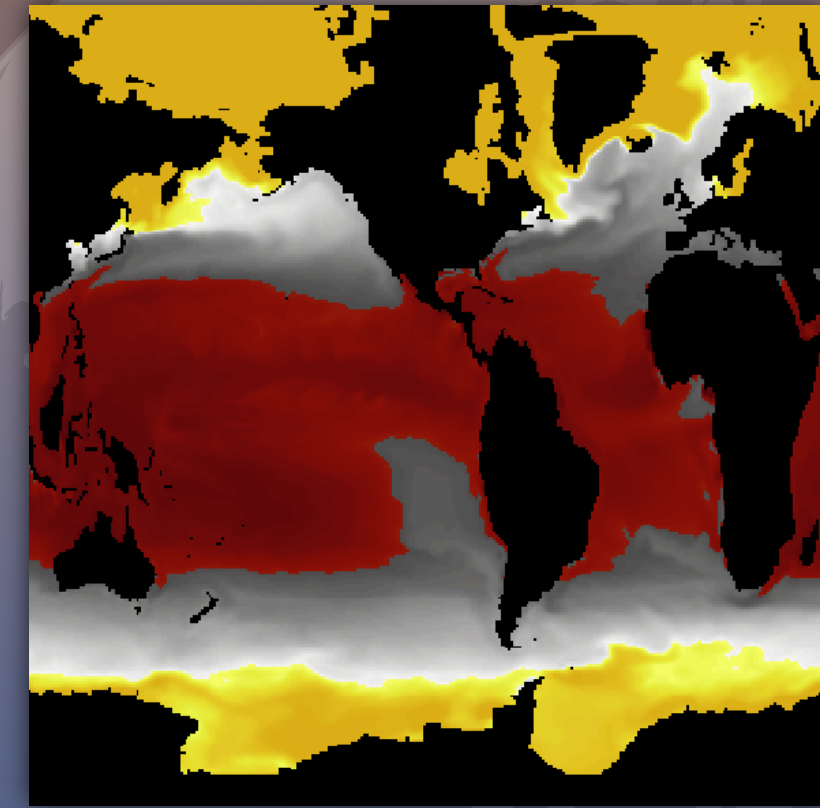


# The CoastWatch Utilities 2024 Update

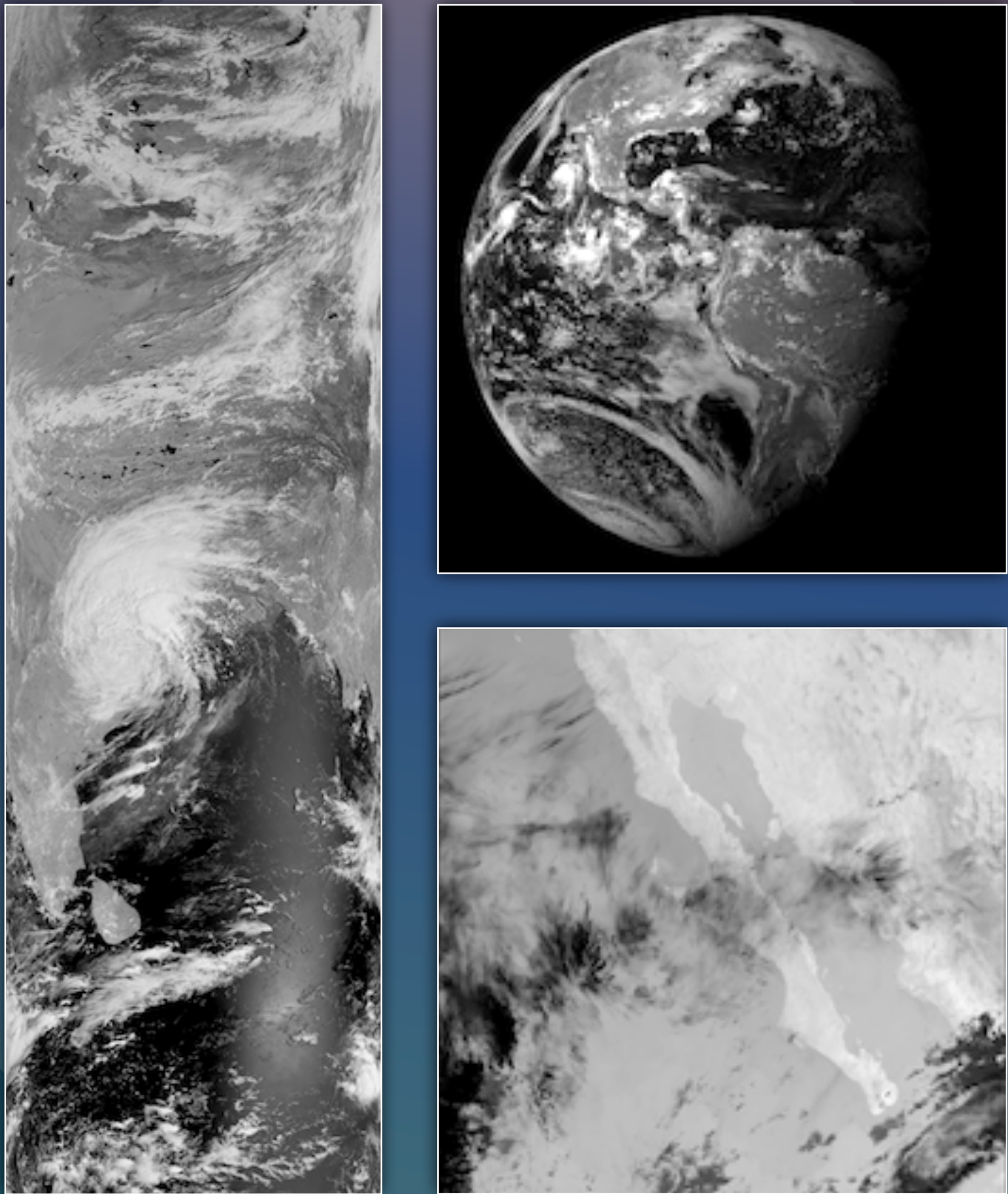
Peter Hollemans

Terrenus Earth Sciences & RIVA Solutions for  
NOAA/NESDIS CoastWatch Central Operations

CoastWatch Annual Meeting  
College Park, MD, May 2024



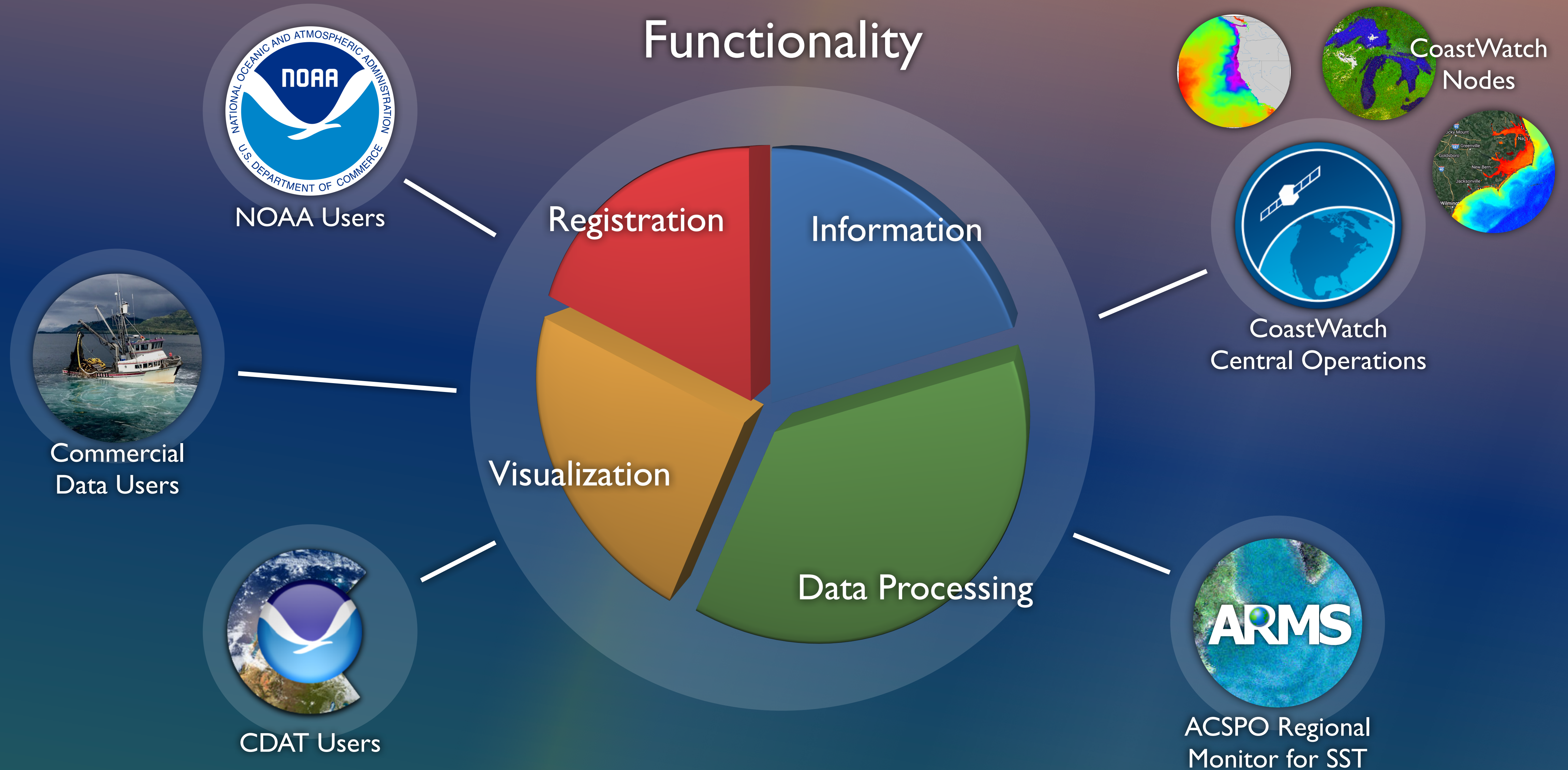
# The CoastWatch Utilities are designed to process and transform satellite data in useful ways for data producers and users.



The screenshot displays the CoastWatch Data Analysis Tool interface. The main window shows a map of the North Atlantic region with a color-coded overlay representing sea surface temperature (SST). A dialog box titled "Select the overlay properties" is open, showing settings for a "cloud" mask variable, including drawing color, transparency, and integer mask value. To the right, a histogram shows the distribution of the data, and an "Enhancement Range" slider is set from 0.0 to 22.0. Below the map, a terminal window displays the output of the "cwstats" command, providing a summary of the data statistics.

Variable	Count	Valid	Min	Max	Mean	Stdev	Median
swath_struct	14	14	-101	108	-5.857143	69.481439	1.5
swath_bounds	426	426	0	5952.133	2986.628026	1728.605016	2999.5
swath_lat	480	480	-1032.669	2033.858	6.873492	114.423444	-0
swath_lon	480	480	-8050.79	16628.578	28.824881	892.041327	-0
avhrr_ch1	123000	123000	0.65	84.59	14.489908	11.56327	10.52
avhrr_ch2	123000	123000	0.63	85.88	14.743629	11.234121	11.75
avhrr_ch3	123000	0	NaN	NaN	NaN	NaN	NaN
avhrr_ch3a	123000	123000	-0.07	53.46	11.415932	9.88044	8.42
avhrr_ch4	123000	123000	-69.06	31.65	-1.914139	17.144276	0.1
avhrr_ch5	123000	123000	-70.35	28.35	-2.960828	16.684404	-0.39
cloud	123000	114250	1	127	59.764604	44.122509	31
hrpt_header	6180	5999	3	1023	407.514586	372.950589	488
rel_azimuth	123000	123000	15.05	171.36	89.155044	54.499502	66.51
sat_zenith	123000	123000	0.28	68.65	32.384955	19.312518	31.85
sst	123000	123000	-69.7	47.69	1.265105	18.56652	2.2
sun_zenith	123000	123000	33.49	91.5	62.174362	11.896446	61.68

The software is actively used by a number of groups and forms an essential part of data processing systems.



New versions are created twice a year and distributed from the CoastWatch central operations website.



~6-12 month release  
as needed

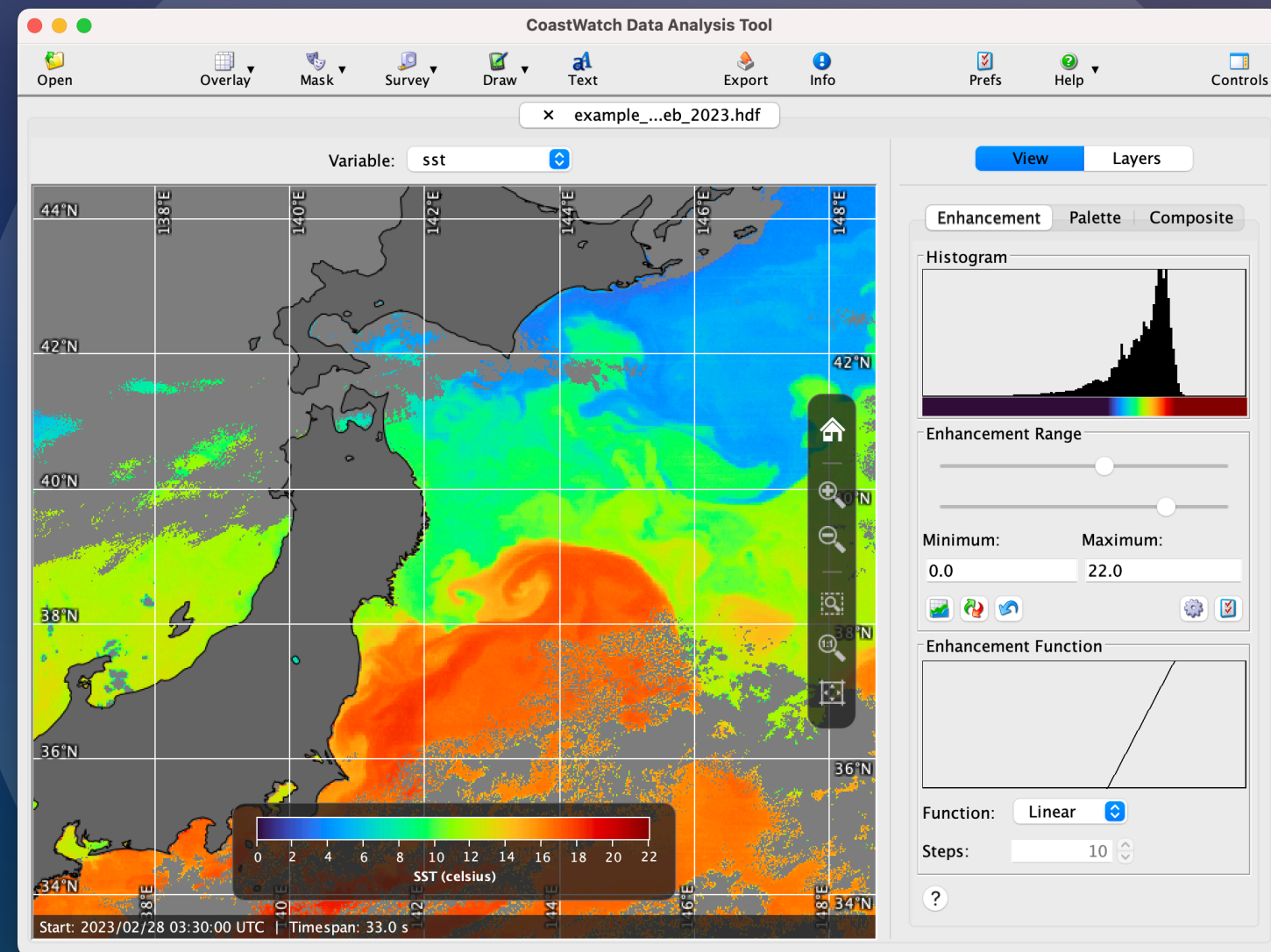


Installable packages: [coastwatch.noaa.gov](http://coastwatch.noaa.gov) (look in Data Tools)

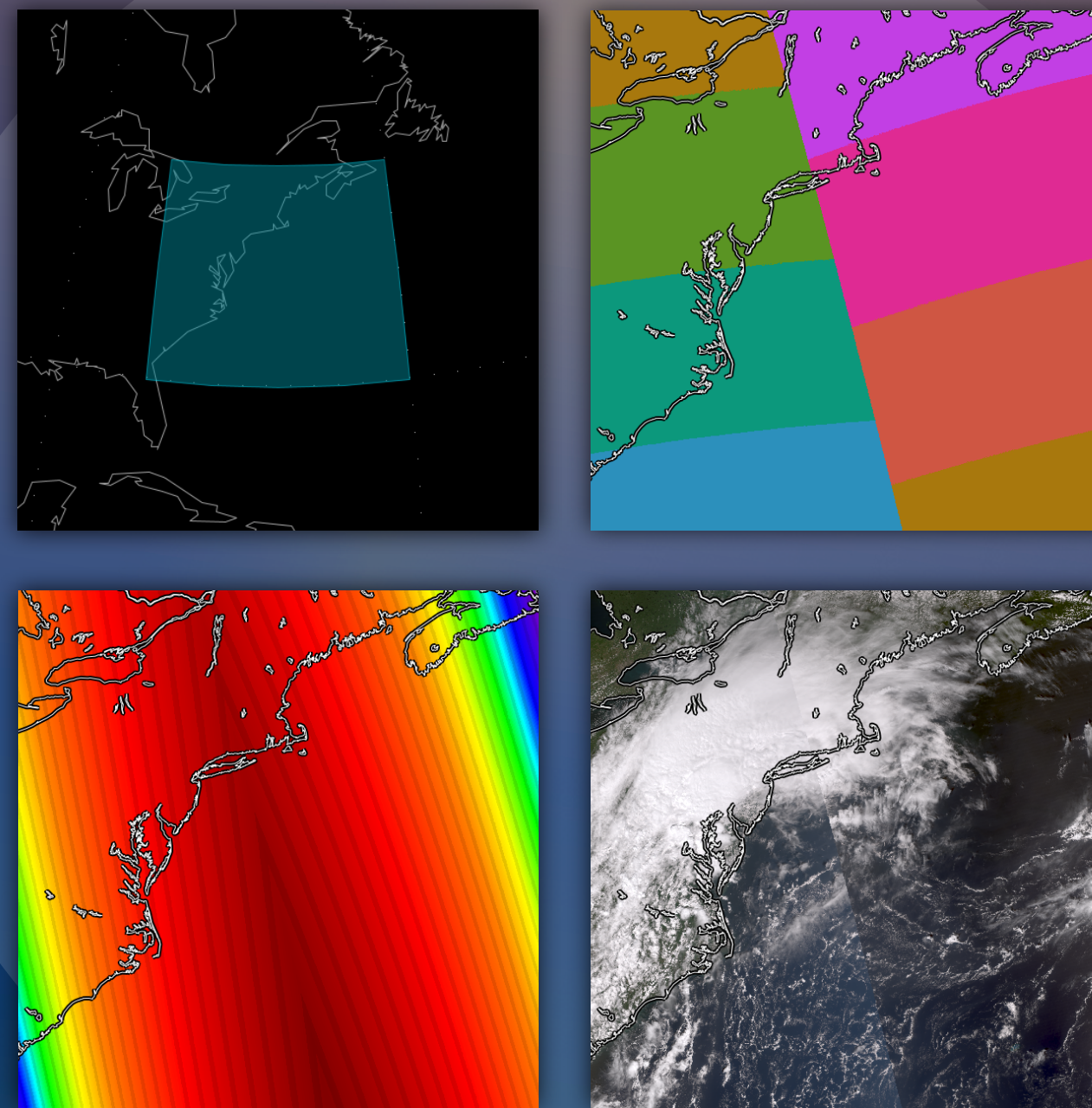
Open source: [github.com/phollemans/cwutils](https://github.com/phollemans/cwutils)

# The latest release includes major improvements.

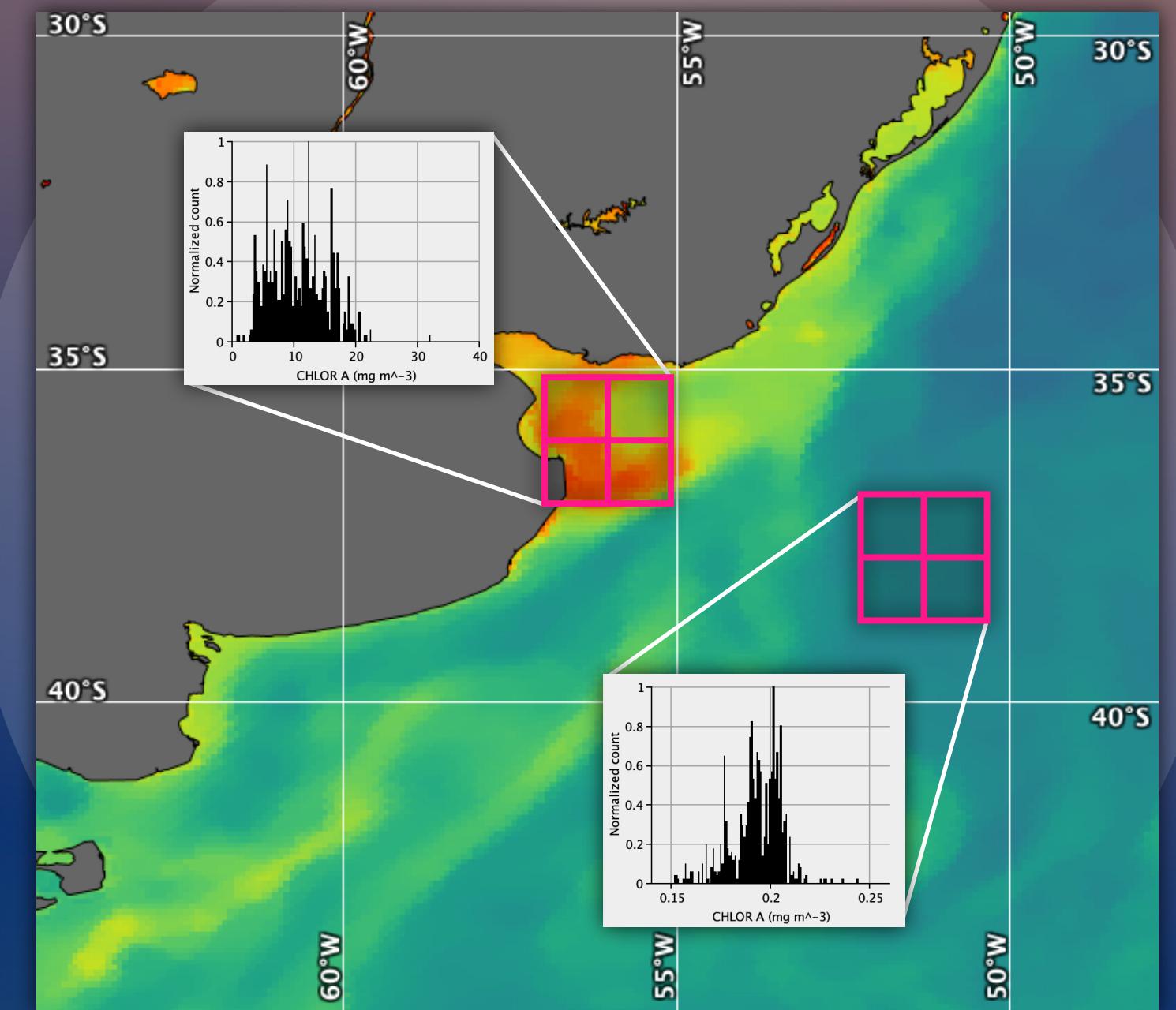
## Release 4.0.0 — May 2024



Overhaul of the CDAT user interface to improve usability



Faster / more accurate temporal compositing







New sampling options to compute window statistics

Also: New GeoTIFF output options, Windows PATH setting, optimized multithreading

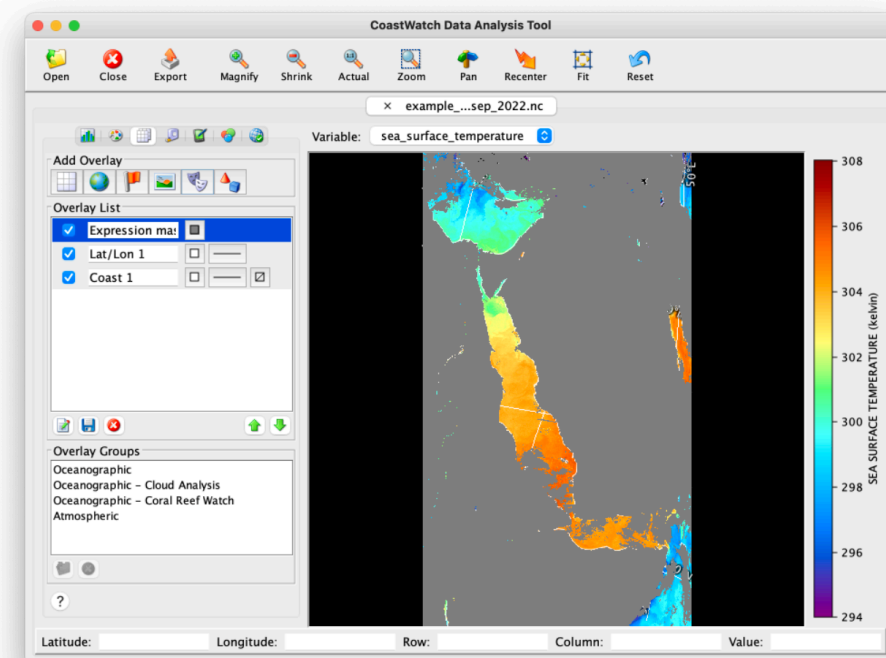
# The CoastWatch Utilities online course is now accessible from CDAT and the CoastWatch Learning Portal.

## Data Overlays

CDAT shows graphics in the data view using overlays, which are layered on top of the data image. To show a latitude/longitude grid, coastlines, and to mask low quality SST data, click the  **Overlay Layers** control tab, then:

1. Click the  **Coast** button to add a coastline.
2. Click the  **Grid** button, and then **Lat/Lon** for a latitude/longitude grid.
3. Click the  **Mask** button, and then **Expression mask**. An overlay properties window will appear – type `quality_level < 5` in the mask expression text field, then click **OK**.

Your CDAT window will look similar to the following:

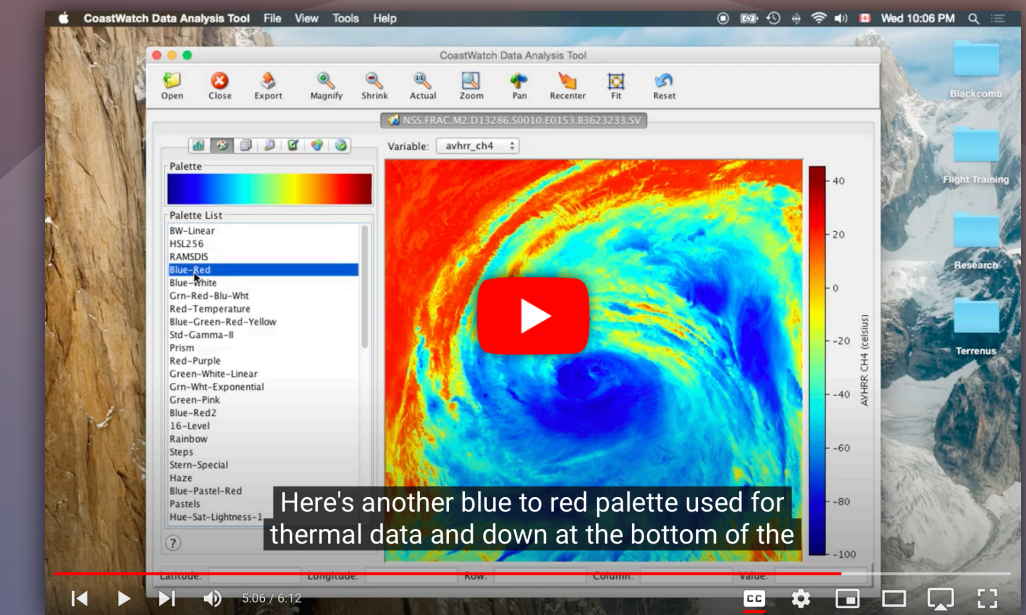
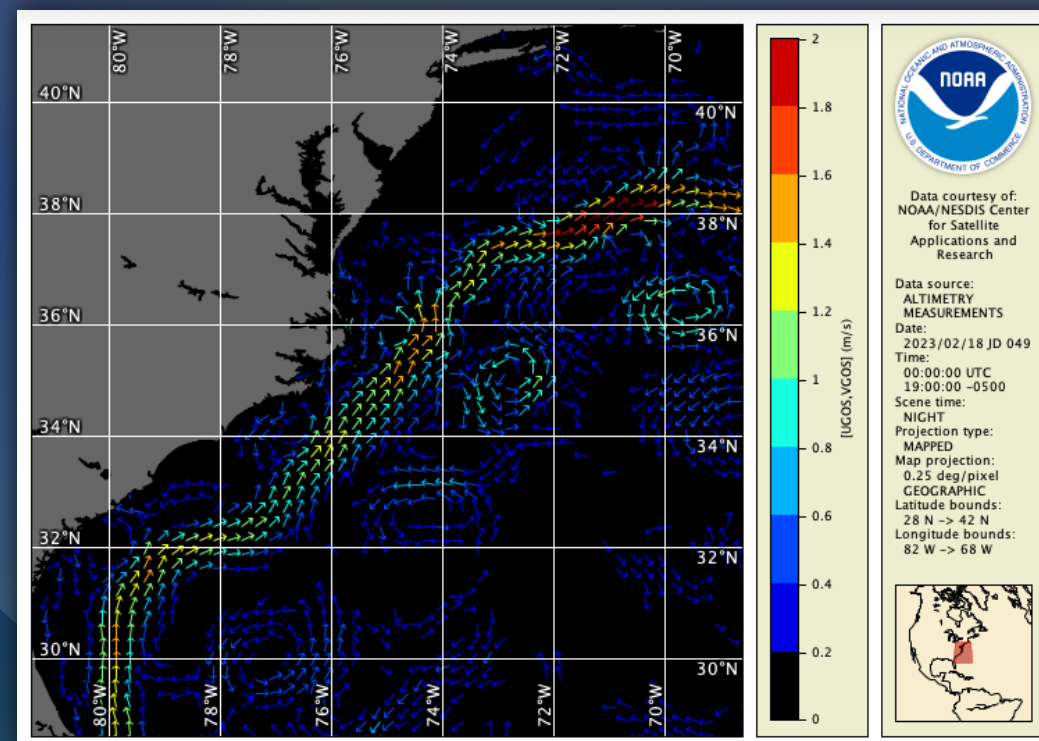


```

phollemas$ cwinfo example_altim_surface_curr_feb_2023.nc
Contents of example_altim_surface_curr_feb_2023.nc

Global information:
Data source:  Altimetry measurements
Date:         2023/02/18 JD 049
Time:        00:00:00 UTC
Scene time:  day/night
Projection type: mapped
Transform ident: noaa.coastwatch.util.trans.GeographicProjection
Map projection: Geographic
Map affine:    0 0.25 0.25 0 -179.88 -89.88
Spheroid:     WGS 84
Origin:       NOAA/NESDIS Center for Satellite Applications and Research
Format:       Java-NetCDF interface (NetCDF-4 user.nc2_dataset.conv.CF1Convention)
Reader ident: noaa.coastwatch.io.CommonDataModelNCReader

Variable information:
Variable  Type  Dimensions  Units  Scale  Offset
sla       short  720x1440   m      0.0001 -0
ugos      int    720x1440   m/s    0.0001 -0
vgos      int    720x1440   m/s    0.0001 -0
time      double 1          days since 1950-01-01 00:00:00
latitude  float  720       degrees_north
longitude float  1440      degrees_east
    
```



**Question 3** 1 pts

The `cwmaster` tool can read and write map projection master templates for:

- Polar Stereographic
- Albers Equal Area
- Mercator
- Icosahedral

**Bonus exercises:**

- Customize the SST processing script to produce a different output file format with your own preferred set of geographic overlays. The `cwrenderer` manual page will be useful.
- Use `cwmaster` to create your own master projection template and use that in the script instead of the one provided.
- Use your own ESRI shapefile data for the aquaculture enclosure polygons. You could create a custom shapefile visually using the [UCLA click2shp](#) web tool.
- Watch a [YouTube video](#) showing the use of a script that composites and renders a year of chlorophyll data.

Step by step use of CDAT with screen captures

Example command line calls and output

Assignments, quizzes, bonus exercises, and videos

The online course was presented at three events during 2023 and received favourable feedback.



Course introduction (7 mins):  
<https://youtu.be/RJ8wqwYf8RU>

- Third International Operational Satellite Oceanography Symposium (OSOS), June 2023, Busan, South Korea ✓
- Operational Satellite Oceanography Workshop (OSOW), November 2023 (Online) ✓
- 20th Korea-Japan/11th Asia Ocean Color Workshop, December 2023, Nagoya University, Japan ✓