

Overview of fisheries habitat prediction using the Pelagic Habitat Analysis Module (PHAM)

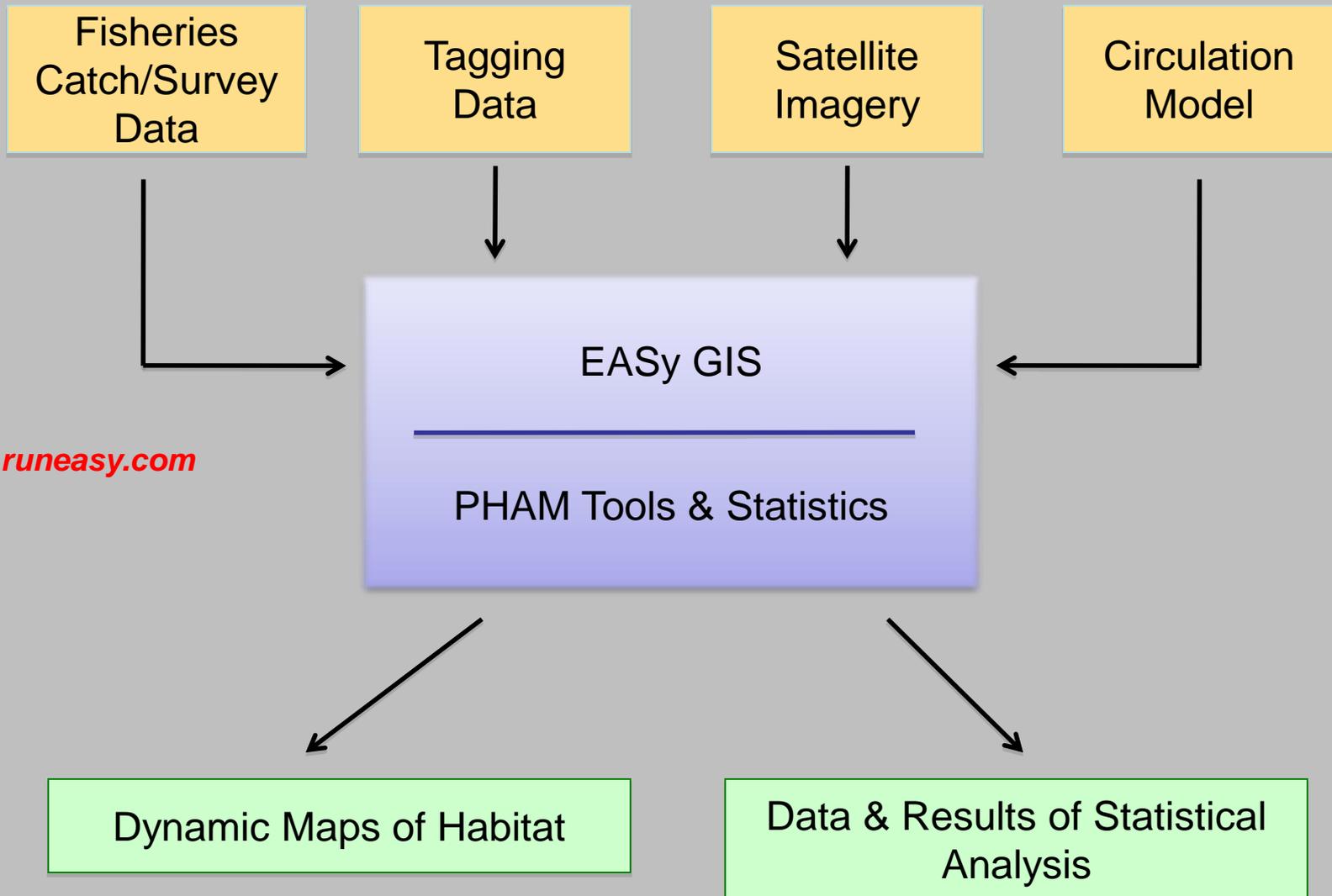


D A Kiefer, **E M Armstrong**, D P Harrison, M G Hinton, S Kohin, S Snyder, F J O'Brien

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Government sponsorship acknowledged



Pelagic Habitat Analysis Module (PHAM)



Improving Fisheries Management

Stock Assessment / By-catch

Tuna of the EPO

- Important Commercial Species (\$2-3 B annual revenues Eastern Pacific)
- Stock assessment models only provide a reliable estimate of recruitment several years after the fact
- Very little (if any) environmental data used in stock assessment models

Sharks of the California Current

- Stock assessment model for Thresher Sharks – Input from PHAM GAM
- By-catch Management – Where does habitat overlap commercial fishing?
- Distribution of pregnant females



Mako Shark (*Isurus oxyrinchus*)



Blue Shark (*Prionace glauca*),



Common Thresher Shark (*Alopias vulpinus*)

Fisheries Data

- Survey Data
- Commercial Catch Data
- Vessel Logbook Data
- Recreational Fishing Data
- Tagging data (not yet)

Environmental Characteristics

Satellite Imagery

- Seawifs Chl
- Modis Chl
- Modis SST
- GHRSSST
- AVHRR SST
- AVISO SSH
- Quikscatt Winds
- NOAA Coastwatch Frontal Probability
- NSA JPL Frontal Probability
- EPTO Bathymetry

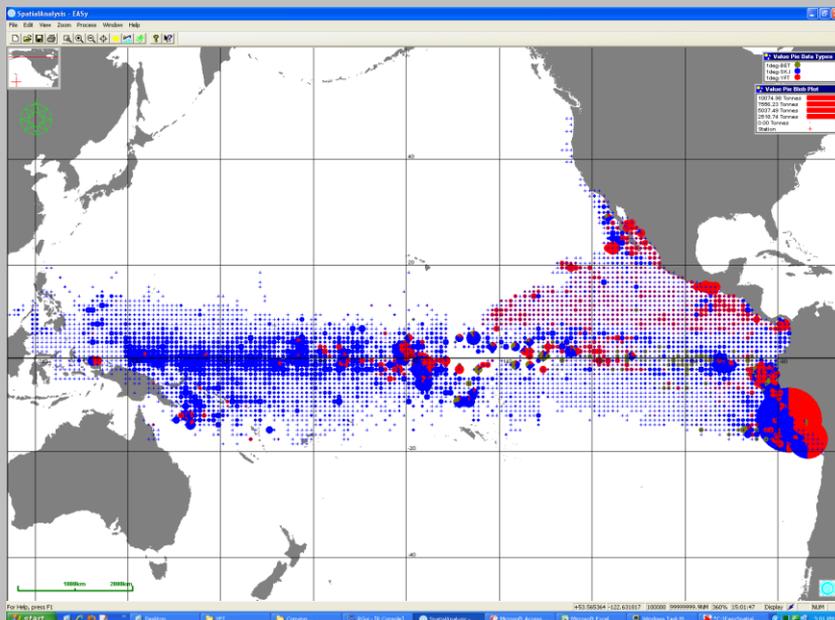


NASA ECCO 2 Model

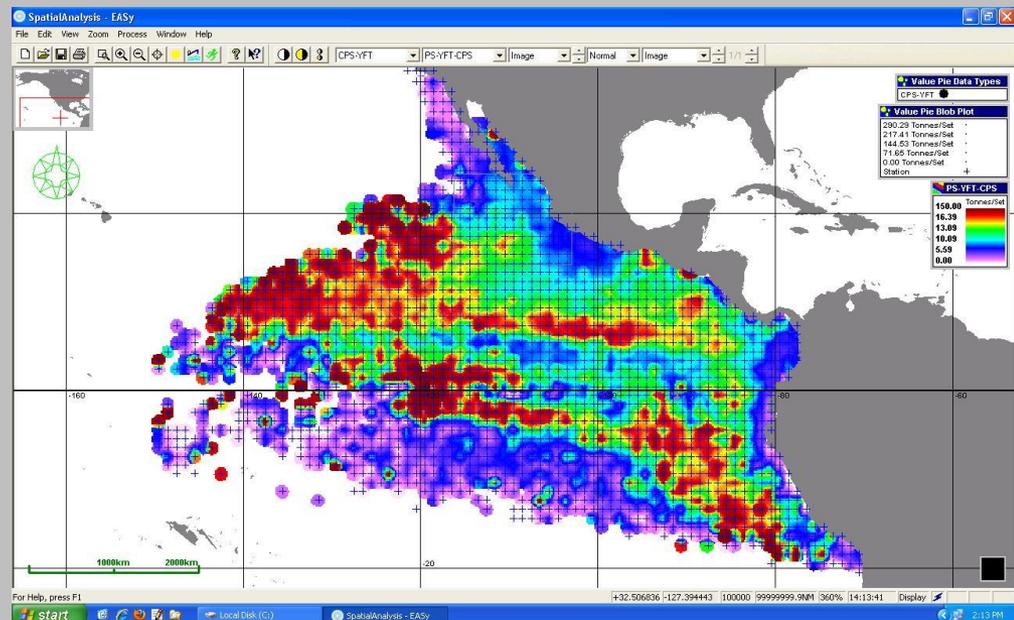
- Mixed Layer Depth
- SST
- Temperature at Depth
- SSH
- Sea Surface Salinity
- Currents

EASy Built In

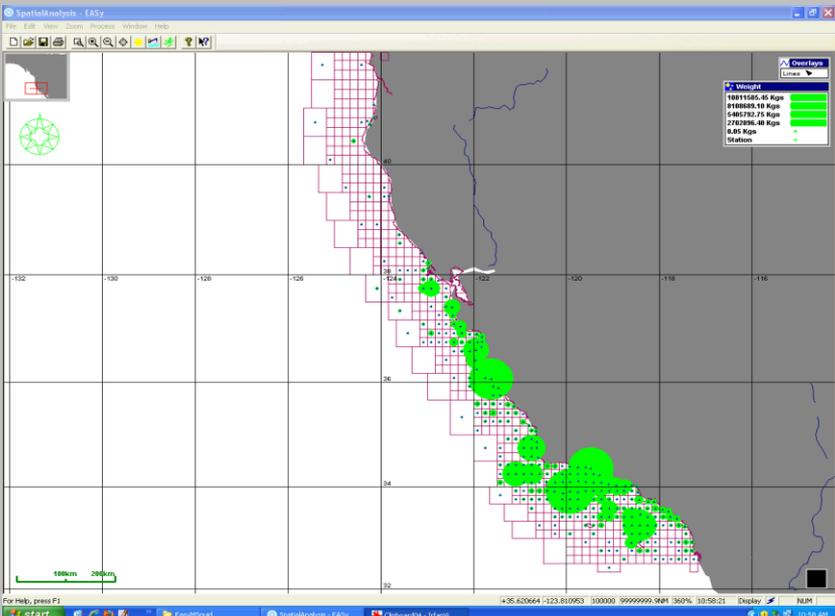
- Earth Magnetic Field
- Longitude
- Latitude
- Month



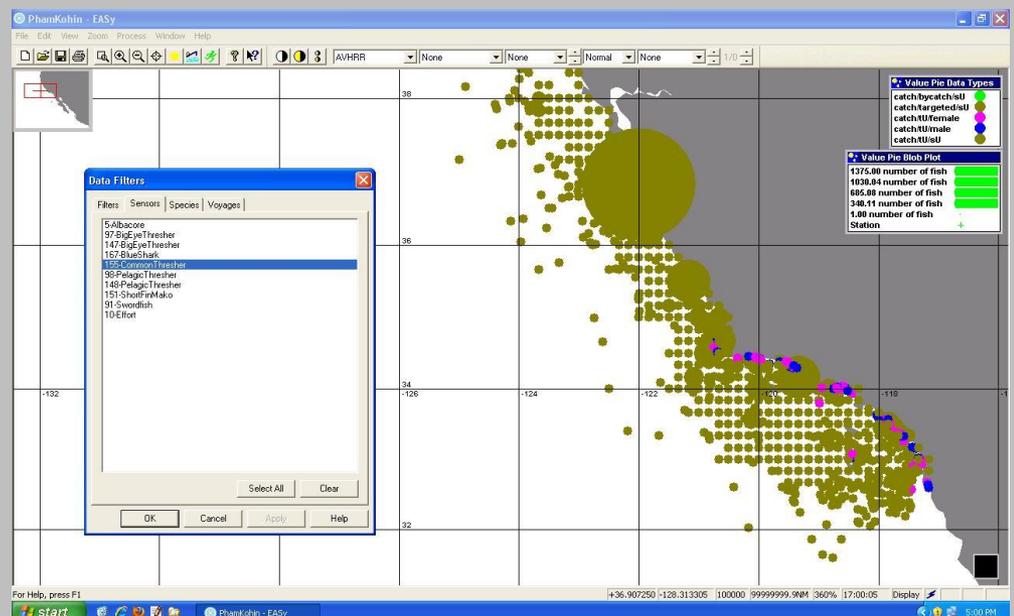
Average catch per set (Purse Seine) Tuna, IATTC 35yrs



Average catch per set (Purse Seine) for Yellowfin Tuna, IATTC 35 Yr Timeseries

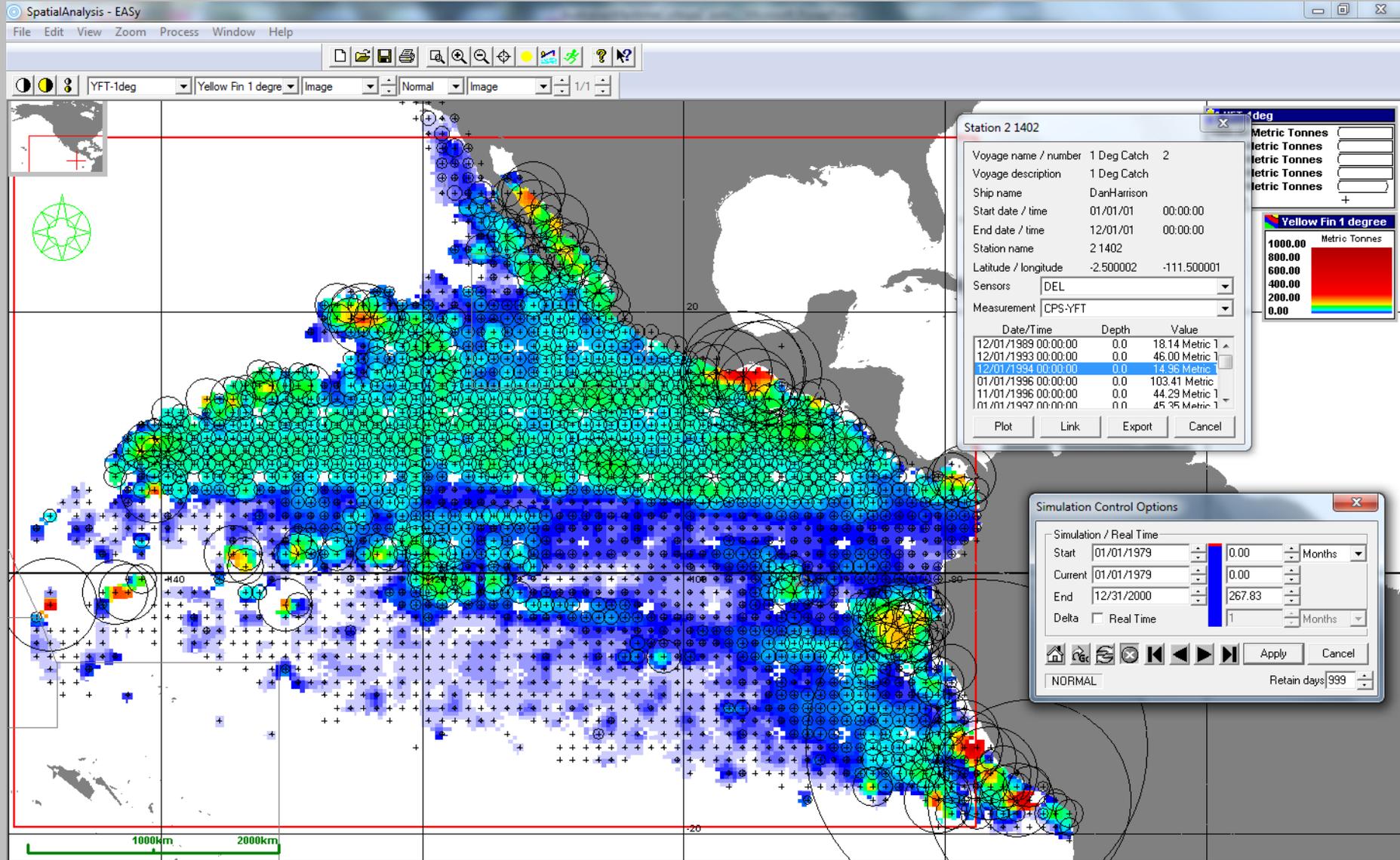


Average Catch Market Squid



Average Catch Number by Sex – Common Thresher Shark, SWFSC

EASy Screen of Pelagic Habitat Module



Station 2 1402

Voyage name / number 1 Deg Catch 2
 Voyage description 1 Deg Catch
 Ship name DanHarrison
 Start date / time 01/01/01 00:00:00
 End date / time 12/01/01 00:00:00
 Station name 2 1402
 Latitude / longitude -2.500002 -111.500001

Sensors DEL
 Measurement CPS-YFT

| Date/Time | Depth | Value |
|---------------------|-------|-----------------|
| 12/01/1989 00:00:00 | 0.0 | 18.14 Metric 1 |
| 12/01/1993 00:00:00 | 0.0 | 46.00 Metric 1 |
| 12/01/1994 00:00:00 | 0.0 | 14.96 Metric 1 |
| 01/01/1996 00:00:00 | 0.0 | 103.41 Metric 1 |
| 11/01/1996 00:00:00 | 0.0 | 44.29 Metric 1 |
| 01/01/1997 00:00:00 | 0.0 | 45.95 Metric 1 |

Plot Link Export Cancel

Simulation Control Options

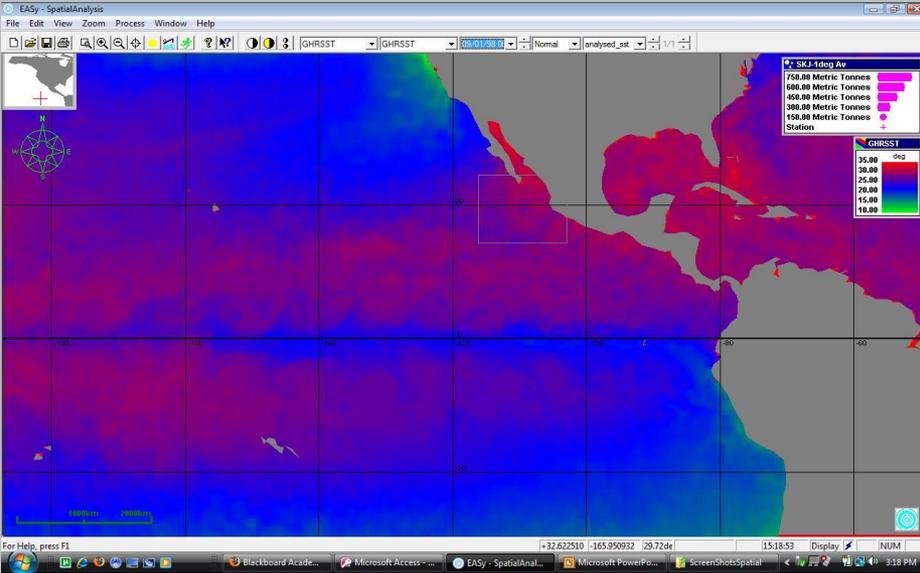
Simulation / Real Time

Start 01/01/1979 0.00 Months
 Current 01/01/1979 0.00 Months
 End 12/31/2000 267.83 Months
 Delta Real Time 1 Months

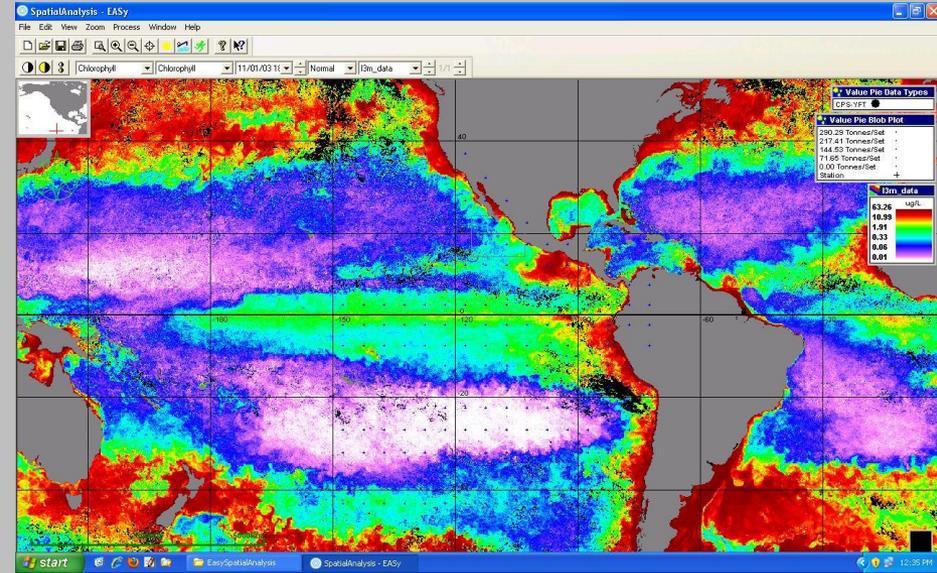
Apply Cancel

NORMAL Retain days 999

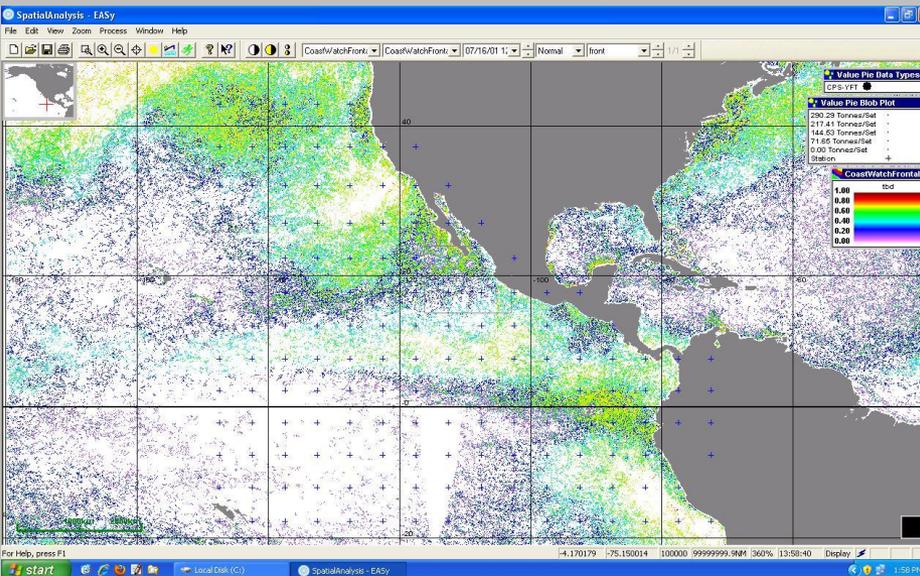
Environmental Characteristics



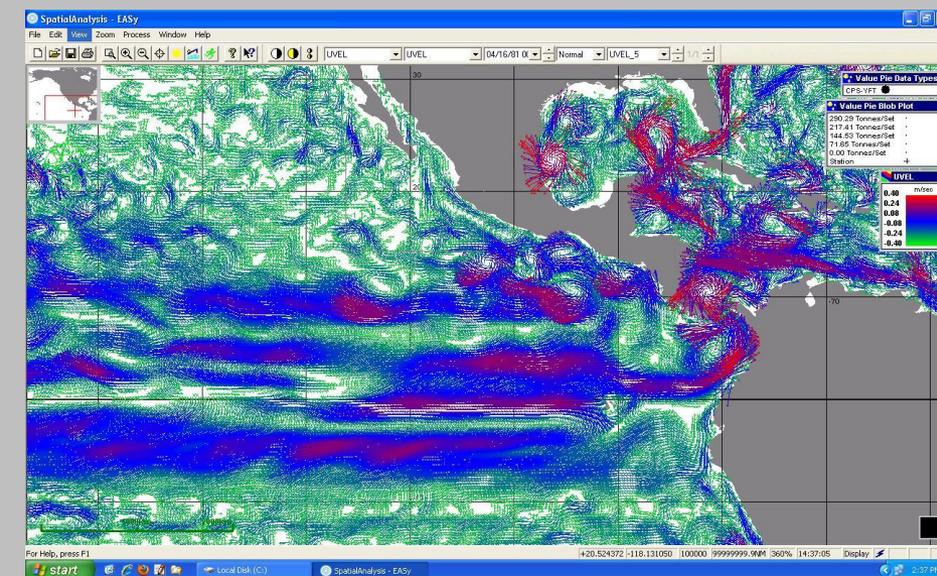
GHRSSST Sea Surface Temperature



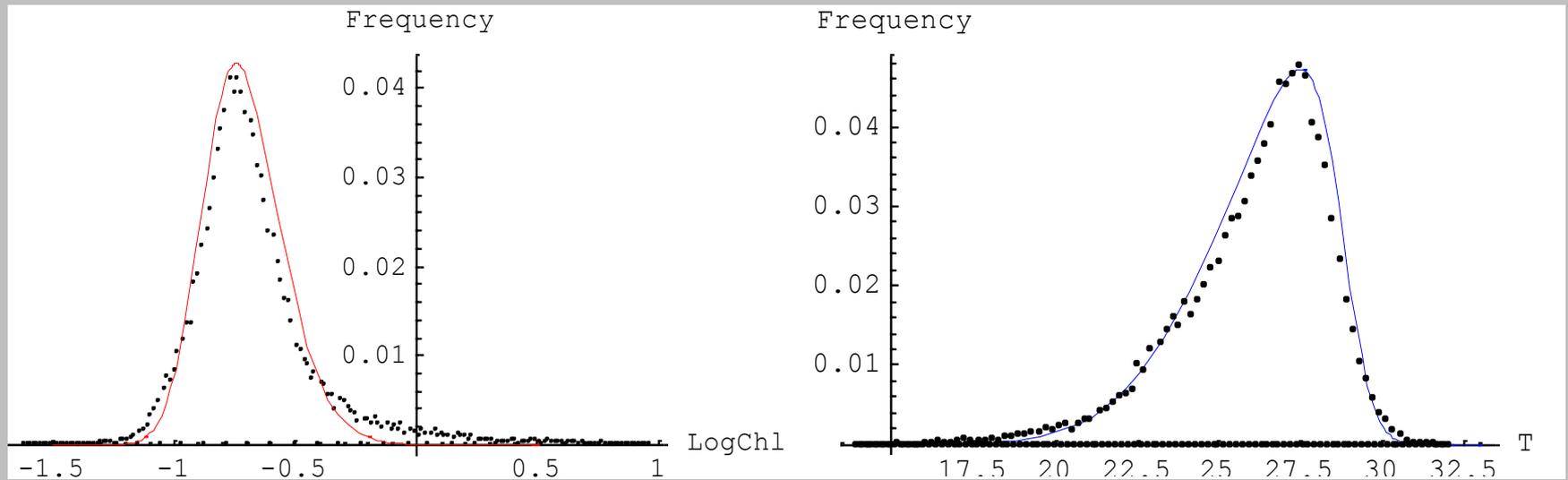
SeaWiFS Chlorophyll



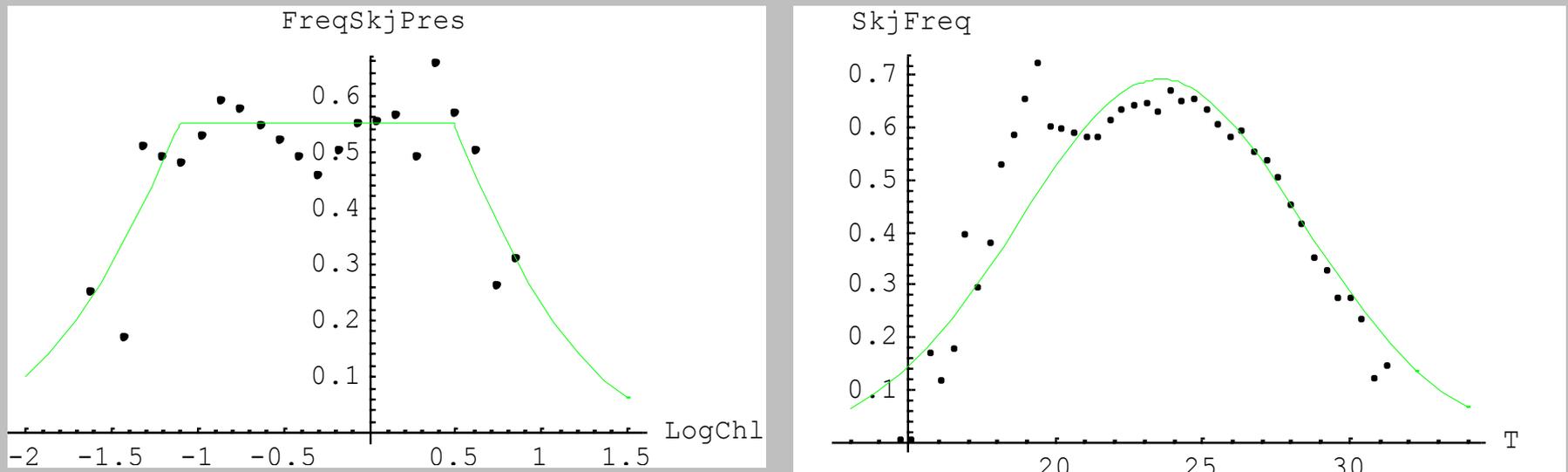
NOAA Coastwatch Frontal Probability



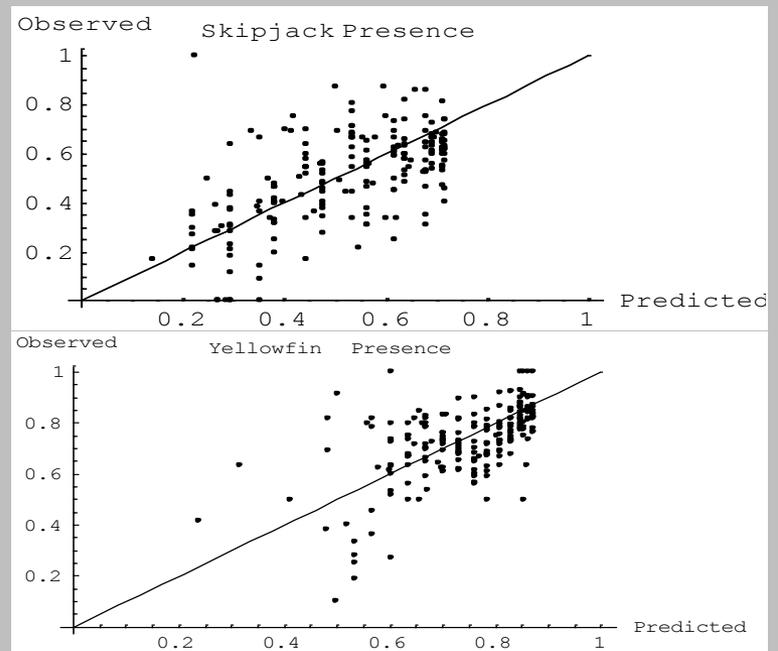
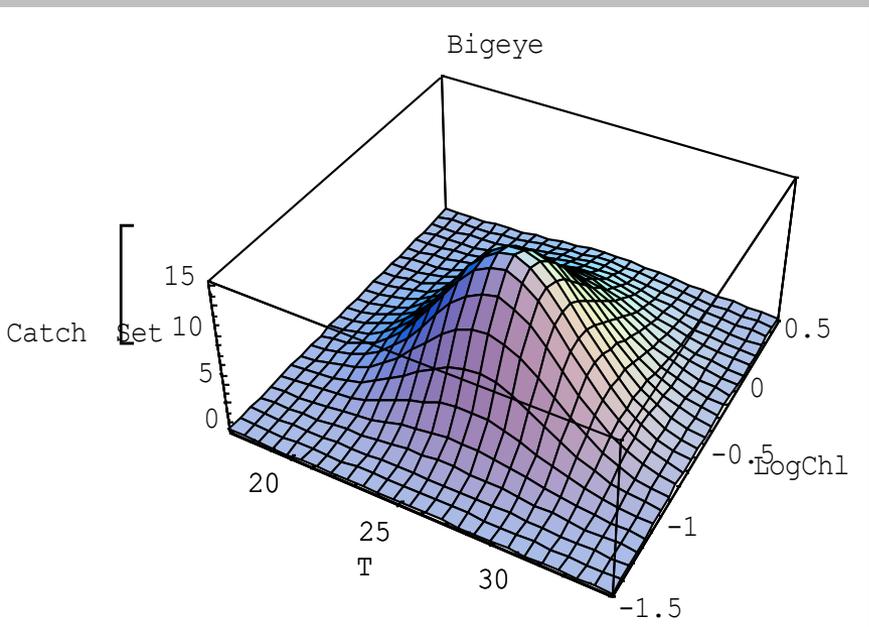
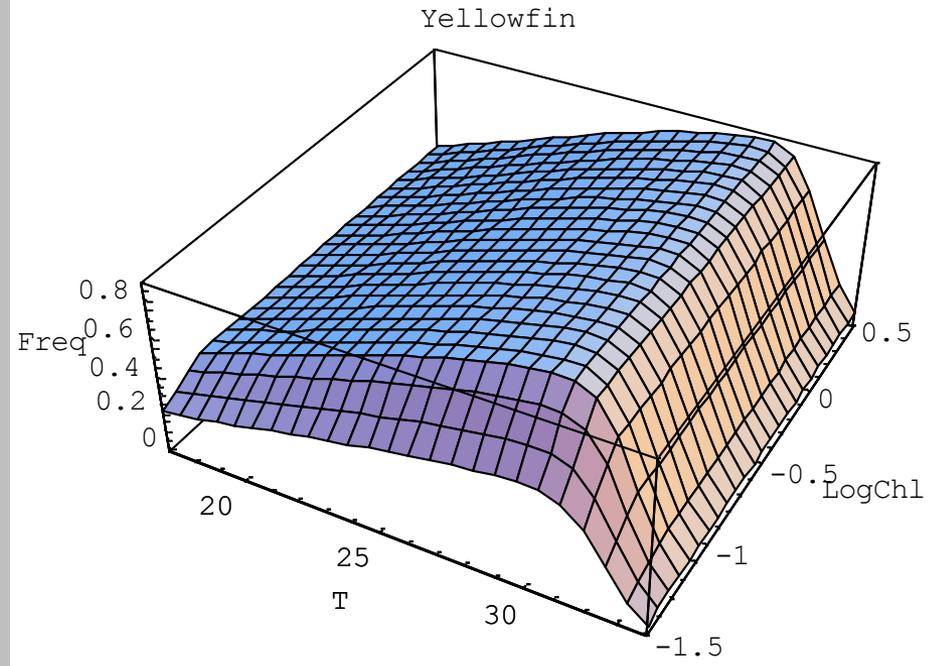
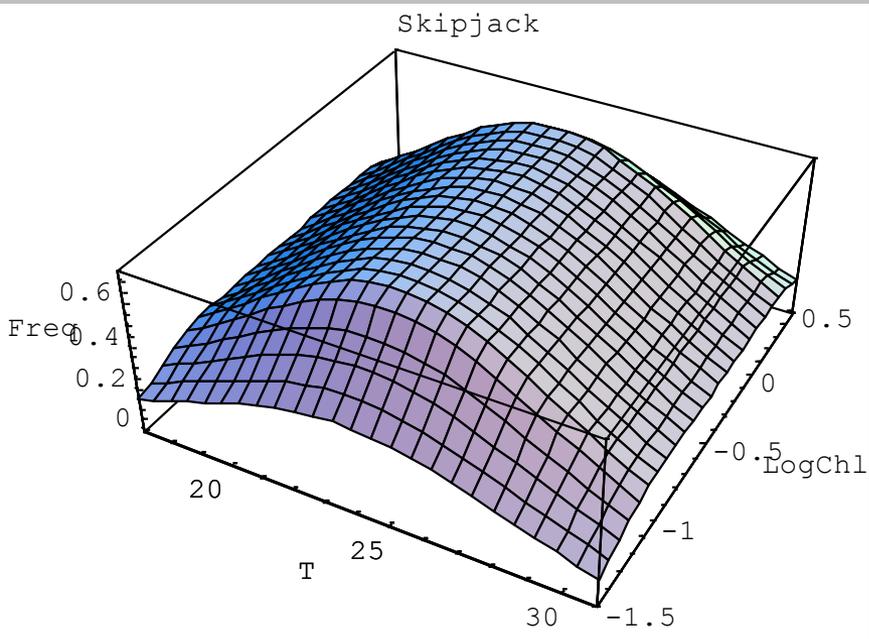
NASA ECCO2 Ocean Currents



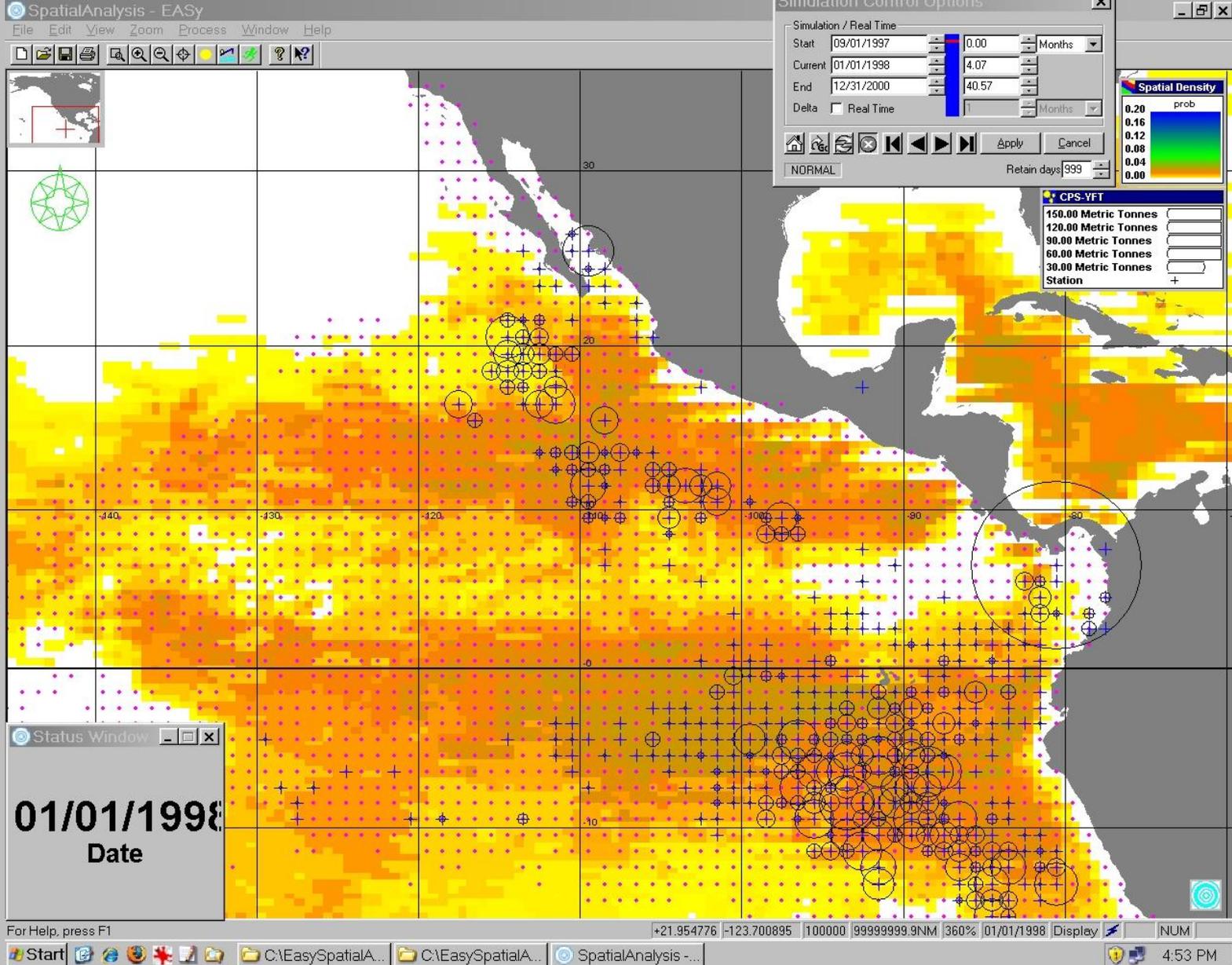
Distribution of sea surface chlorophyll concentrations and water temperatures where purse seine sets were deployed in the IATTC time series for Pacific Tuna.



Distribution of probabilities that a skipjack tuna was caught in a purse seine set in surface water of a given chlorophyll concentration and water temperature.

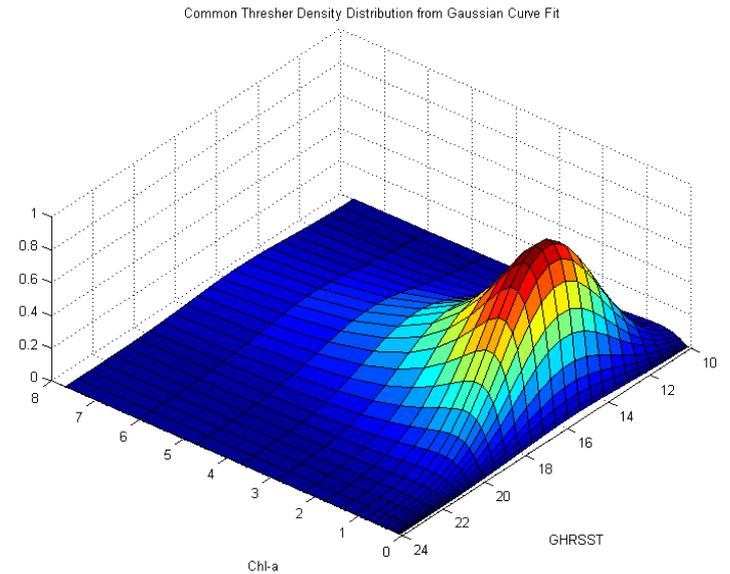
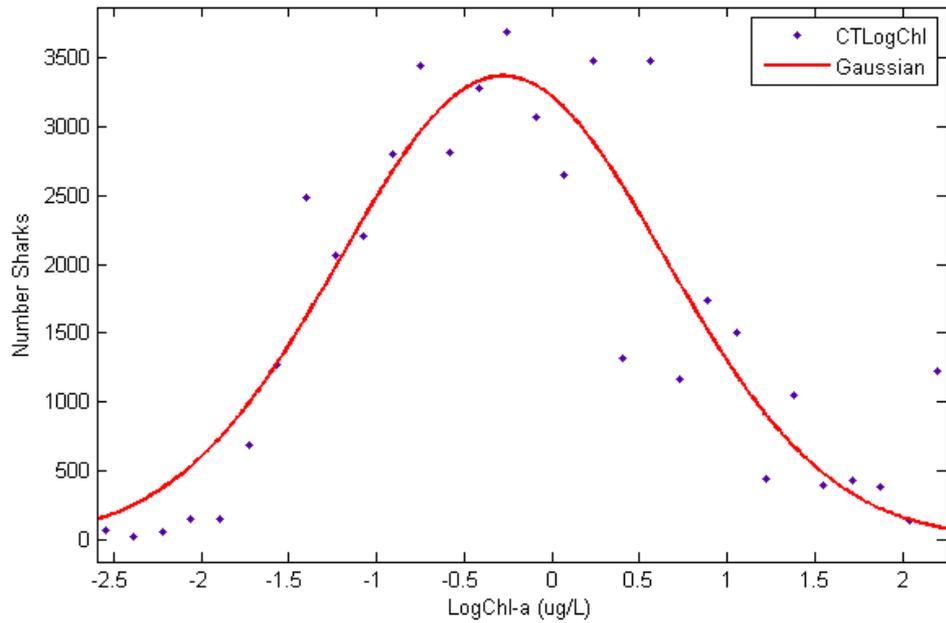
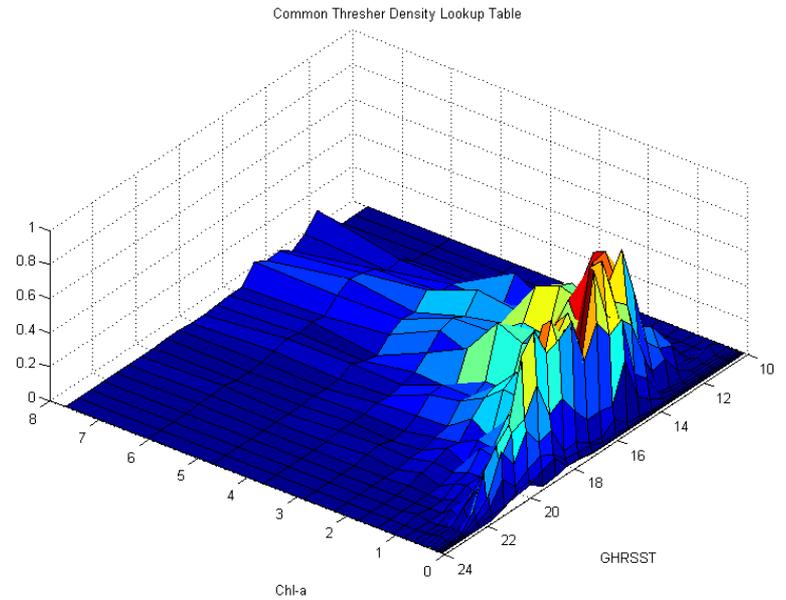
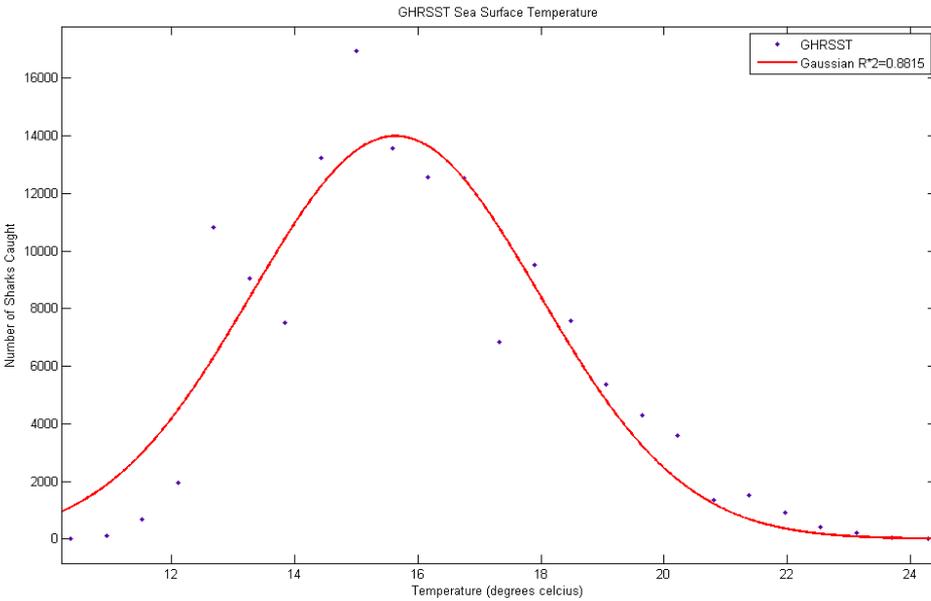


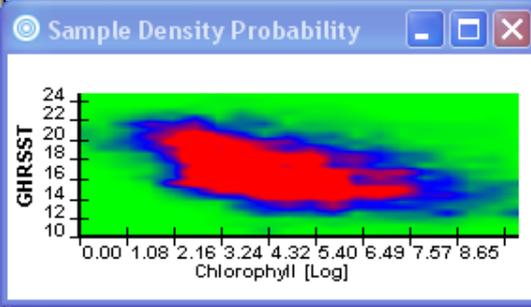
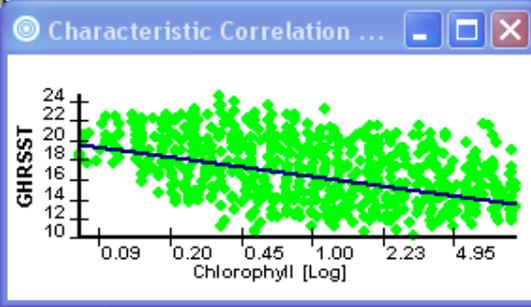
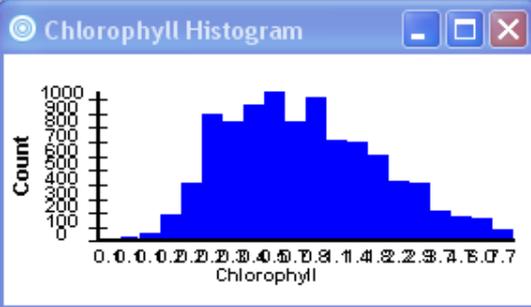
Habitat characterization for 3 tuna species of the Eastern Pacific.



PHAM screen of critical habitat of skipjack tuna as calculated from habitat analysis and current satellite imagery.

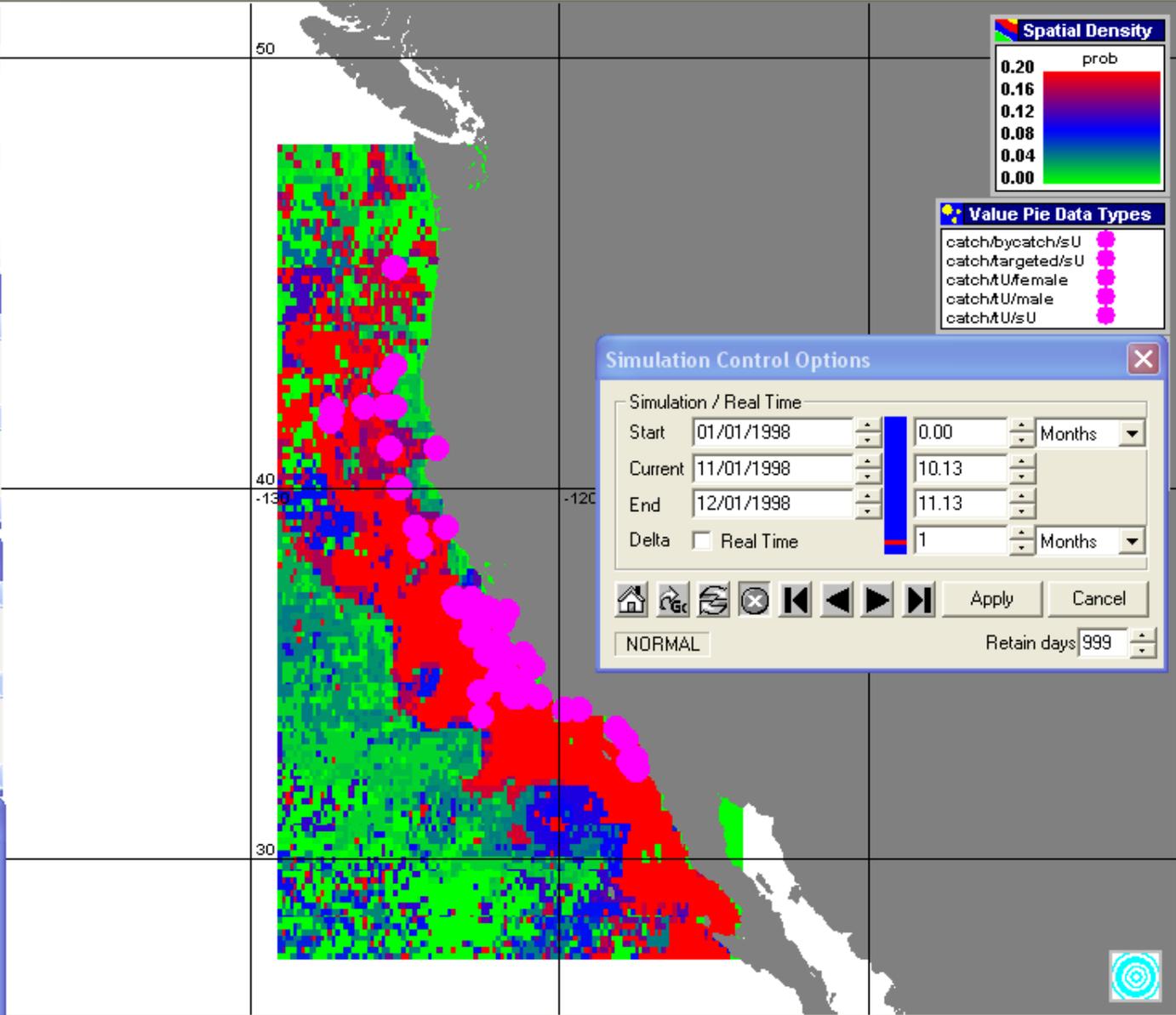
Common Thresher Shark Habitat Mapping





Status Window

11/01/1998
Date



Simulation Control Options

Simulation / Real Time

Start: 01/01/1998 | 0.00 | Months

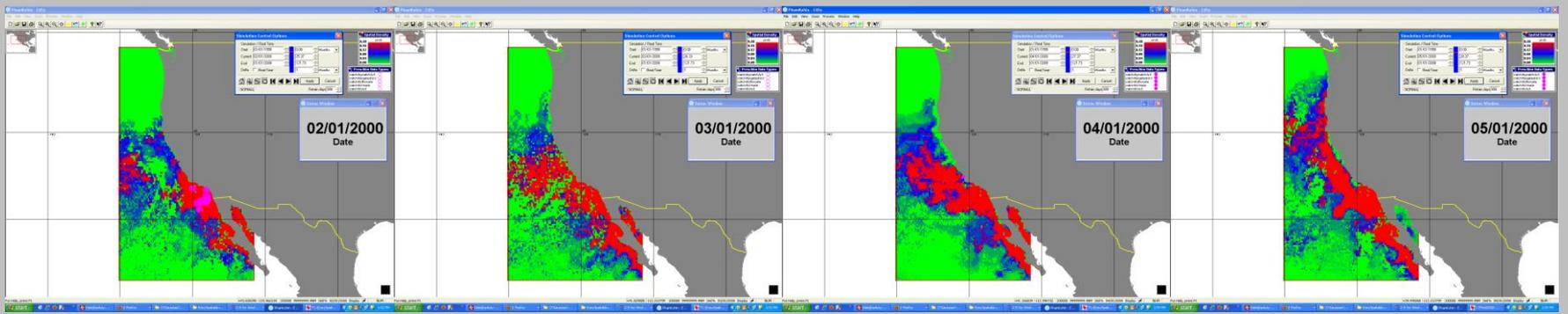
Current: 11/01/1998 | 10.13

End: 12/01/1998 | 11.13

Delta: Real Time | 1 | Months

Apply Cancel

NORMAL Retain days 999

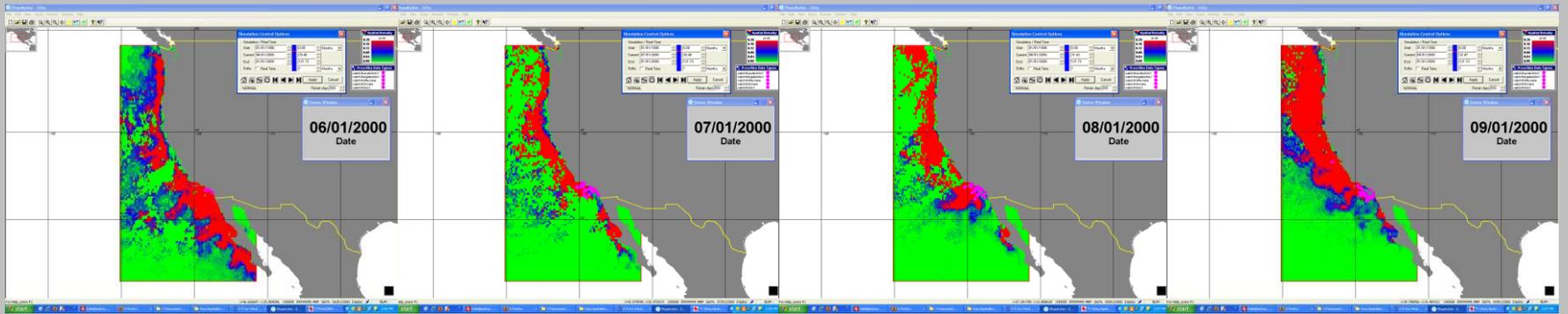


JAN

FEB

MAR

APR

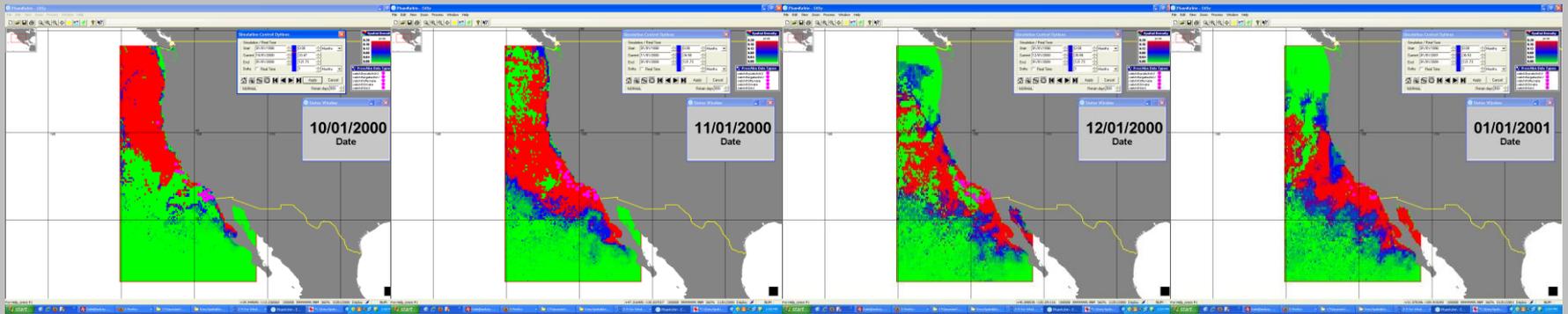


MAY

JUN

JUL

AUG



SEP

OCT

NOV

DEC

PHAM Common Thresher Shark Habitat Prediction for 2000
based on chlorophyll and SST

Conclusions

- We have assembled a system that integrates satellite and model output with fisheries data
- We have developed tools that allow analysis of the interaction between species and key environmental variables
- Demonstrated the capacity to accurately map habitat of Thresher Sharks *Alopias vulpinus* & *pelagicus*. Their seasonal migration along the California Current is at least partly driven by the seasonal migration of sardine, key prey of the sharks.
- *If you are interested in using PHAM software (free) please contact kiefer@usc.edu*
 - URLs for more information:
 - <http://phamlite.com>
 - <http://runeasy.com>



The Coastal Marine Discovery Service: Data Discovery, Visualization, and Understanding

Ed Armstrong – PI

Chris Mattmann

Luca Cinquini

NASA Jet Propulsion Laboratory

Frank O' Brien

System Science Applications, Inc.

2012 Fall AGU -- 7 Dec 2012

Operational Gateways

- http://podaac.jpl.nasa.gov/podaac_labs
 - Main PO.DAAC Labs web site
- <http://cmds.jpl.nasa.gov>
 - Main CMDS web site with the ESGF interface
- <http://cmds-gis.jpl.nasa.gov>
 - Direct link to NetViewer visualization

CMDS web site

ESGF Earth System Grid Federation

NASA

Home Search Tools Login

Coastal Marine Discovery Service
Jet Propulsion Laboratory

Welcome to the NASA Marine Discovery Service

NASA's Coastal Marine Discovery Service, an ACCESS 2009 funded proposal to leverage open source technology for unifying coastal

Quick Search

Keyword: **Search**

Advanced Search (Category, Geospatial, Temporal, and more)...

Resources

- [EASy GIS NetViewer](#)

(supported browsers)

ESGF Peer Nodes

- [PCMDI Node](#)
- [ORNL Node](#)
- [NASA-JPL Node](#)
- [PNNL Node](#)
- [ANL Node](#)

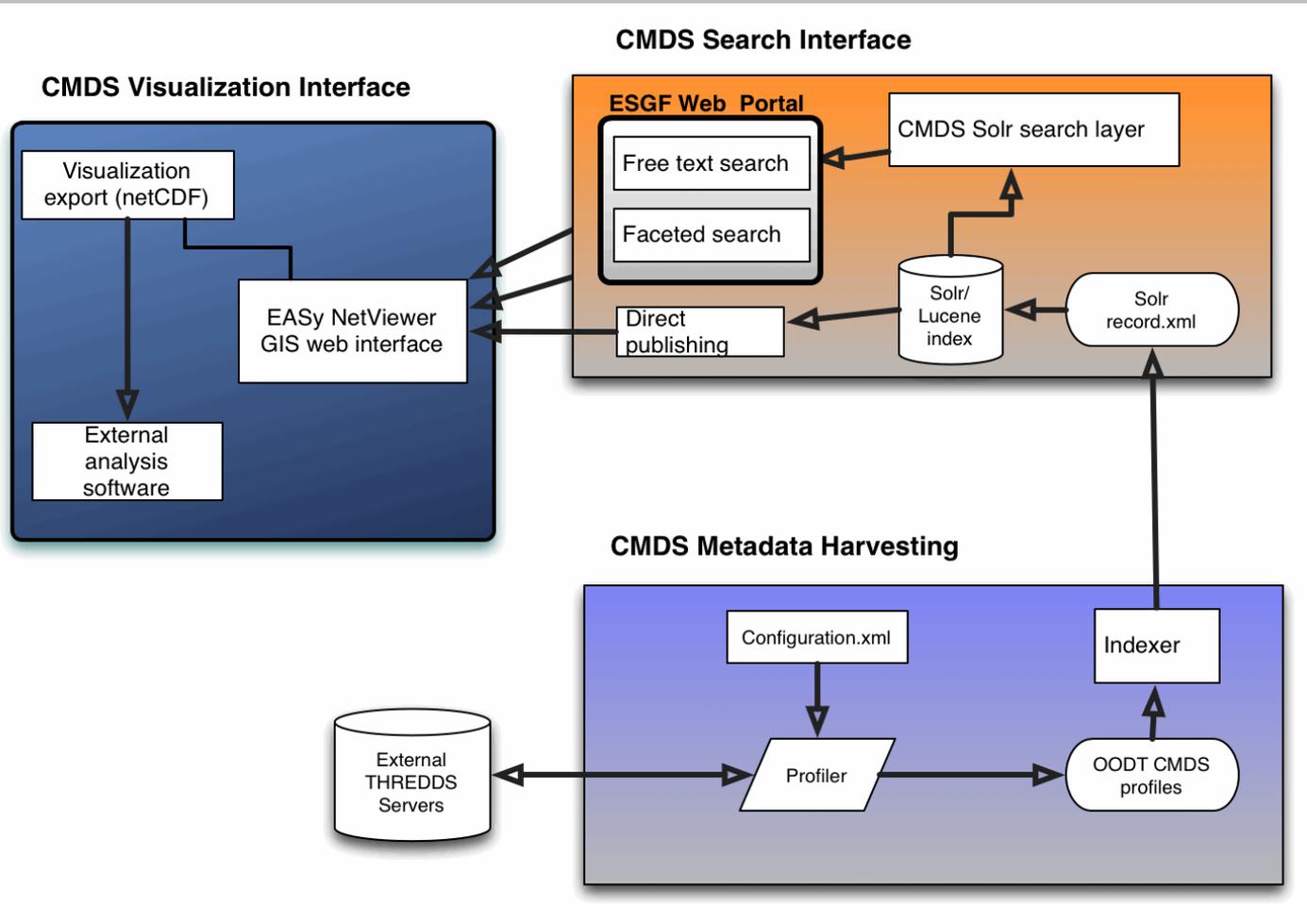
Guest User
ESGF P2P Version 1.4.0-brighton_beach-release-18-g3141bda-devel [fe-2.2.5]

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CMD5 datasets exposed

- Focused on global and coastal datasets from CoastWatch, NOAA ERDDAP, NOAA NODC, US NAVY on THREDDS (OPeNDAP) servers
 - Over 200 datasets indexed. More to come.
- Organized as faceted search on provider, measurement (CF standard name), spatial coverage and sensor. This list is extensible and easily changed.
- Free text search on keywords harvested from metadata exposed from THREDDS servers

Current architecture



Example of SST “on the fly”

The screenshot shows the EASy web interface for marine resource mapping. The main map displays a color-coded Sea Surface Temperature (SST) field over a geographic area, with a red box highlighting a specific region. An 'Image Profile' plot is visible in the top left, showing temperature vs. distance. The interface includes various control panels for data selection, simulation parameters, and a data view sidebar.

Available ArcShape Files

| |
|-----------------|
| nat_rfi_display |
| rain020 |

Available Imagery

| |
|-------------|
| MagnetoI |
| MagnetoM |
| MagnetoO |
| MagnetoY |
| MagnetoZ |
| SSH-AVISO |
| SST.GHRSSST |

Range

| Minimum | Maximum |
|-----------------|---------------------------|
| Latitude (deg) | N35:32.4091 N40:00.1192 |
| Longitude (deg) | W127:40.1494 W121:16.9030 |
| Date | 01-01-2000 07-01-2000 |

Selected Imagery

| |
|----------------------------|
| DODS_CH_SeaWIFS_GL_monthly |
| DODS_GHRSSST |
| SSH-AVISO |

Range

| Minimum | Maximum |
|-----------------|-------------------------|
| Latitude (deg) | -89.975000 +89.975000 |
| Longitude (deg) | -179.975000 +179.975000 |
| Date | 04-01-2006 12-30-2012 |
| Res/Imaging | 3mm 2467 |
| Exporting | 0 of 0 (0 errors) |

Simulation

Start: 01-01-2000, End: 12-31-2000, Current: 01-01-2000, Interval: 1 days

Mode

Browse | Simulate

Data View

Images | Overlays | Plots

None

Bathy:ETOPO
Bathy:GEBCO
CHL:CZCS
DODS_CH_SeaWIFS_GL_8day
DODS_CH_SeaWIFS_GL_daily
DODS_CH_SeaWIFS_GL_monthly
DODS_CH_SeaWIFS_GL_8day
DODS_CH_SeaWIFS_GL_monthly
DODS_CH_SeaWIFS_GL_8day
DODS_Chlorophyll
DODS_Climatology
DODS_GHRSSST

Image Depth

None

To download one or more sets of imagery or ArcShape files:

- Select desired imagery types and/or ArcShape files
- Enter latitude, longitude, and date range
- Press Export
- When completed press Download
- Unzip the downloaded data files
- Exportedimagery.htm describes the downloaded data

Messages

N42:47.2449 W125:21.7231
634.6km 138.1°
Selected exports imagery types, press 'Export' to download data

Latitude/Longitude N42:47.2449 W125:21.7231 **Location** CLICK LATION **Scene** current scene
Distance/Azimuth 634.6km 138.1° **Value** CLICK VALUE **Image** image name

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Example: Export ocean model data

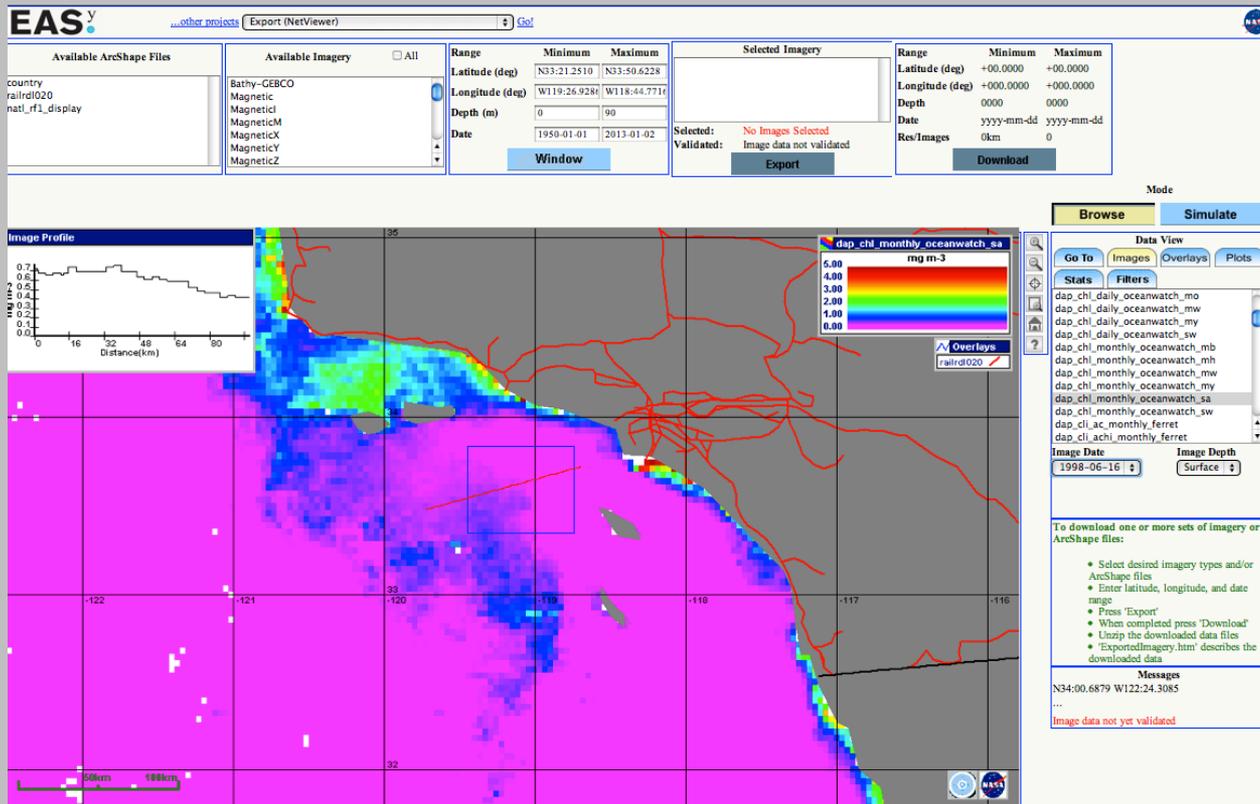
The screenshot shows the EASy web interface with the following components:

- Search Bar:** A Google search bar at the top.
- Available ArcShape Files:** A list containing 'naif_41_display' and 'naif4020'.
- Available Imagery:** A list including 'Bathy-ETOPO', 'Bathy-GEBCO', 'CHL-2255', and several 'DODS_CH_SeaWIFS_GL' files.
- Range Selection:** Fields for Latitude (deg), Longitude (deg), and Date, with 'Minimum' and 'Maximum' values.
- Selected Imagery:** A section with 'None' selected and an 'Export' button.
- Map View:** A large map showing a vector field of blue arrows over a coastal area, with a red box highlighting a specific region.
- Data View Panel:** A panel on the right showing a list of data variables like 'DODS_OM_R1_VEL', 'DODS_OM_R2_SURFEL', etc., with a 'Download' button.

The dialog box contains the following information:

- Download Zipped File:** A section with a link to 'HERE' to download the zipped data file.
- Exported Imagery:** A list of file names, including:
 - EzDODS_Ch_SeaWIFS_WC_monthly_2000011604000.nc
 - EzDODS_Ch_SeaWIFS_WC_monthly_2000021504000.nc
 - EzDODS_Ch_SeaWIFS_WC_monthly_2000031605000.nc
 - EzDODS_Ch_SeaWIFS_WC_monthly_2000041517000.nc
 - EzDODS_Ch_SeaWIFS_WC_monthly_2000051605000.nc
 - EzDODS_Ch_SeaWIFS_WC_monthly_2000061517000.nc
 - EzSSH-AVISO_2000010500000.nc
 - EzSSH-AVISO_2000011200000.nc
 - EzSSH-AVISO_2000011900000.nc
 - EzSSH-AVISO_2000012600000.nc
 - EzSSH-AVISO_2000020200000.nc
 - EzSSH-AVISO_2000020900000.nc
 - EzSSH-AVISO_2000021600000.nc
 - EzSSH-AVISO_2000022300000.nc
 - EzSSH-AVISO_2000030100000.nc
 - EzSSH-AVISO_2000030800000.nc
 - EzSSH-AVISO_2000031500000.nc
 - EzSSH-AVISO_2000032200000.nc
 - EzSSH-AVISO_2000032900000.nc
- Messages:** A section at the bottom with the text '304-464294 W113-09-2651' and instructions to click for image value or double-click for station or web-cam data.

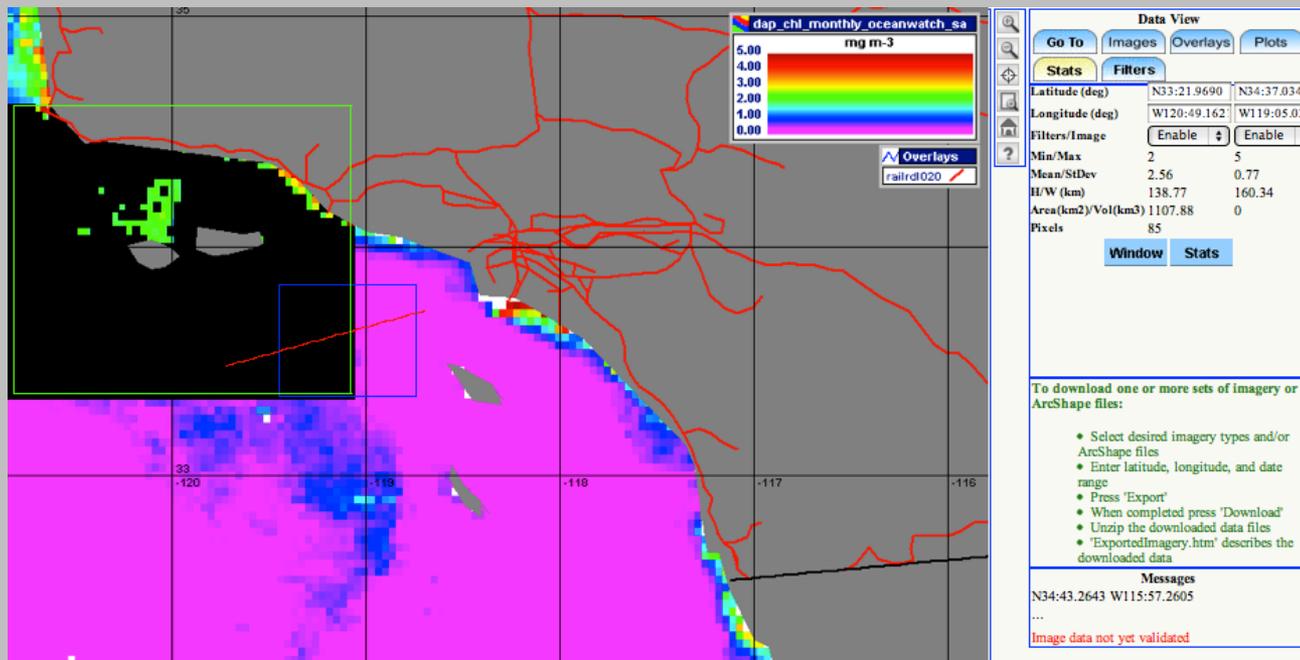
NetViewer visualization: Chl_A



- Implementation of the visualization capability has been completed
 - Stand alone software running on a Windows server
 - Accessed via web browser
 - Reads and displays any OPeNDAP URL from CMDS either from a populated list or from the results of a search
 - Can package custom subsets of data

Query and statistics capability added

- Use case: Where are the high chlorophyll values and what is their distribution in the Santa Barbara Channel ?
- Can be combined with up to 3 other layers for multi dimensional query; e.g., Where the high chlorophyll values with a temperature range of 10-15 degC in shallow to shelf depth water.



Comparison of popular tools

| Tool/ Interface | Data Discovery | Visualization | Data interrogation | ROI Statistics | Export | Shapefile support |
|-----------------------|-----------------------|---------------|-----------------------|----------------|--------|----------------------|
| CMDS/ NetViewer | "quasi- Federated" | ✓ | ✓ | ✓ | ✓ | ✓ |
| IDV | Specific THREDDS | ✓ | ✓ | No | No | No |
| Live Access Server | Specific LAS | ✓ | No | No | ✓ | No |
| Godiva2 | Specific THREDDS | ✓ | No | No | No | No |
| Panoply | None | ✓ | Table format | No | ✓ | No |
| netCDF- JavaToolUI | Specific THREDDS | ✓ | ✓ | No | No | No |