An online toolkit for
plankton time series
analysis and visualization.

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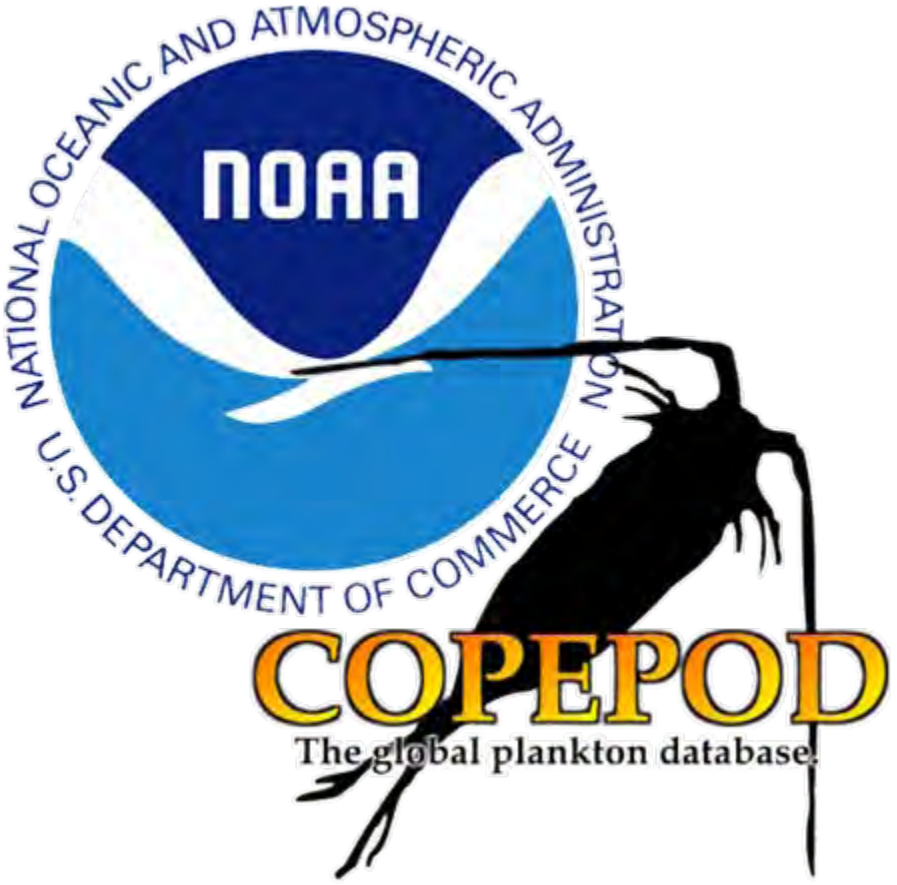
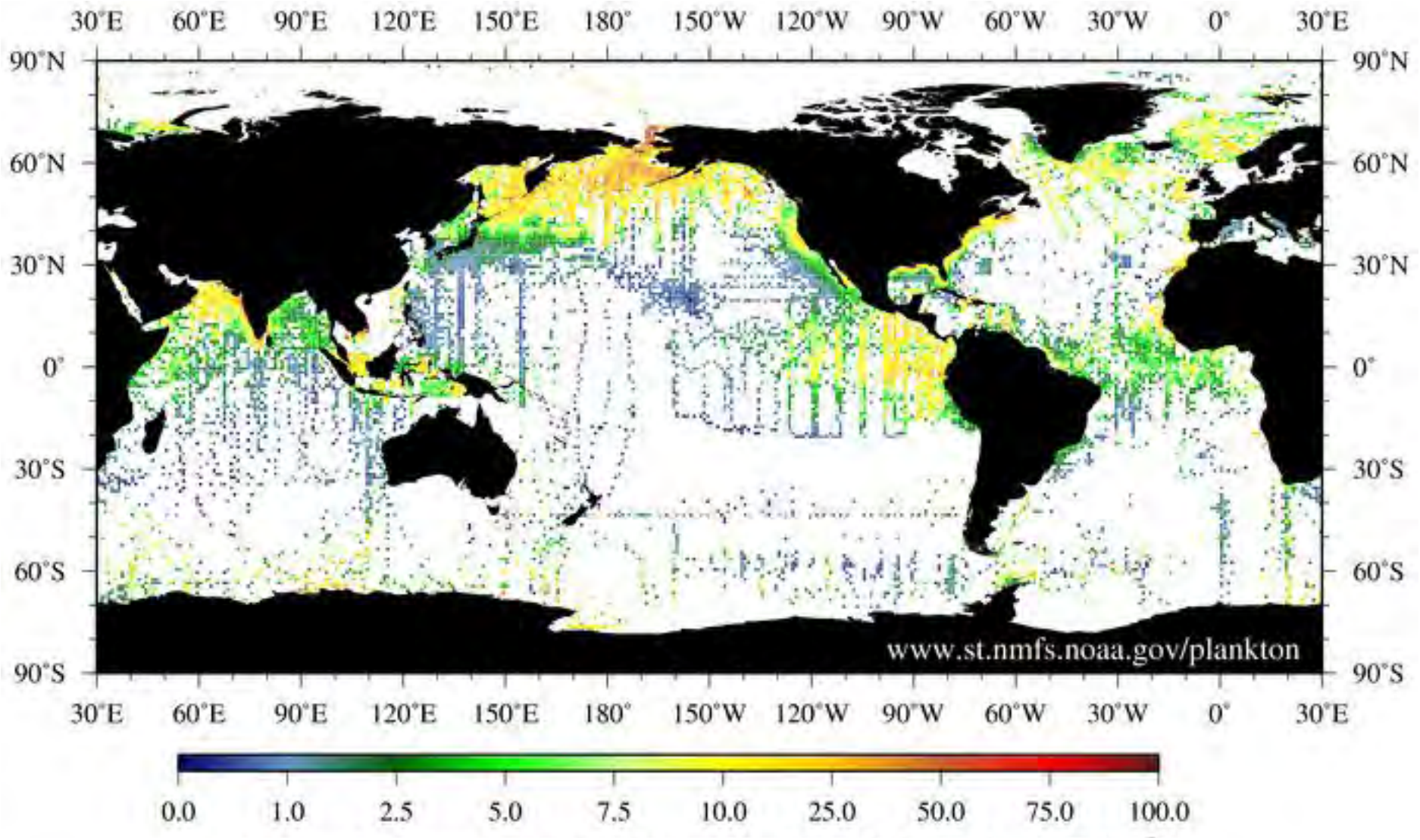
What is **COPEPOD**?

C oastal &
O ceanic
P lankton
E cology,
P roduction, &
O bservation
D atabase



COPEPOD is a global database of plankton ...



Zooplankton Carbon Mass (mg-C/m^3)

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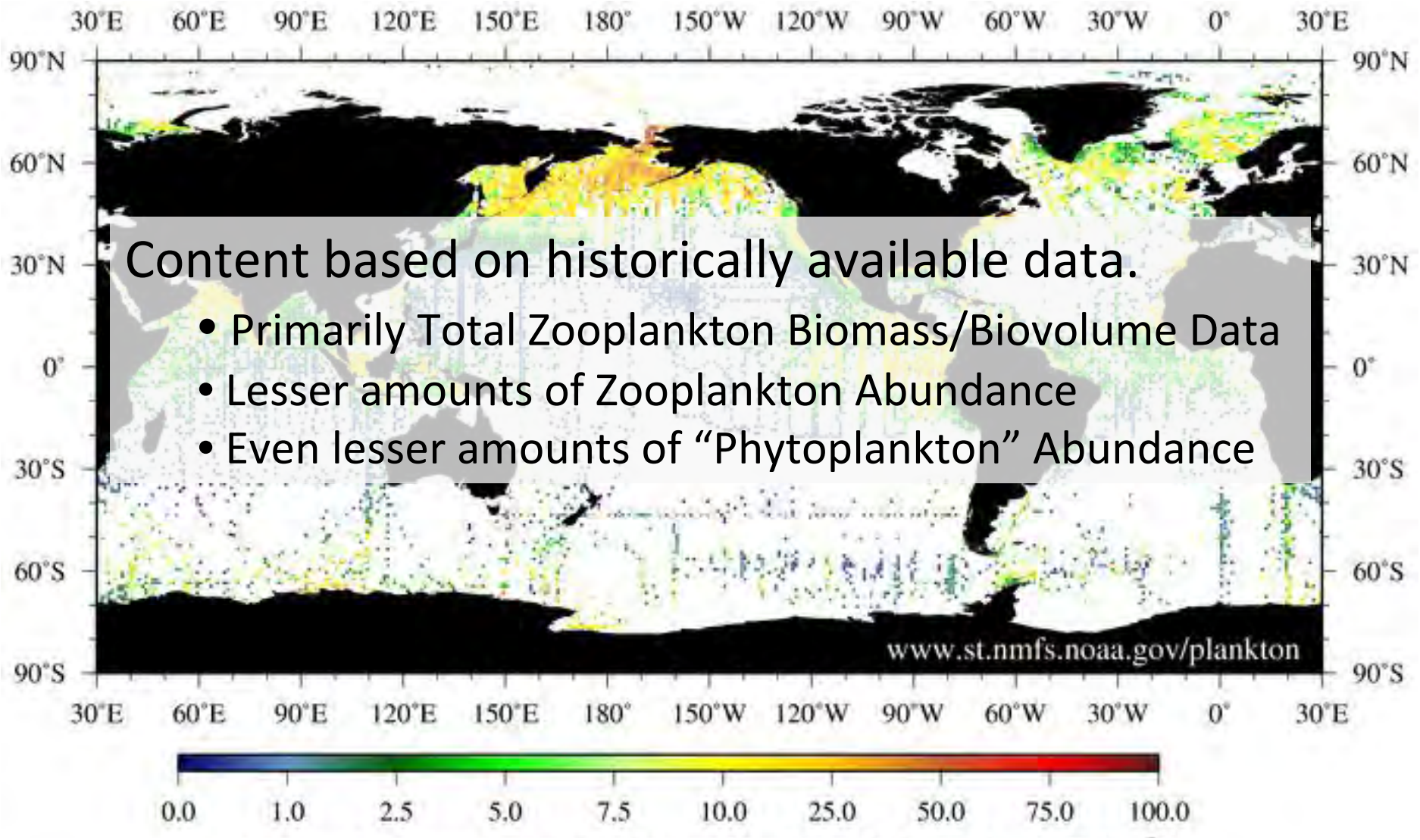


Zooplankton Carbon Mass (mg-C/m^3)

What is **COPEPOD**ITE?

COPEPOD's

I nteractive

T ime-series

E xplorer

COPEPODITE was created by its support to and from plankton time series Working Groups.

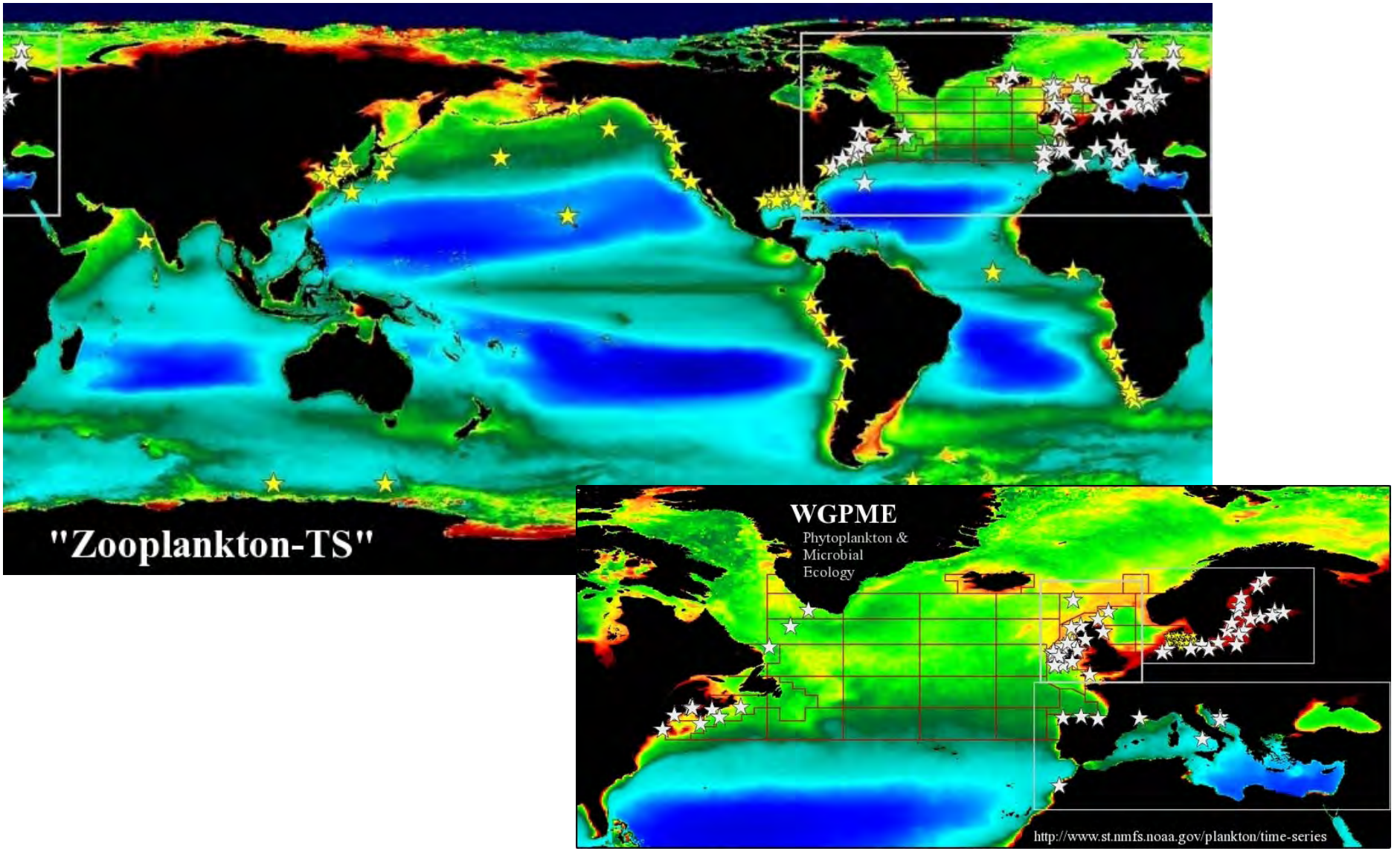
1. **SCOR WG125:** *Global Comparisons of Zooplankton Time Series*
2. **ICES WGZE:** *Working Group on Zooplankton Ecology*
3. **ICES WGPME:** *Working Group on Phytoplankton & Microbial Ecology*
4. **SCOR WG137:** *Global Patterns of Phytoplankton Dynamics in Coastal Ecosystems*

COPEPODITE has two main components.

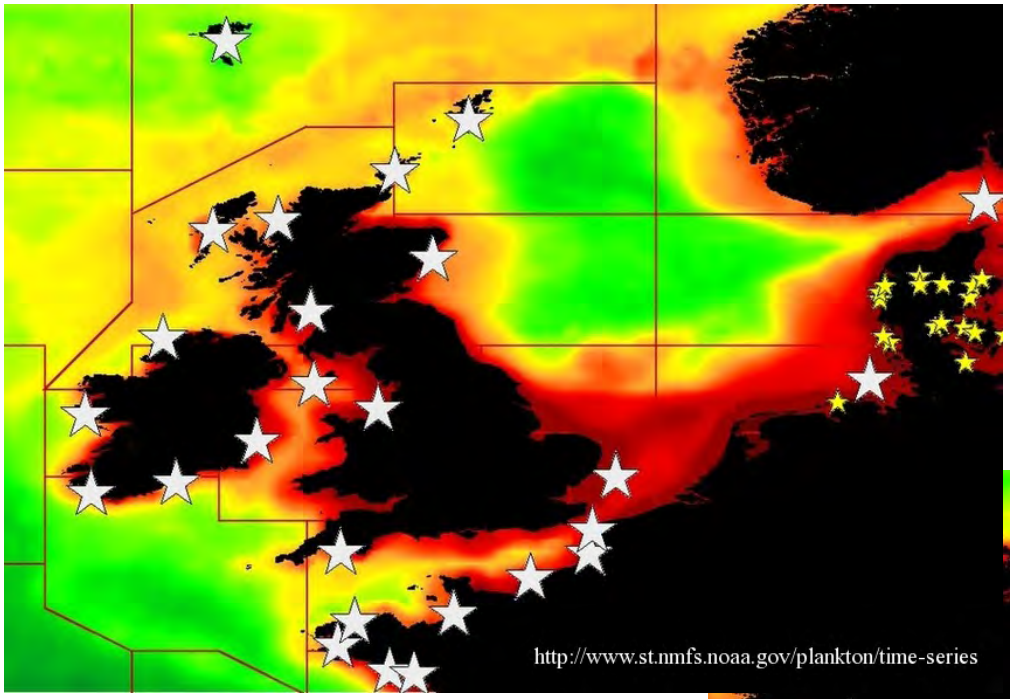
- An online informational database (metabase) of participating plankton time series and monitoring sites.

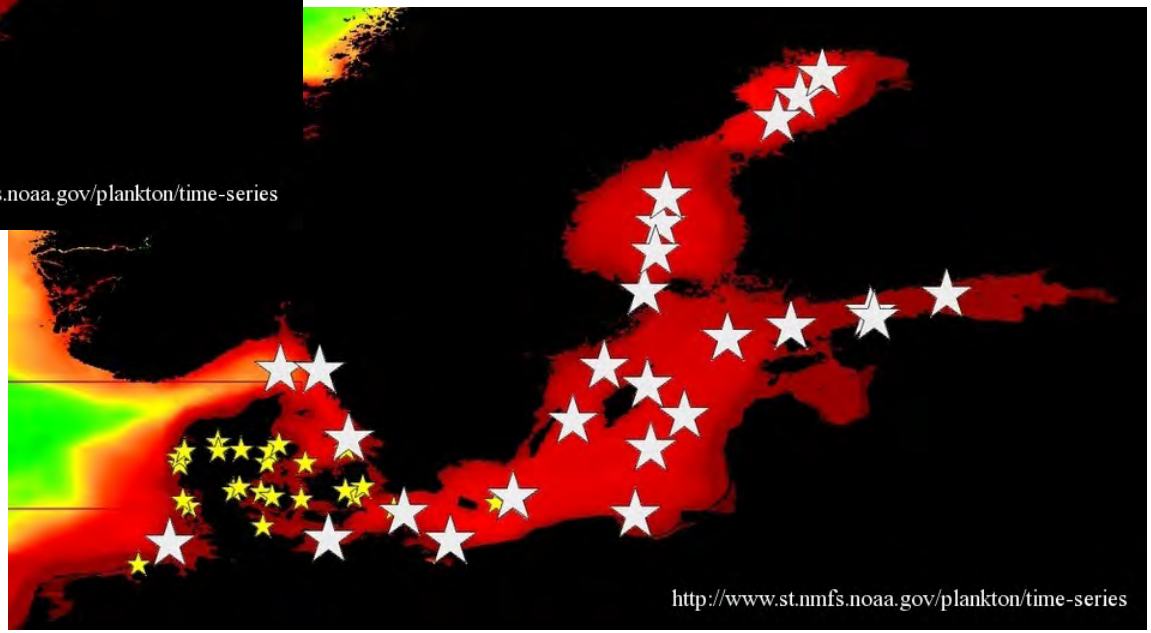
- An online toolkit of plankton time series data analysis and visualization tools.

COPEPODITE features an interactive metabase of over 200 monitoring sites!

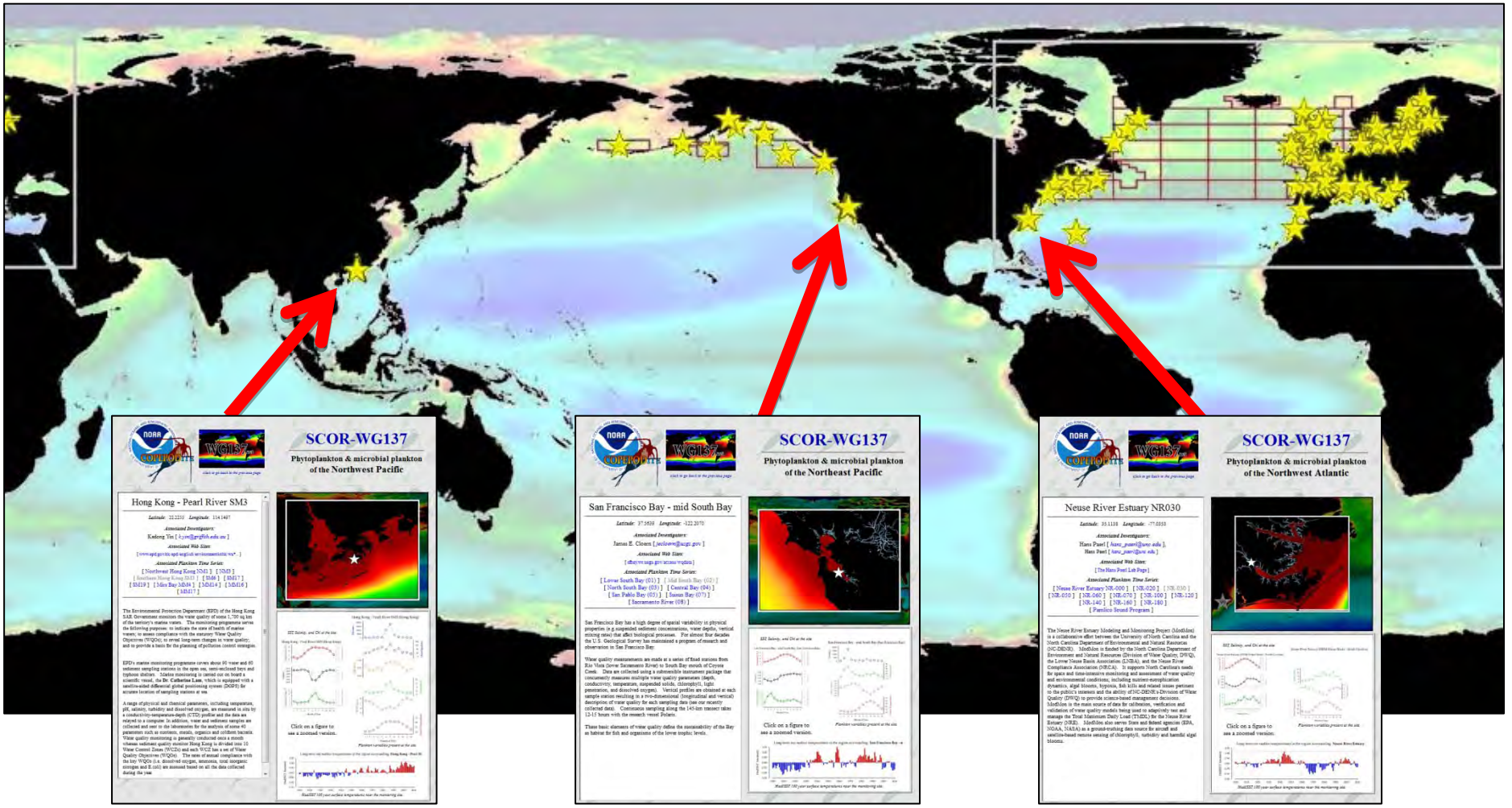


These sites can be accessed via a variety of interactive maps and searching tools.

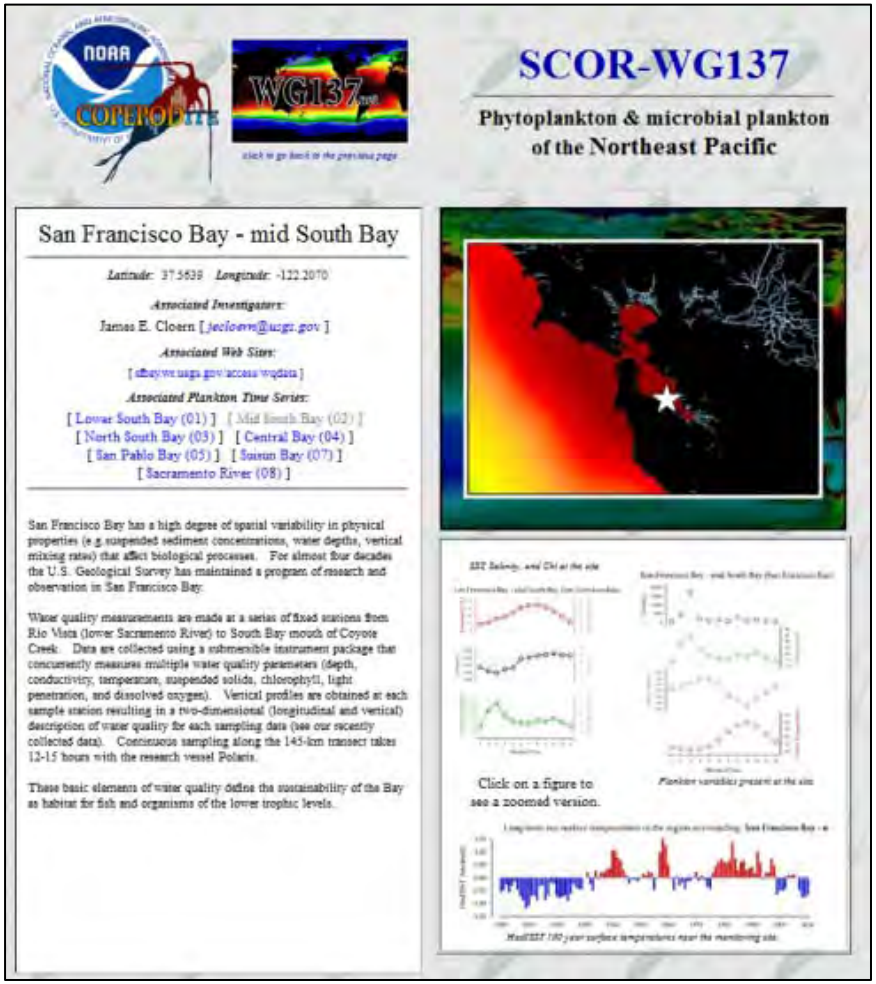


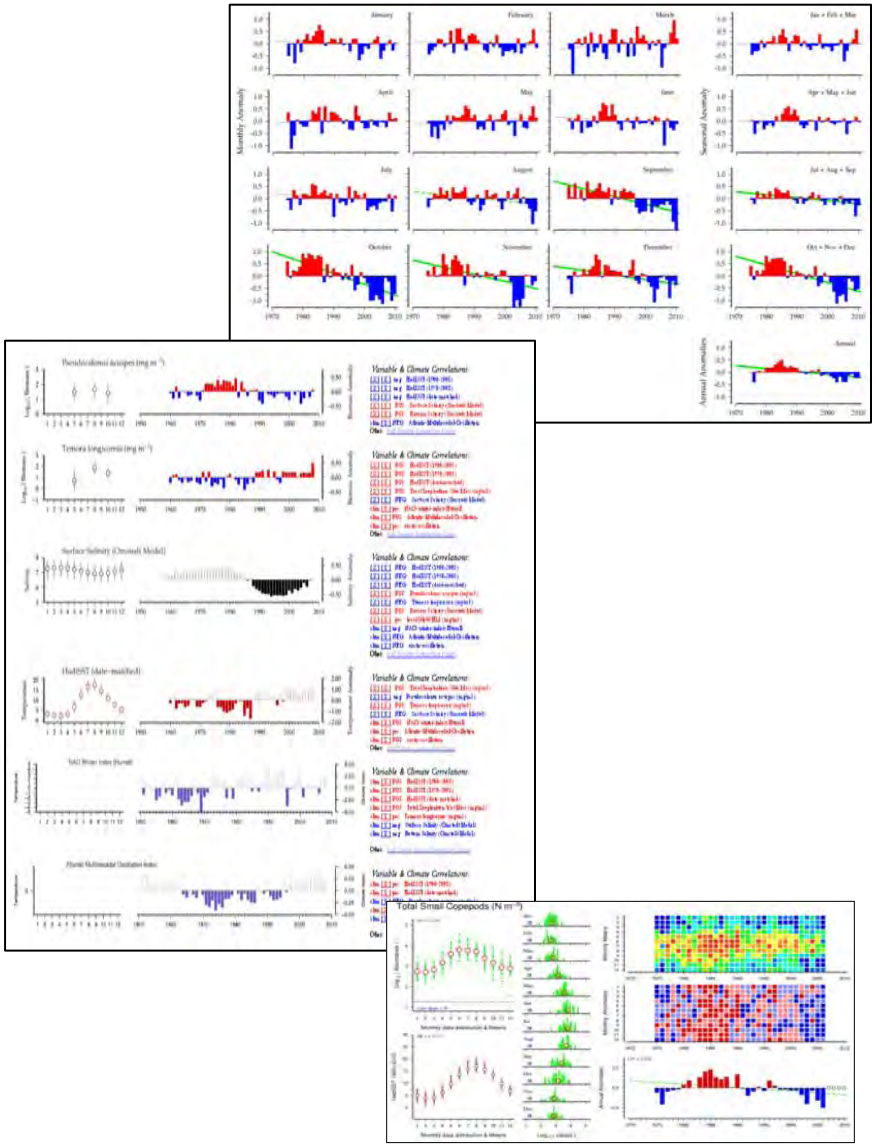


Each site in the metabase has its own standard text and visual summary pages.



Each summary describes the site and variables monitored and provides full contact information.





Why was the Online Toolkit Created?

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- Type 1: Those that have insanely expensive software and the ability to use it and interpret it.
- Type 2: Those that have a computer genius who can mimic "Type 1" results for free by using "R".
- **Type 3: The rest of us … (***including many who have only seen their data via basic Excel plots***).**

The **COPEPODITE** Online Toolkit

Minimal Software Requirements:

- any “CSV-capable” spreadsheet software
- a web browser and internet access

Three Simple Steps

- 1. Prepare your data.
- 2. Select your geographic location.
- 3. Select the modules you want to run.

STEP 1: COPEPODITE's Smart Data Format

DATE 1	(date 1)	(date 1)	DATE 2	(date 2)	(date 2)	DATE 3	(date 3)
DATE-YMD	BIOM= Wet Mass	ABND= Total Zoo	DATE-DMY	TEMP= SST	PSAL= Salinity	DATE-MDY	CHLA= Chlorophyll-a
	123	43323		17.1	34.124		1.23
	34	23456		18.1	34.324		0.34
	122	642		18.4	34.324		1.22
	158	34236		17.5	33.985		1.58
	1008	23435		14.5	34.102		1.00
	300	65456		12.1	34.354		3.00

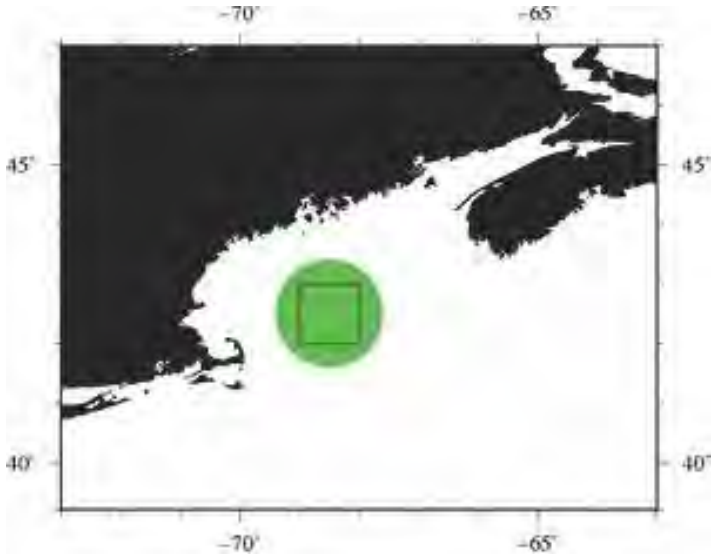
MONTHLY DATA

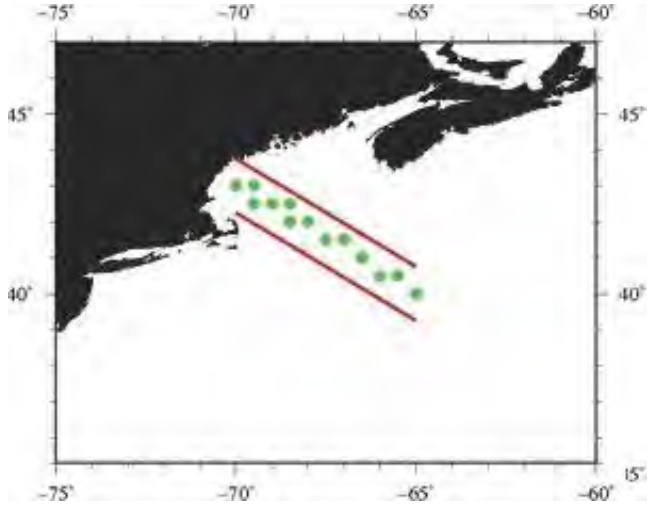
DAILY DATA

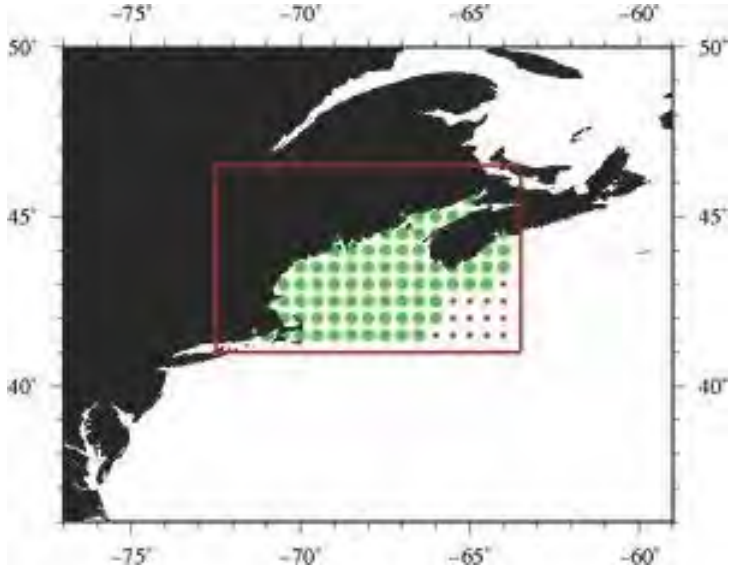
WEEKLY DATA

- Flexible sampling date handling (MDY, YMD, DMY, etc.)
- System automatically bins and synchronizes dates & data
  - Currently MONTHLY, but working on weekly and half-months
- Variable types identified using variable tags (TEMP=, ABND=)

Step 2: Select your site's geographic area







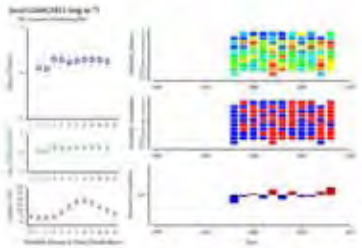
Step 2: *Automatically-added, location-derived Ancillary Data*

- Hadley (UK-Met Office):
  - Sea Surface Temperature (1900-present)
  - Surface & sub-surface Temperature and Salinity (1950-present)
- ICOADS Surface Winds (1960-present)
- Model Products (e.g., Baltic-PROBE data)
- Satellite-based fields (Chl-A, MLD?, Upwelling Indices?, Precip?)
- Climate Indices
  - NAO, AMO
  - PDO, PNA, Nino 3.4, TNI, NPGO, BEST
  - SOI
  - AO / AAO
  - WeMO

Step 3: Analysis Module Selection

WGZE Plot

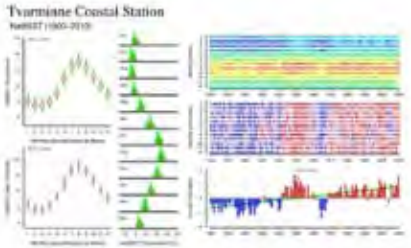
WGZE Standard Summary Plots



This plot displays the seasonal and interannual properties of your data variables using the WGZE standard presentation layout.

WG125 Plot

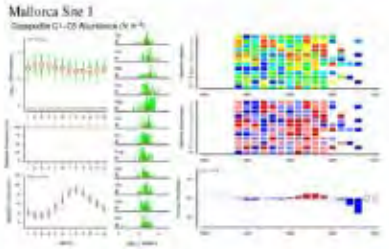
WG125 Standard Summary Plots



This plot displays the standard WG125 components with interannual trend lines (green = significant).

WGPME "Species Plot"

Species Presence Plots

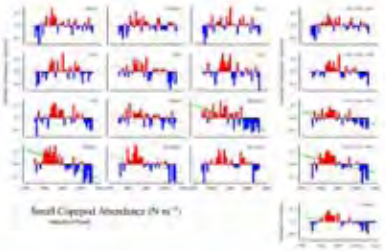


This plot will only work correctly if you are using the "ABDT" tag (in place of "ABND").

This plot is similar to the WG125 plot above, with the addition of monthly "% Relative Present" and "Absence Flagging".

Month-Season-Annual Anom Plot

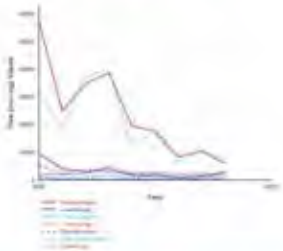
MonAnoms Plots



This plot shows monthly, seasonal, and annual anomalies and any long term trends (green = significant).

Group Plot

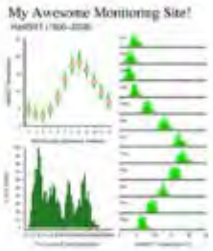
Group Plots



This plot shows user-identifed groups that are configured in your data file.

Basic QC Plot

Basic QC and Statistical Summaries



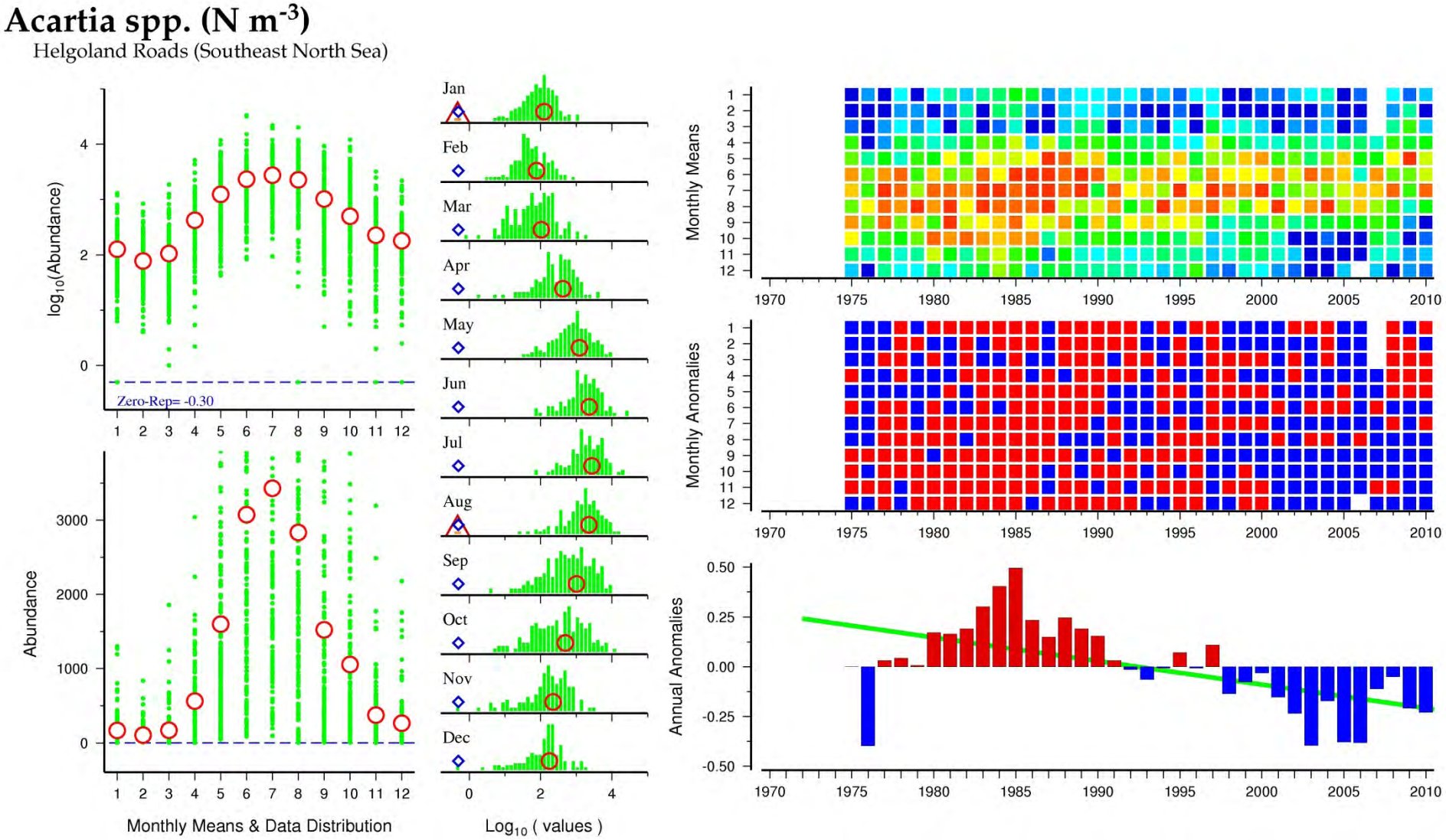
This plot is useful for identifying numerical outliers and anomalous values by month or year.

The **COPEPODITE** Results Page:

- The COPEPODITE system returns your results via a custom web results page that is protected (private) using a 32-character unique web link that is mailed to you.

- This private web page contains all of the analysis results and figures from the modules you requested, including your original data in time-synchronized (monthly bin) format.

Standard Plots



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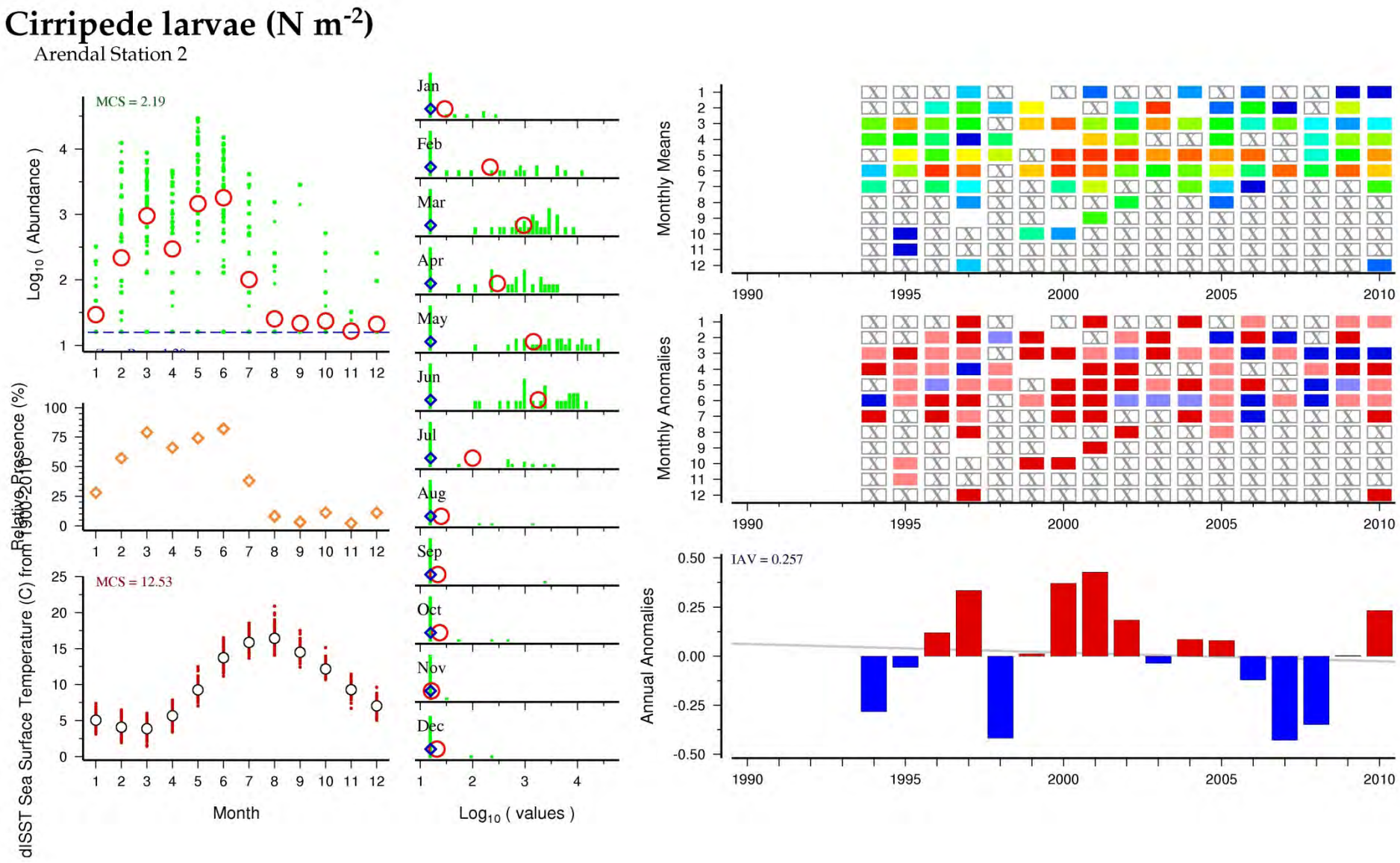
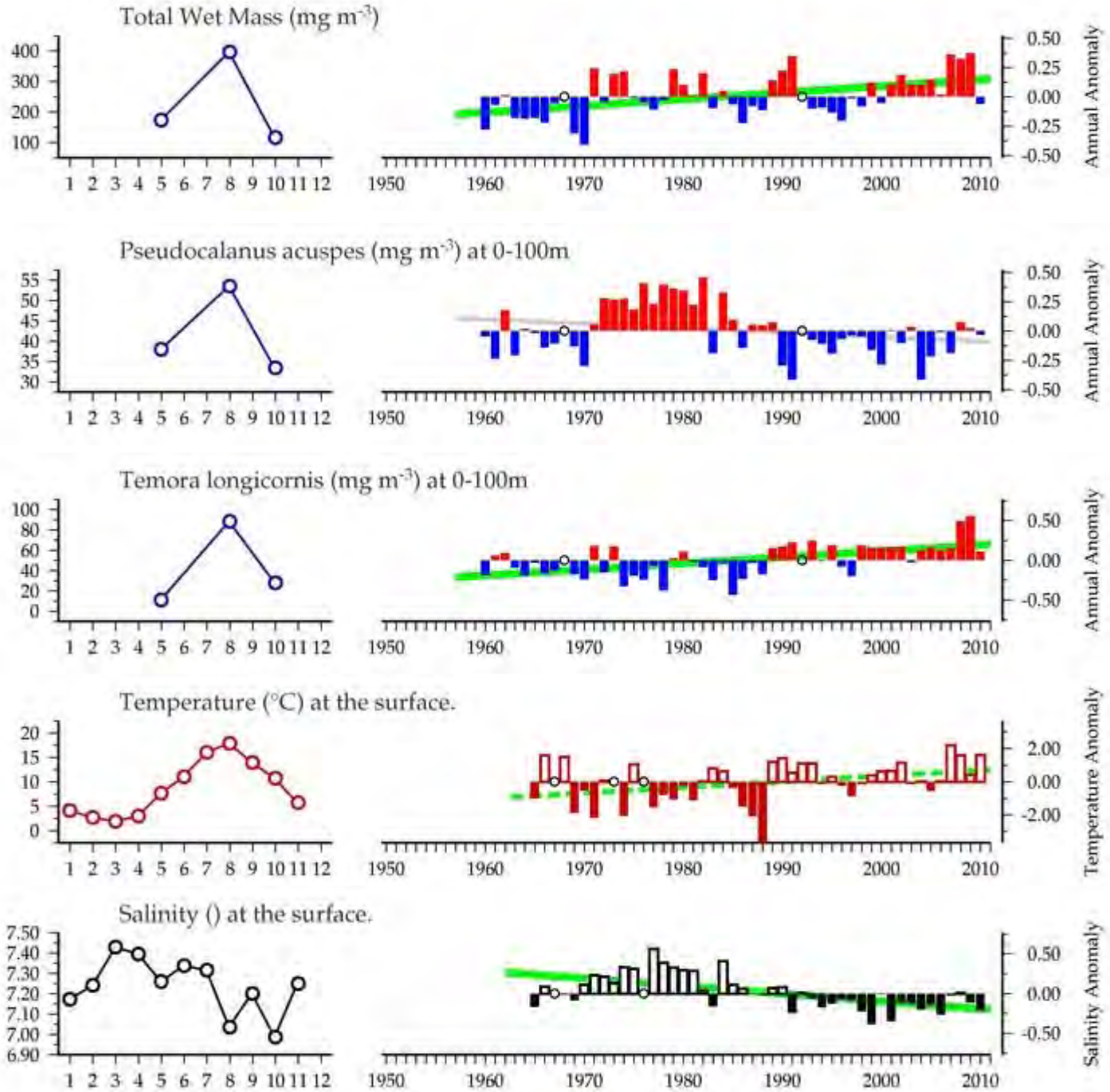
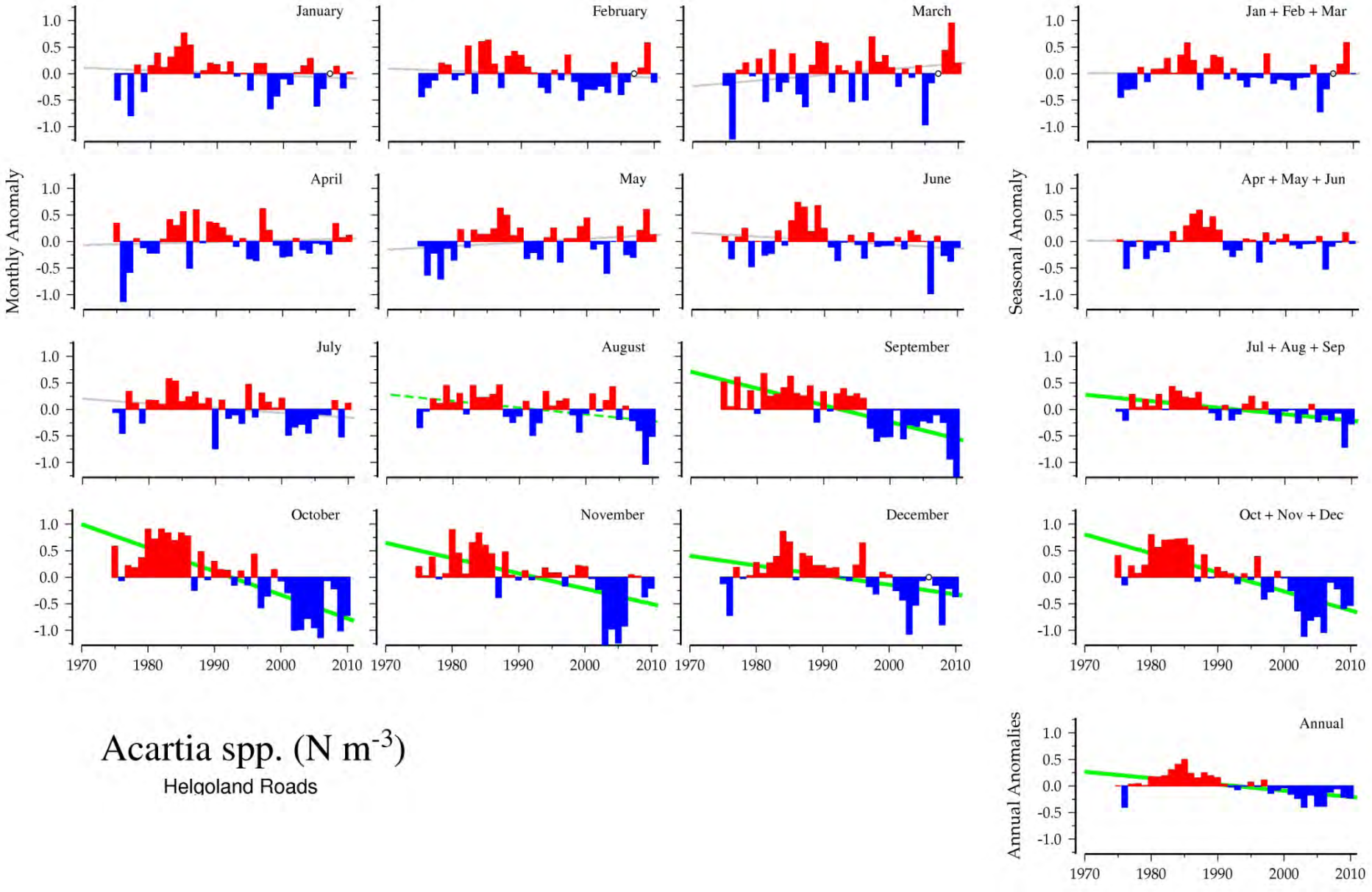


Multi-Variable Comparison Plot



Monthy/Seasonal/Annual Anomaly Plot ("MonAnom")



Acartia spp. (N m^{-3})

Helgoland Roads

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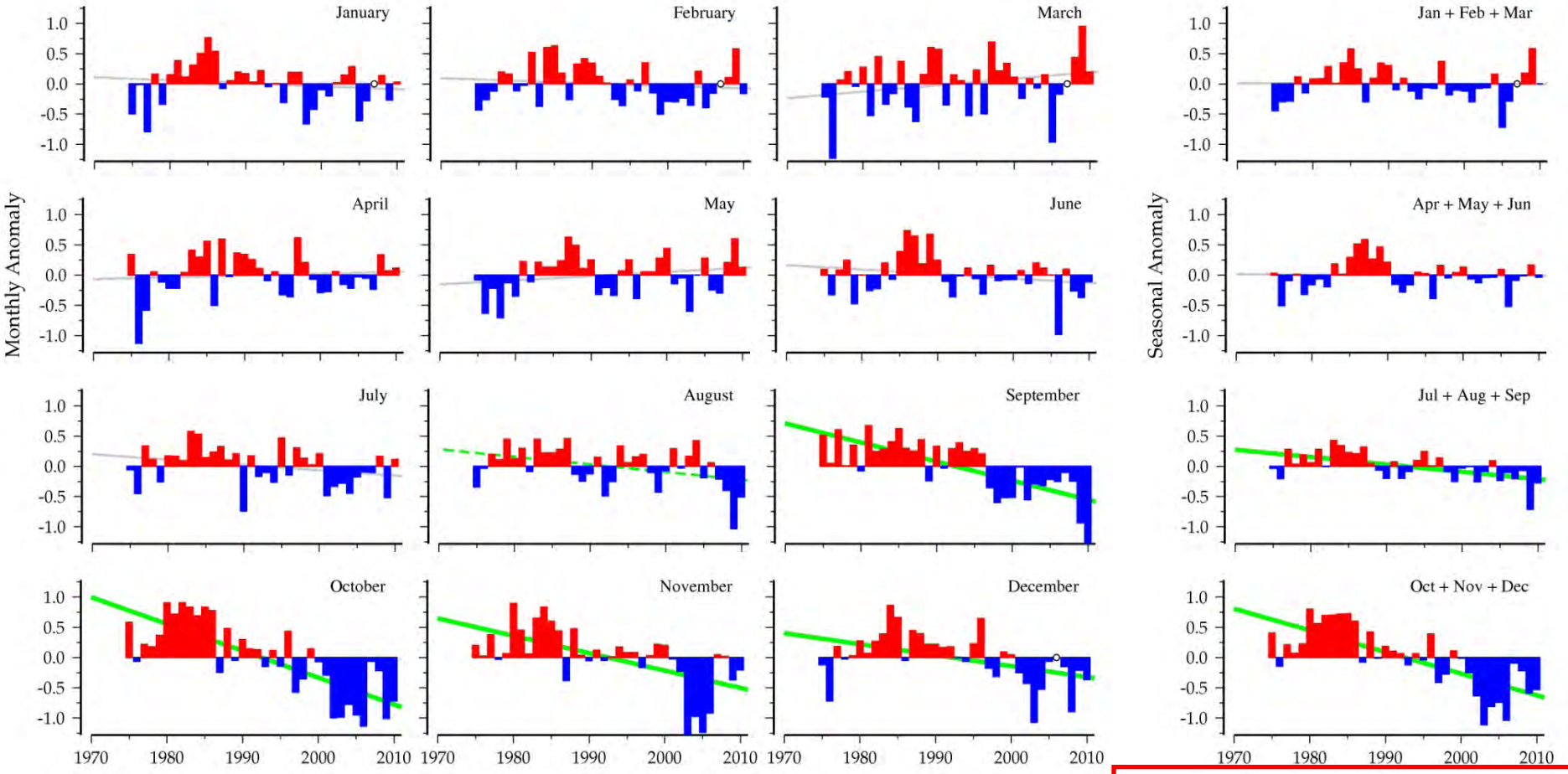

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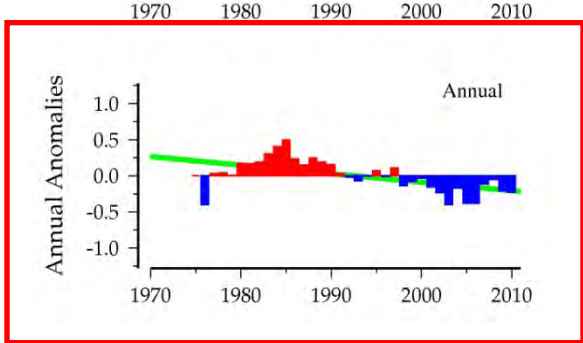

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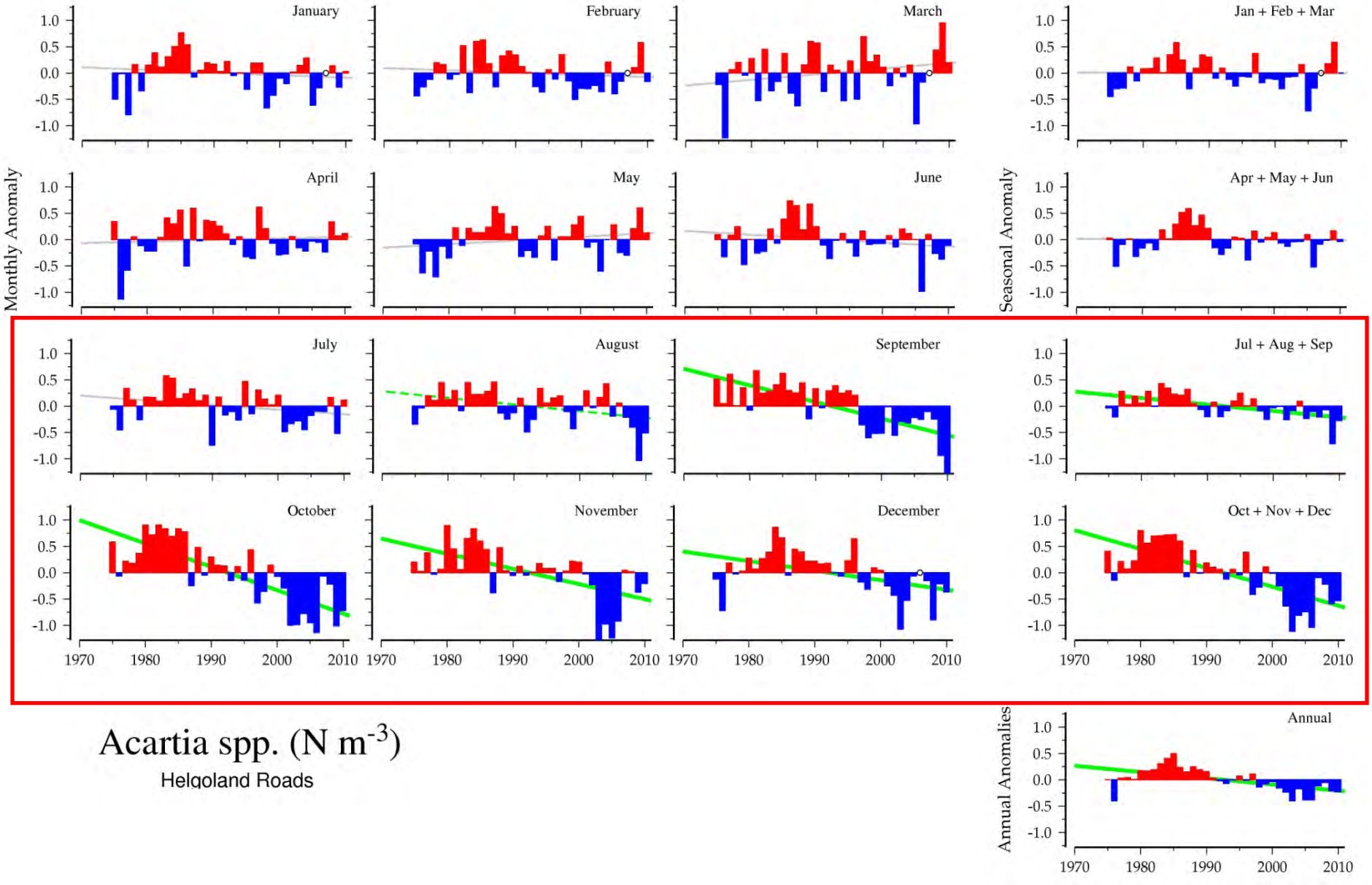
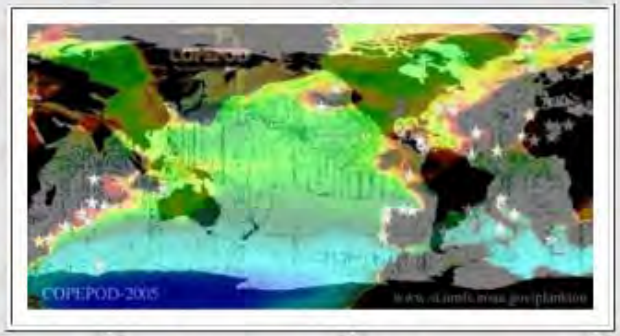


Future Additions to **COPEPODITE**

- New Ancillary Data
  - E.g., Stratification, Precipitation, Upwelling Indices
- New Analysis Modules
  - Currently annual-focused … will add monthly-based
  - ***Weekly*** (52) and ***half-month*** (24) time bins
  - Cross time-bin analyses
- **Better Statistics (!!!)**
- New Interface and Results Options
  - More user control over plots and plots sub-figures
  - Multiple-site uploading and comparison options

COPEPOD

A global plankton database of phytoplankton data and zooplankton data sampled from around the world.



Online Database

Search by [Geographic Region] [Taxonomic Group] [Other search options ...]

Data Products

[Global Zooplankton Biomass Fields] [Global Group Compilations] [More ...]

Time Series

[Zooplankton] [Phytoplankton] [**COPEPODITE Toolkit**] [Methods]

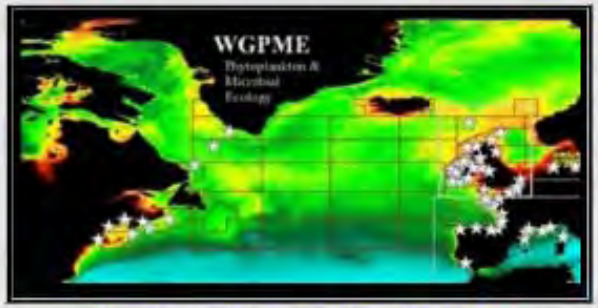
What is COPEPOD?

The Coastal & Oceanic Plankton Ecology, Production, & Observation Database **(COPEPOD)**

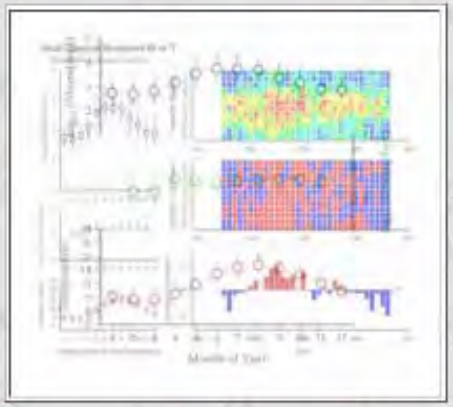
http://COPEPOD.org

COPEPODITE

An online plankton time-series analysis and visualization toolkit.



Plankton Time-series Metabase



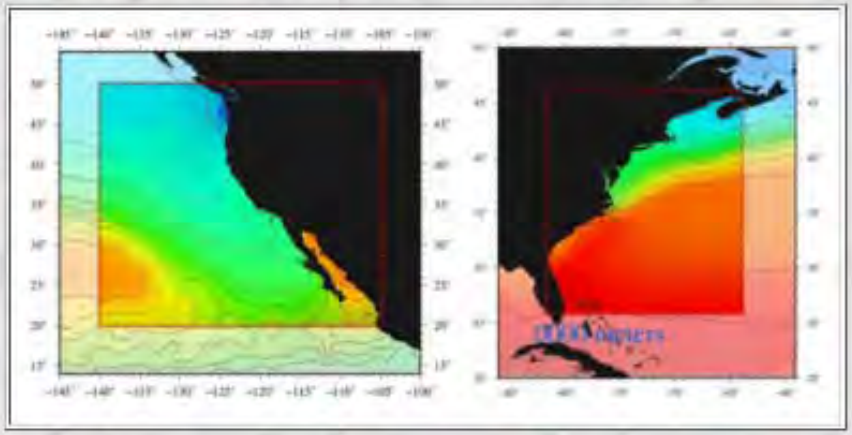
Interactive Time-series Explorer

COPEPODITE *is the* **I**nteractive **T**ime-series **E**xplorer *module of the* **COPEPOD** *global plankton database project.*

http://COPEPODITE.org

NAUPLIUS

Advanced Plankton & Ecosystems Data Products & Visualization Tools.



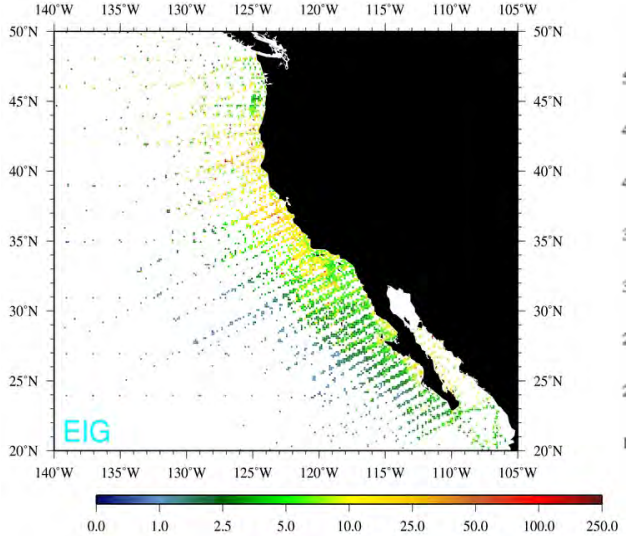
NAUPLIUS ties together data and visualization components from the **COPEPOD**, **COPEPODITE**, and **ECHO** projects, creating a comprehensive ecosystem overview from hydrography to biology.

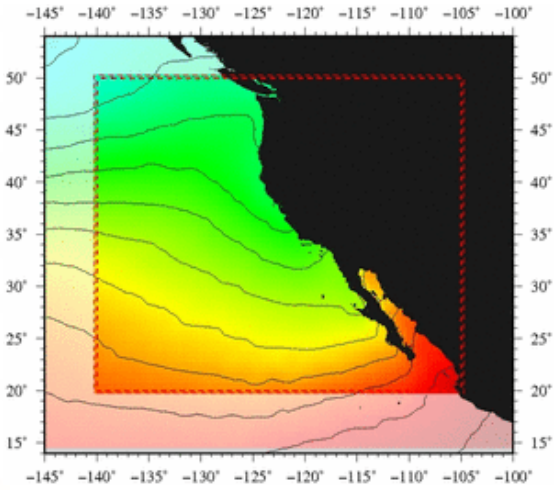
NAUPLIUS provides comprehensive data access and visualization tools for use in the classroom, laboratory, and management office.

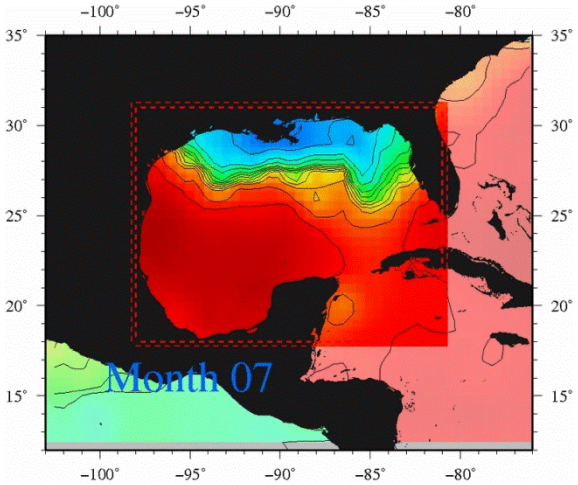
http://NAUPLIUS.org

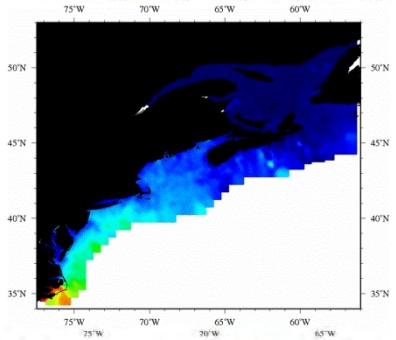
NAUPLIUS

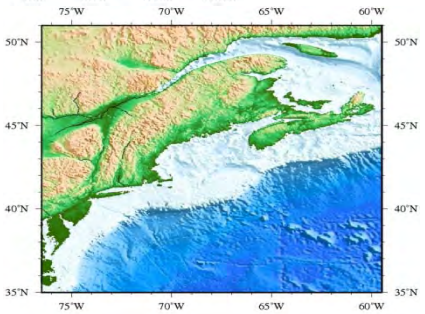
Advanced Plankton & Ecosystems Data Products & Visualization Tools

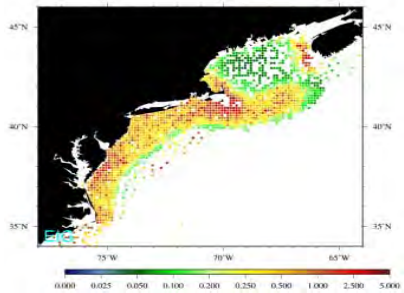


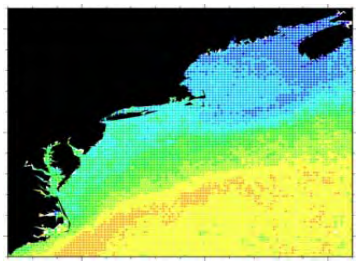


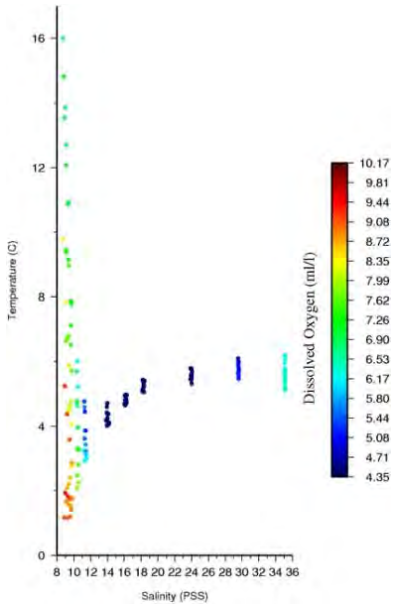


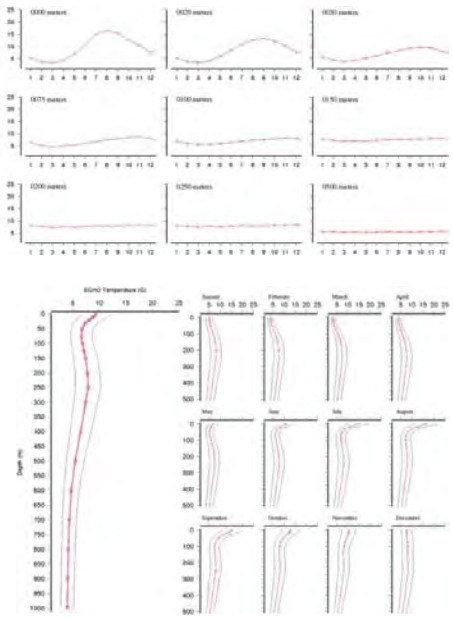












Internet Shortcuts:

- http://COPEPOD.org
- http://COPEPODITE.org
- http://NAUPLIUS.org

The "Official" Web Addresses:

- http://www.st.nmfs.noaa.gov/copepod
- http://www.st.nmfs.noaa.gov/copepodite
- http://www.st.nmfs.noaa.gov/nauplius