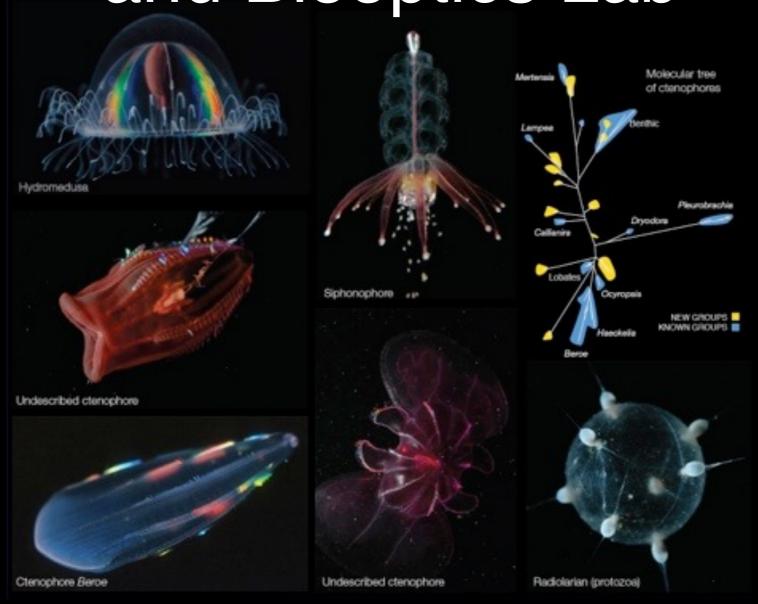
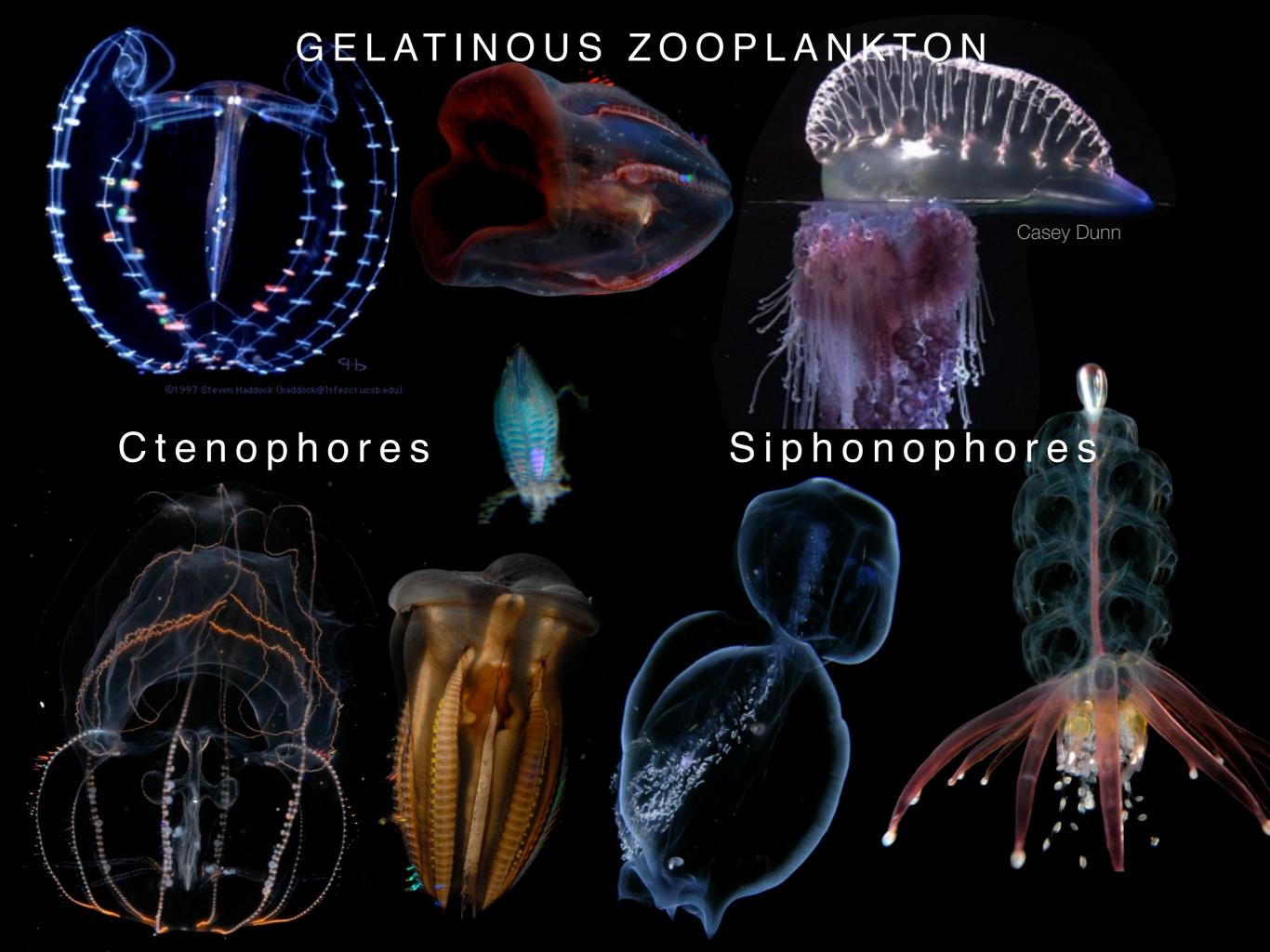
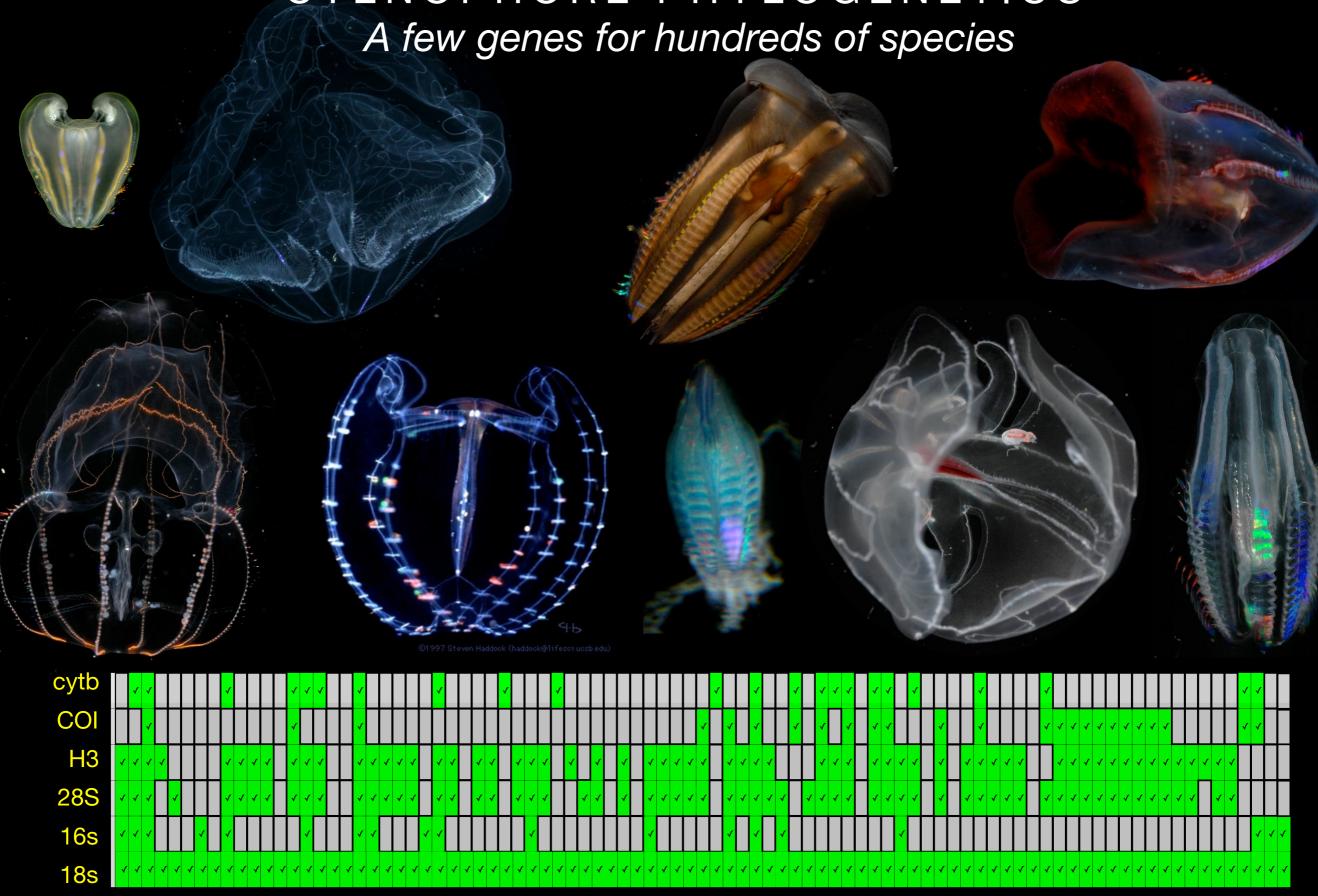
Zooplankton Biodiversity and Biooptics Lab



Steve Haddock haddock@mbari.org Lynne Christianson Darrin Schultz dschultz@mbari.org



Sanger sequencing for CTENOPHORE PHYLOGENETICS



Transcriptomes (94) Thousands of genes for dozens species

SIPHONOPHORES

Abylopsis

Apolemia

Chelophyes

Chuniphyes_moserae

Chuniphyes_multidentata

Cordagalma

Craseoa

Desmophyes

Diphyes

Frenna

Forskalia

Hippopodius

Lilyopsis

Lions mane

Lychnagalma

Marrus

Nanomia

Resomia

Rhisophysa

Rosacea

Stephalia

CRUSTACEANS

Gaussia Luminous Tail Gaussia Non-Luminous Pleuromamma_robusta

WORMS

(Polychaete & Chaetognath)

C.macrocephala

E.fowleri Body

E.fowleri Tail

Harmothoe

Tomopteris

Flota

Swima bombiviridis

MOLLUSCS

Chiroteuthis

Dosidicus

Octopoteuthis

Phylliroe

Pterygioteuthis

Vampyroteuthis

CTENOPHORES

Bathocyroe fosteri

Bathyctena chuni

Benthic ctenophore

Beroe abyssicola

Beroe forskalii

Bolinopsis infundibulum

Charistephane

Ctenoceros red

Dryodora

Euplokamis

Haeckelia rubra

Hormiphora

Lampea

Lampocteis cruentiventer

Nephelo red

Nephelo white

Ocyropsis maculata

Thalassocalyce

Vermillion lobate

Velamen parallelum

Weird cteno

OTHER CNIDARIA

Atolla vanhoeffeni

Halitrephes_valdiviae

Aegina_citrea

Solmissus incisa

Tetraplatia volitans

PROTISTS (Radiolaria)

T_globosa

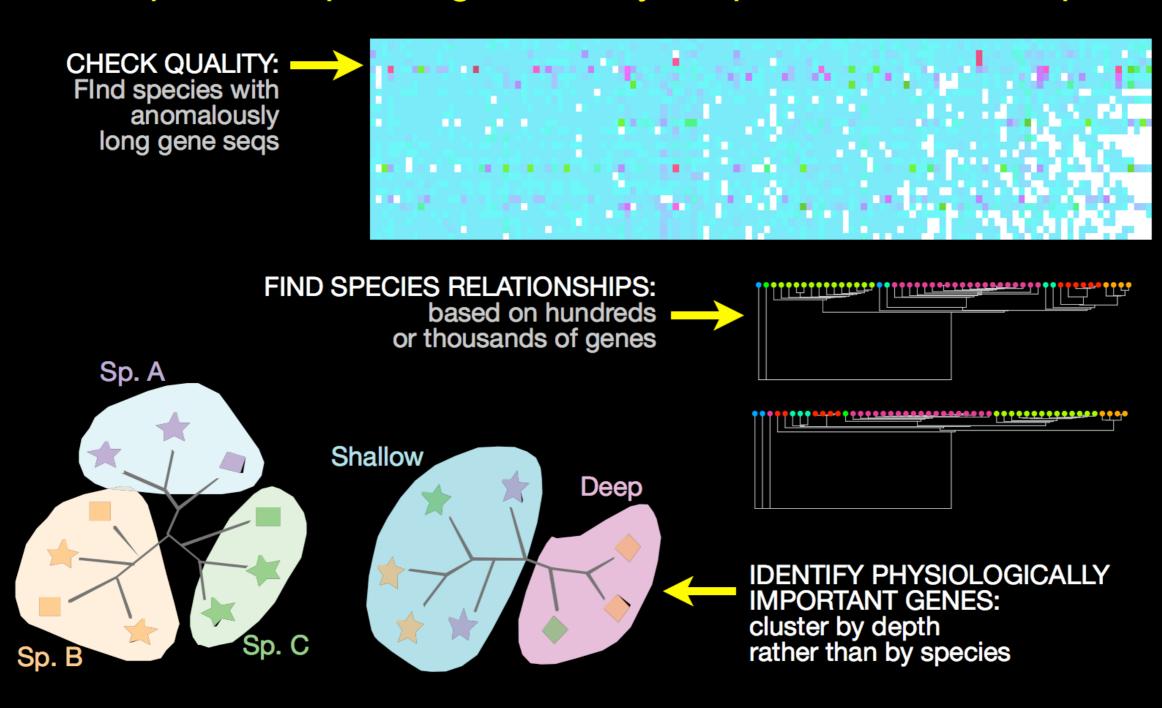
T_campanella

T. braueri



Transcriptomes -> mtDNA genomic -> primers

Transcriptome sequencing to identify adaptations to the deep-sea



KogPlot.R script Transcriptomes give thousands of genes, • bathocyroe • Micromonas these are assigned to clusters Want to then identify outliers in clusters.

Resources

Internal BLAST database for many hundreds of zooplankton specimens, including undescribed species.

At least one undescribed siphonophore was found in this recent microbial survey

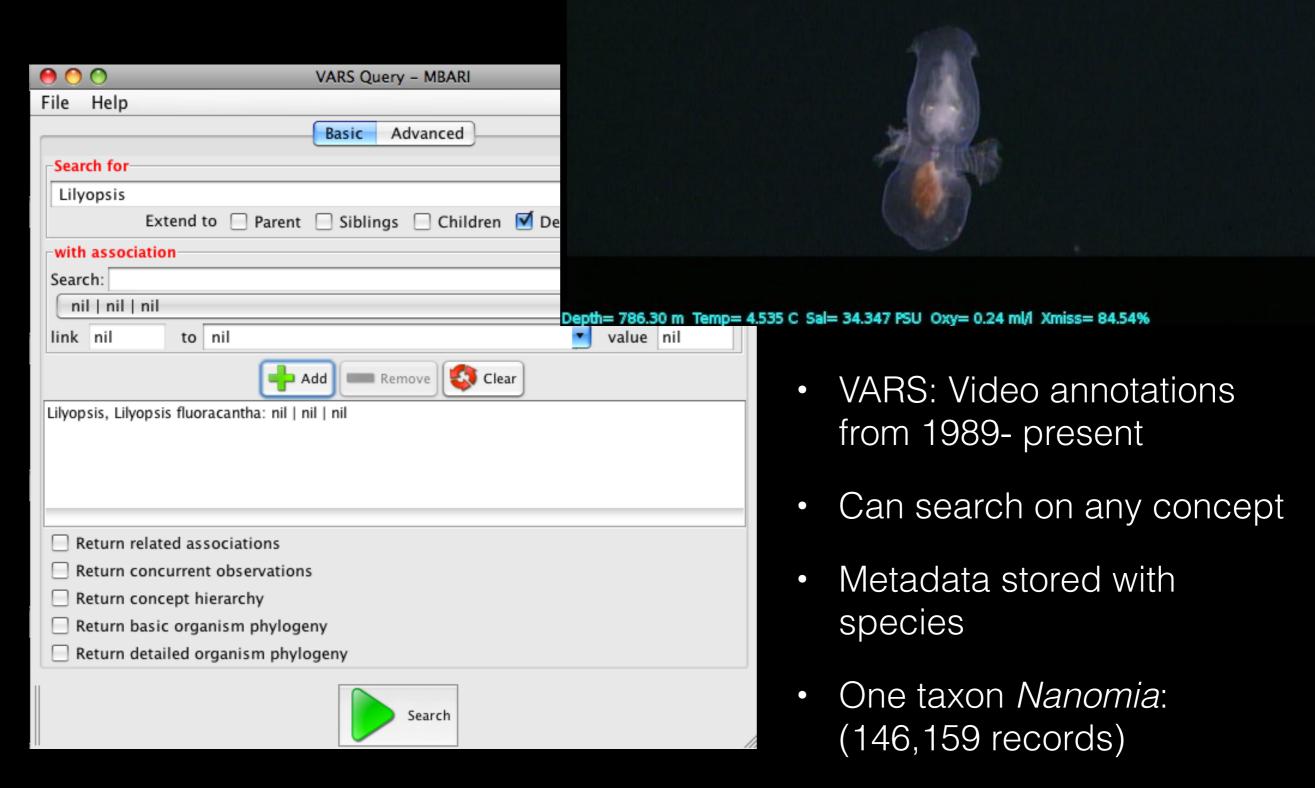


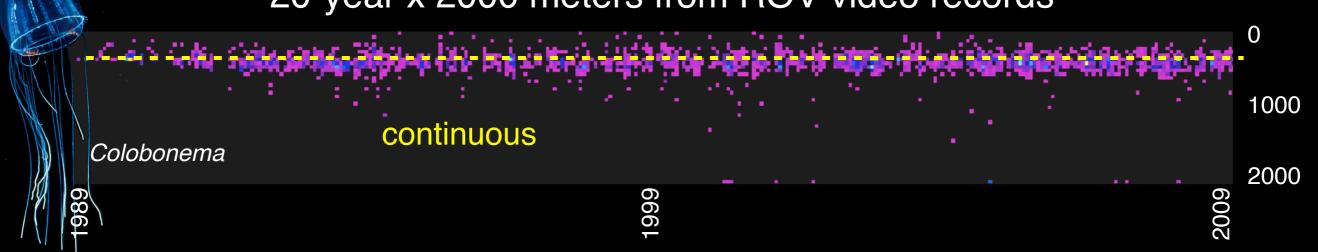
Investigating Microbial Eukaryotic Diversity from a Global Census: Insights from a Comparison of Pyrotag and Full-Length Sequences of 18S rRNA Genes

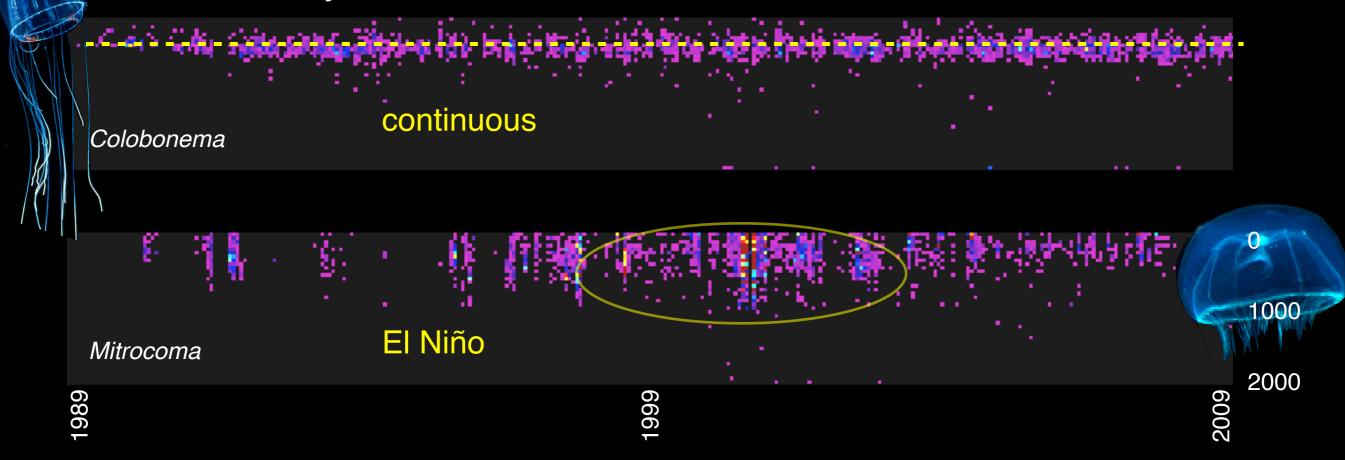
Alle A. Y. Lie,^a Zhenfeng Liu,^a Sarah K. Hu,^a Adriane C. Jones,^a Diane Y. Kim,^a Peter D. Countway,^b Linda A. Amaral-Zettler,^{c,d} S. Craig Cary,^{e,h} Evelyn B. Sherr,^f Barry F. Sherr,^f Rebecca J. Gast,^g David A. Caron^a

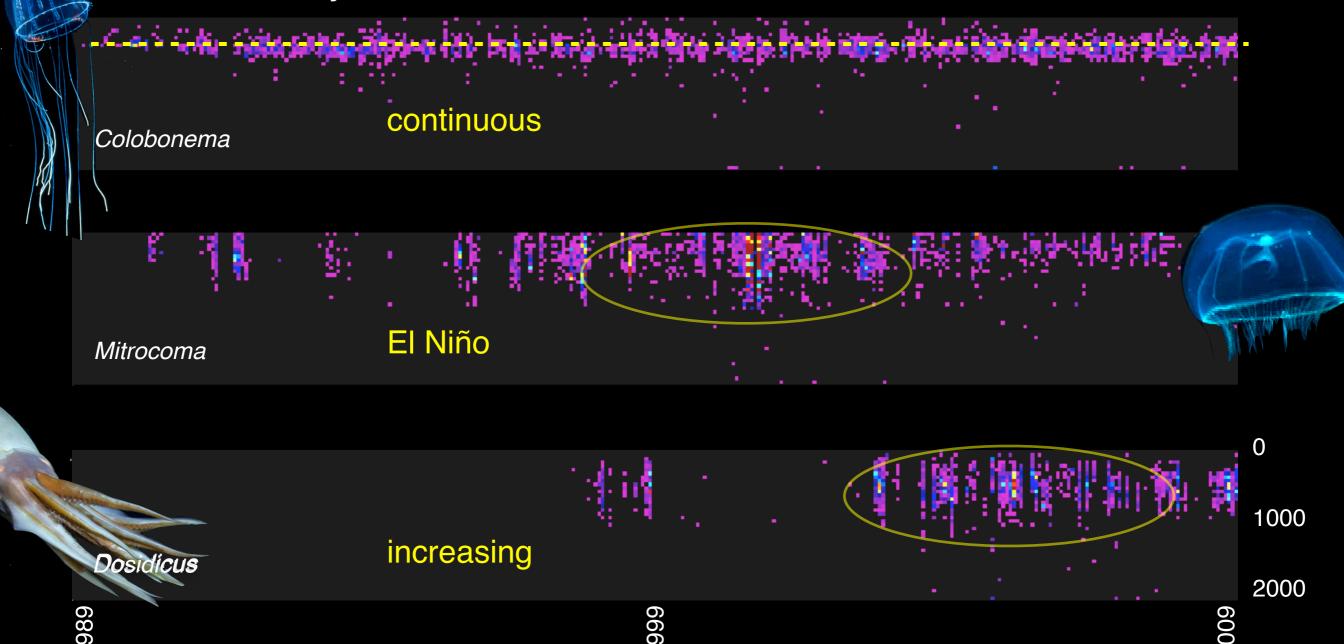
Department of Biological Sciences, University of Southern California, Los Angeles, California, USA^a; Bigelow Laboratory for Ocean Sciences, East Boothbay, Maine, USA^b; The Josephine Bay Paul Center for Comparative Molecular Biology and Evolution, Marine Biological Laboratory, Woods Hole, Massachusetts, USA^c; Department of Geological Sciences, Brown University, Providence, Rhode Island, USA^d; Environmental Research Institute, School of Science, University of Waikato, Hamilton, New Zealand^e; College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, Oregon, USA^f; Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, USA^g; College of Earth, Ocean, and Environment, University of Delaware, Lewes, Delaware, USA^h

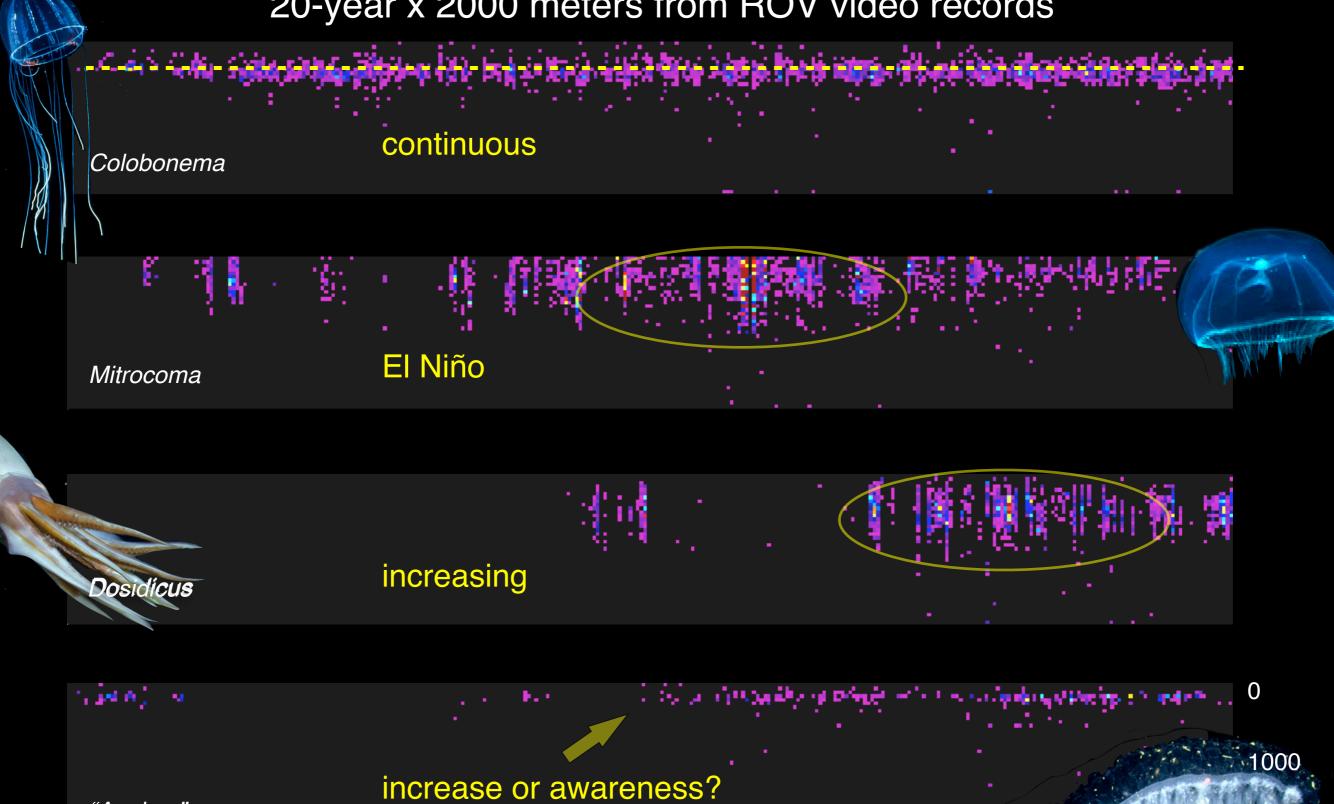
VIDEO RECORDS of DEEP DIVERSITY





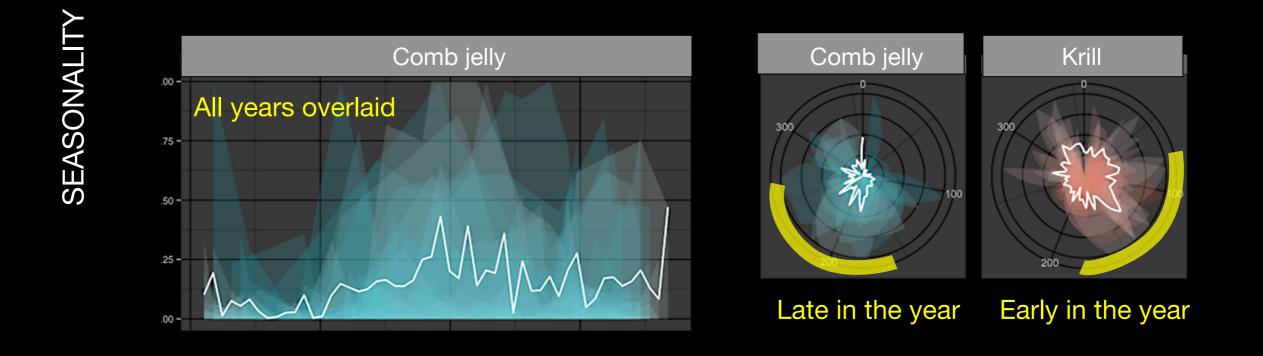


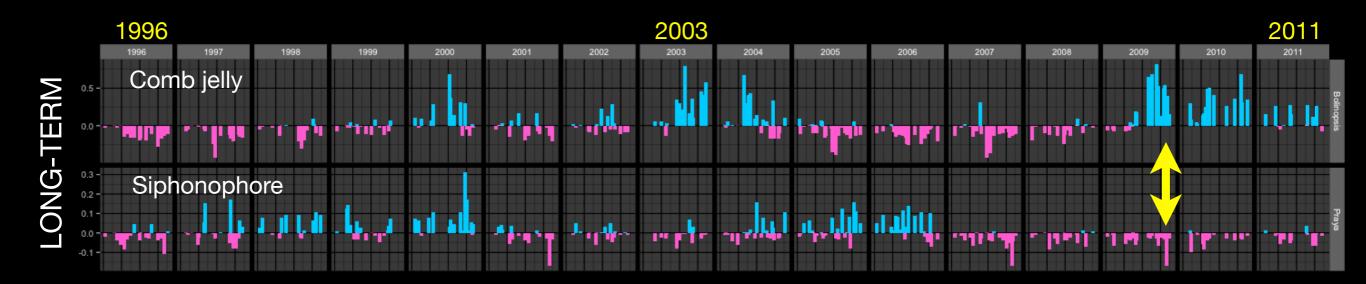




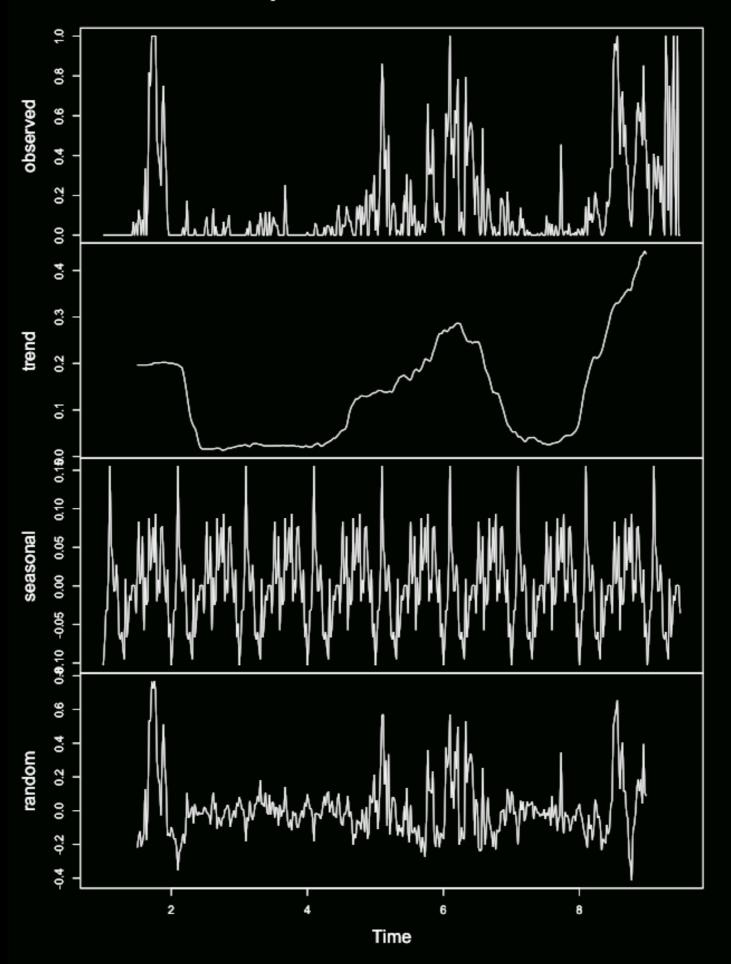
"Agalma"

Tools for analyzing and visualizing data Identifying long-term ecosystem trends





Decomposition of additive time series

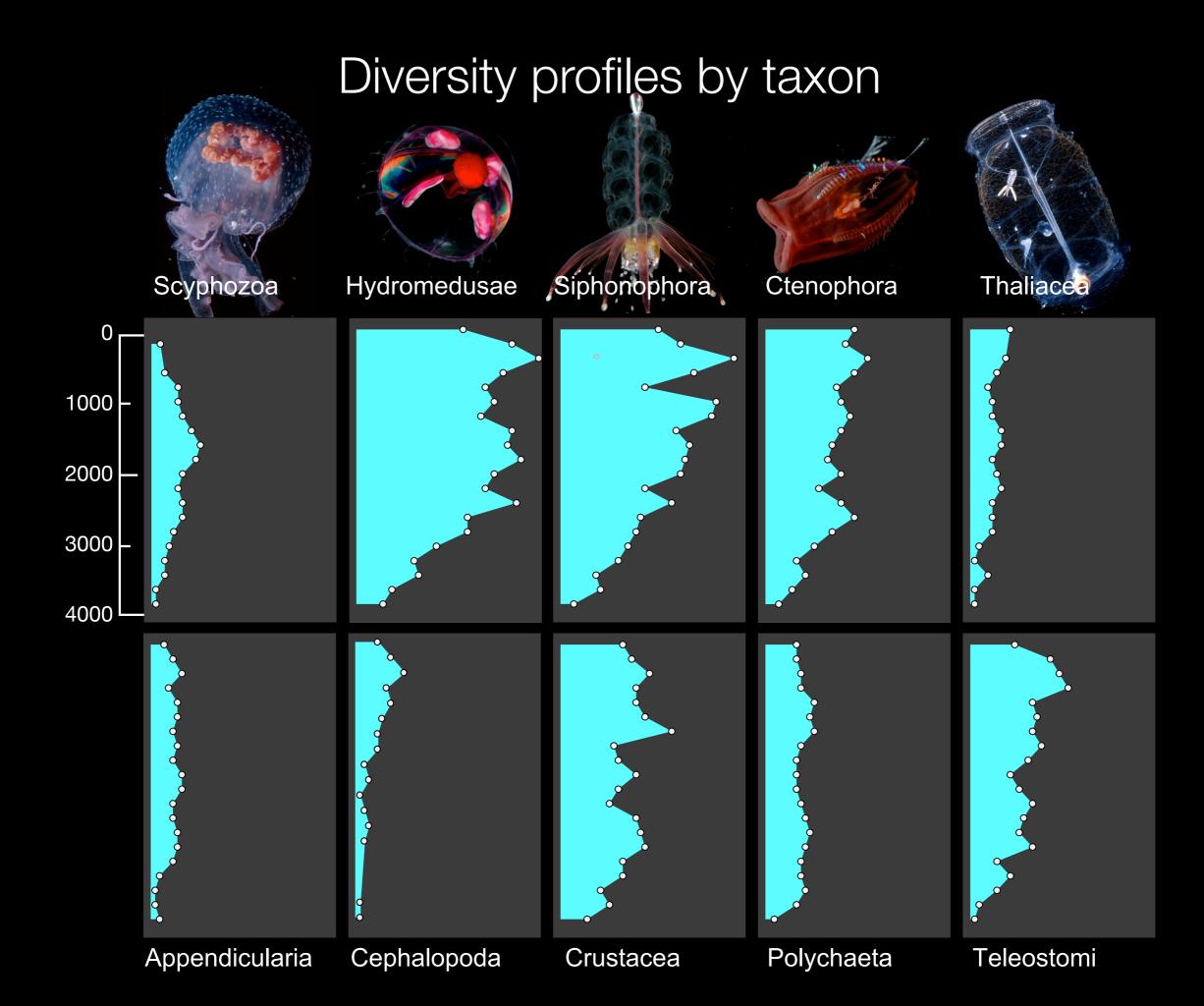


Original data (= sum of below)

Long-term trend

Periodic element

Random element



Current MBARI Database Tools

VARS DB

(Video Annotation -Species/OTU, Phys Data, Dive data)

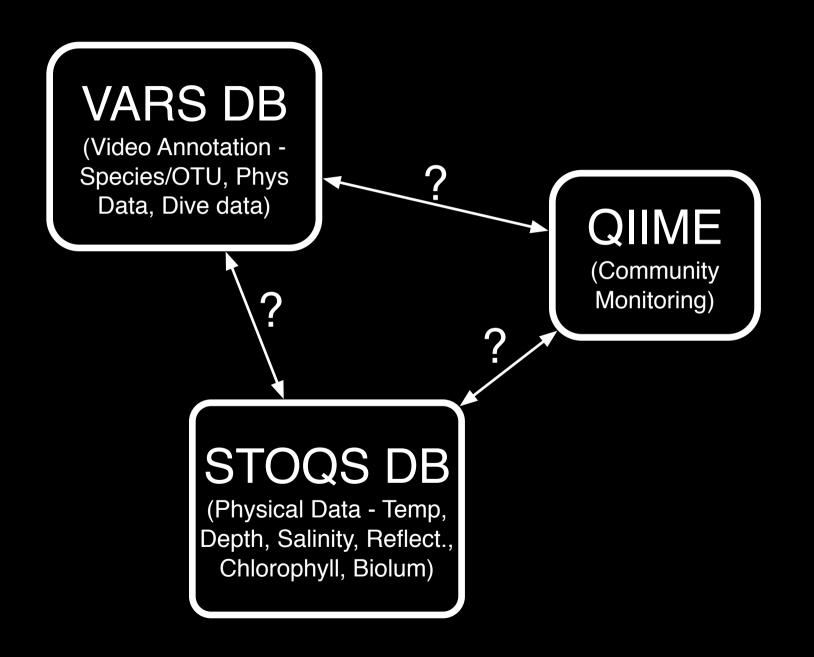
QIIME

(Community Monitoring)

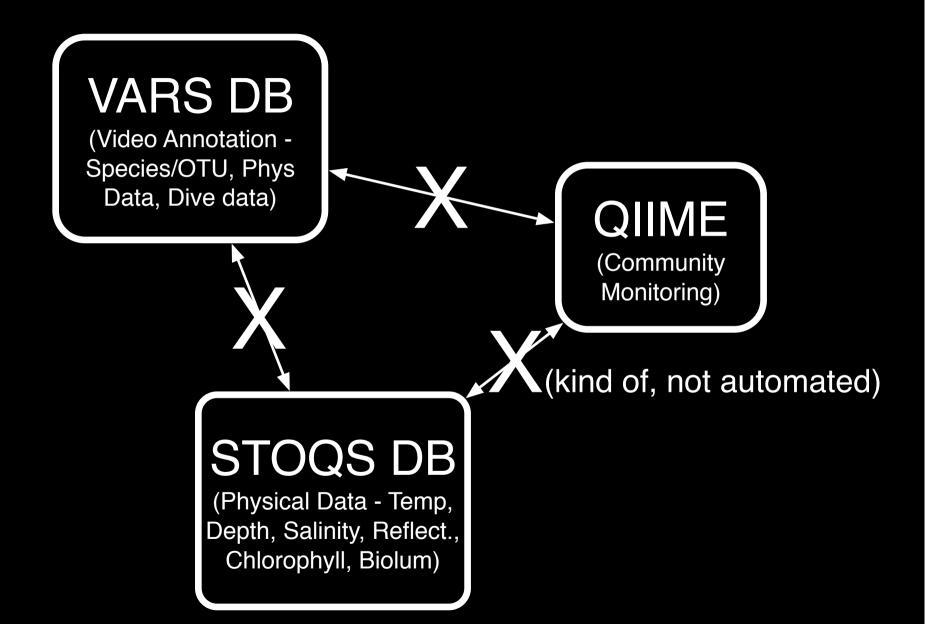
STOQS DB

(Physical Data - Temp, Depth, Salinity, Reflect., Chlorophyll, Biolum)

Current MBARI Database Tools



Current MBARI Database Tools



VARS DB

(Video Annotation -Species/OTU, Phys Data, Dive data)

STOQS DB

(Physical Data - Temp, Depth, Salinity, Reflect., Chlorophyll, Biolum)

Current MBARI Database Tools

DeLong - Microbe Metagenomes Transciptomes

MMESTP Transcriptomes

Worden
Transcriptomes/
Sequences

Haddock
Transcriptomes/
Sequences

Scholin
Microbes +
Phytoplankton

Vrijenhoek DNA/RNA data (Transects)

QIIME

(Community Monitoring)

VARS DB

(Video Annotation -Species/OTU, Phys Data, Dive data)

STOQS DB

(Physical Data - Temp, Depth, Salinity, Reflect., Chlorophyll, Biolum)

Database Integration for MBON

DeLong - Microbe Metagenomes Transciptomes

MMESTP Transcriptomes

Worden
Transcriptomes/
Sequences

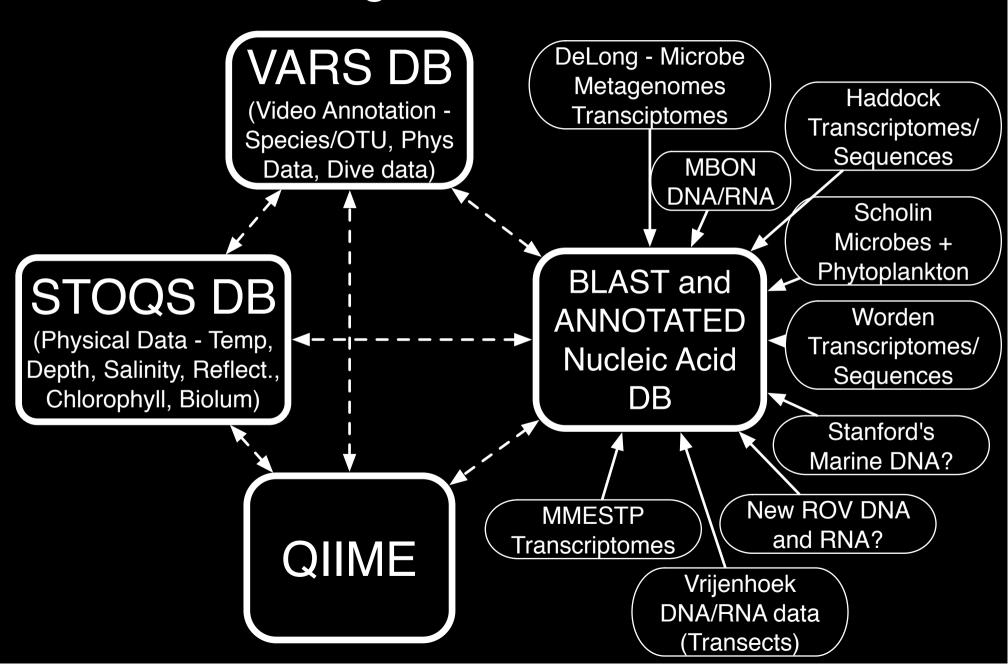
Haddock
Transcriptomes/
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Scholin
Microbes +
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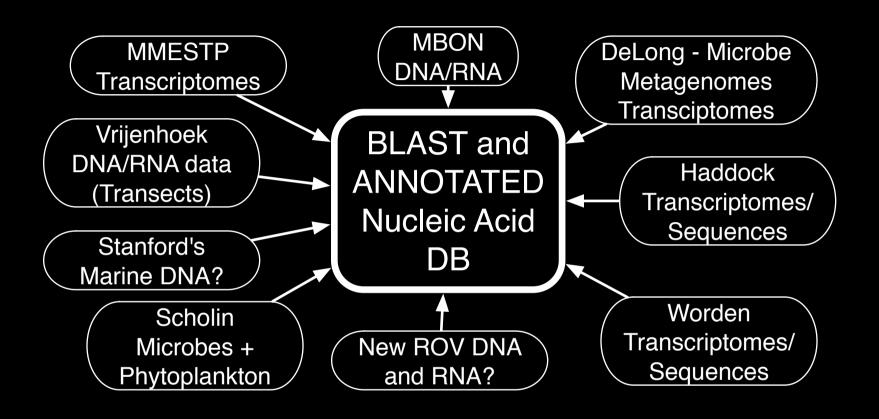
Vrijenhoek DNA/RNA data (Transects)

QIIME

Database Integration for MBON - Future?

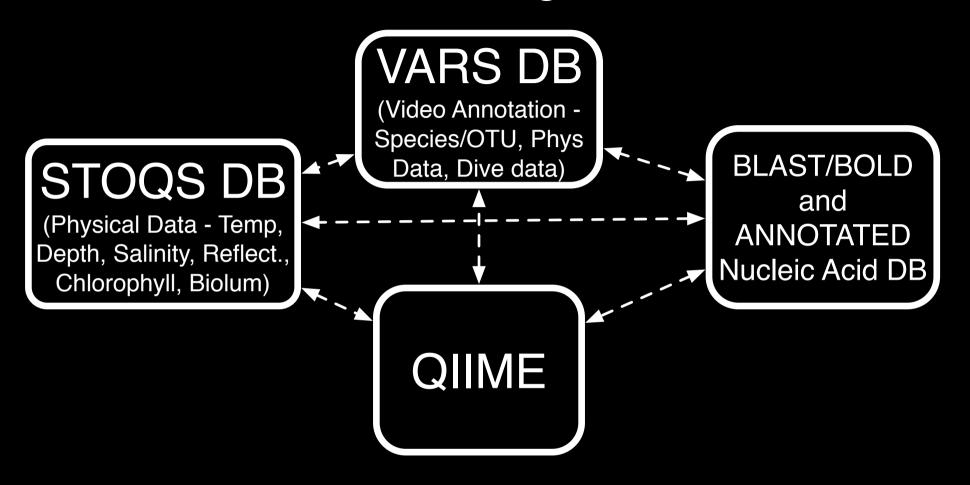


What's needed to integrate databases?



Collation of Scattered In-House Data (Bioinformatics/Programming)

What's needed to integrate databases?



Modification of Existing Databases (Software Engineering)

Database Integration for MBON - Future?

