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Monterey Bay Aquarium
Research Institute

the David & Lucile
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FOUNDATION

FathomNet: Accelerating observations of marine life using artificial intelligence and broad community engagement



IOQS
ASSOCIATION

EcoObs Topic 2 IRA

Kakani Katija • Kevin Barnard • Katy Croff Bell • Lilli Carlsen • Laura Chrobak • Emily Clark • Issie Corvi • Megan Cromwell • Susan Poulton
• Henry Ruhl • Ben Woodward



OCEAN
DISCOVERY
LEAGUE



CENTRAL & NORTHERN
CALIFORNIA OCEAN
OBSERVING SYSTEM



CVision

&RANJ

Collaborators and supporting institutions:



NATIONAL
GEOGRAPHIC



Impact
Observatory



Monterey Bay
Aquarium



E • Line
MEDIA

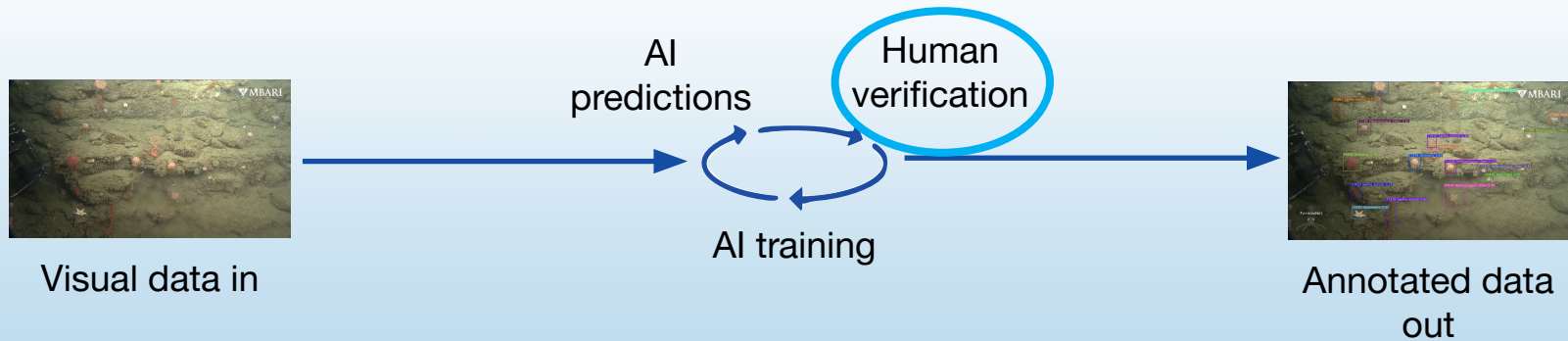


A vision for the Blue Economy

Growing the blue economy requires understanding of its impact on the ocean environment, particularly the life that lives there.

Image credit: *The Ocean Economy in 2030*, OECD (2016)

The Challenge

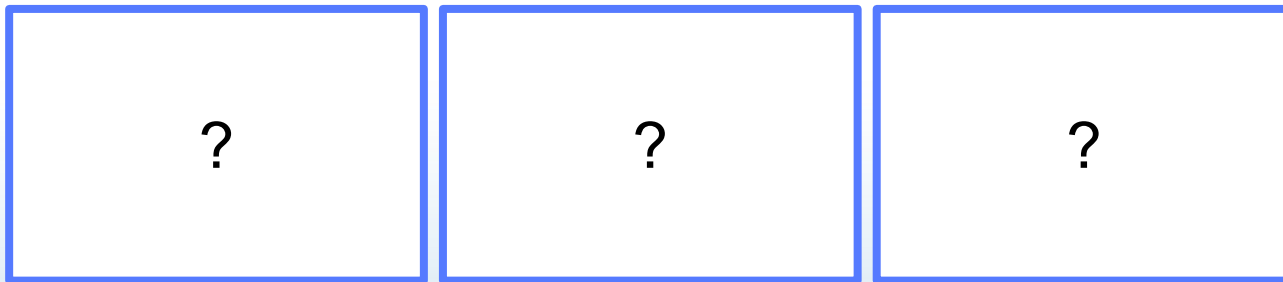




FATHOMNET

The Approach

FathomNet Database



EXPERTS

ENTHUSIASTS

Human-AI interfaces



Visual data in

AI
predictions

Human
verification

AI training

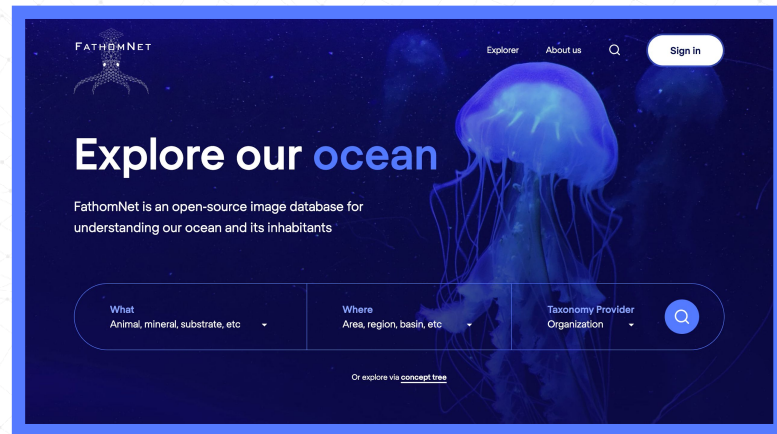


Annotated data
out

FathomNet Database

Global image and ML model repository

- Upload, host visual data and ML models
- Publicly available labeled image dataset
- Search, view metadata, augment labels
- Taxonomic expertise aggregator
- MBARI-NOAA agreement to host submitted data for up to 75 years from contributors all over the world
- FathomNet-Kaggle Competition as part of CVPR-FGVC



www.database.fathomnet.org

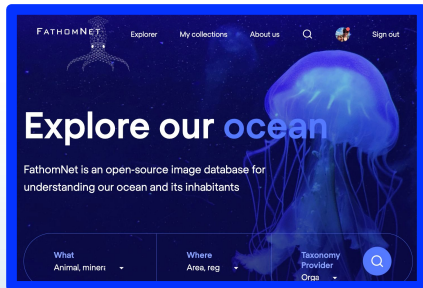




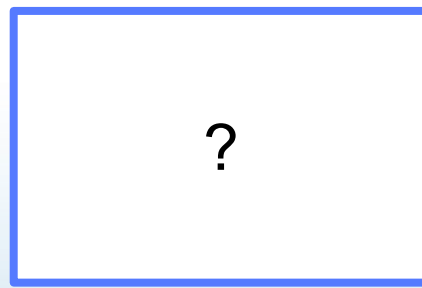
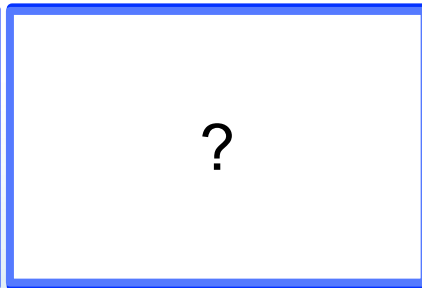
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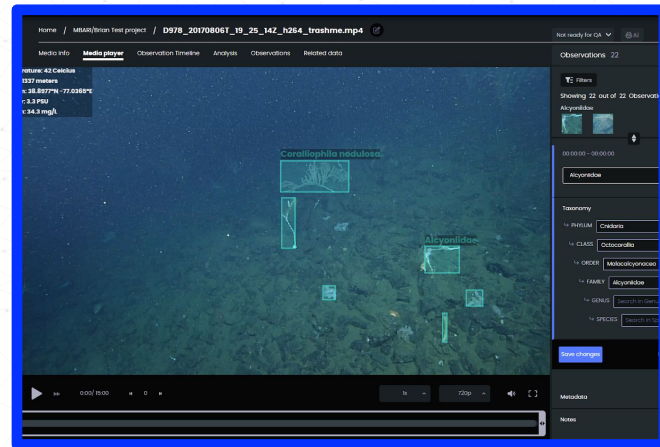


Annotated data
out

FathomNet Portal

Providing access to ML data pipelines

- Upload, host visual data
- Public/private repositories
- Select, train, deploy machine learning models
- Verify, augment labels generated by models
- Annotations exported to OBIS/GBIF, searchable database, FathomNet



www.portal.fathomnet.org

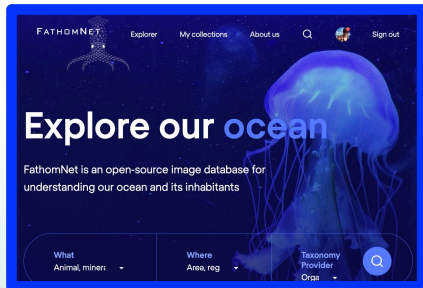




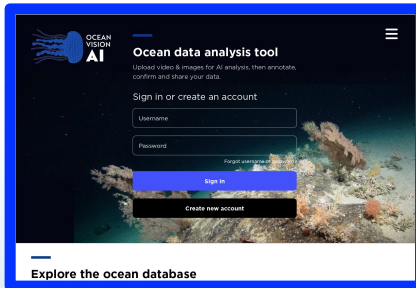
FATHOMNET

The Approach

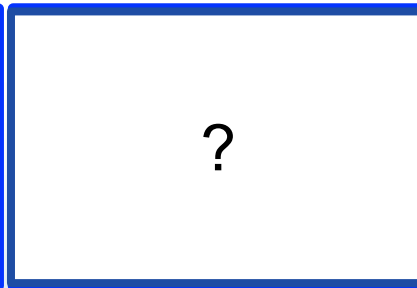
FathomNet Database



FathomNet Portal



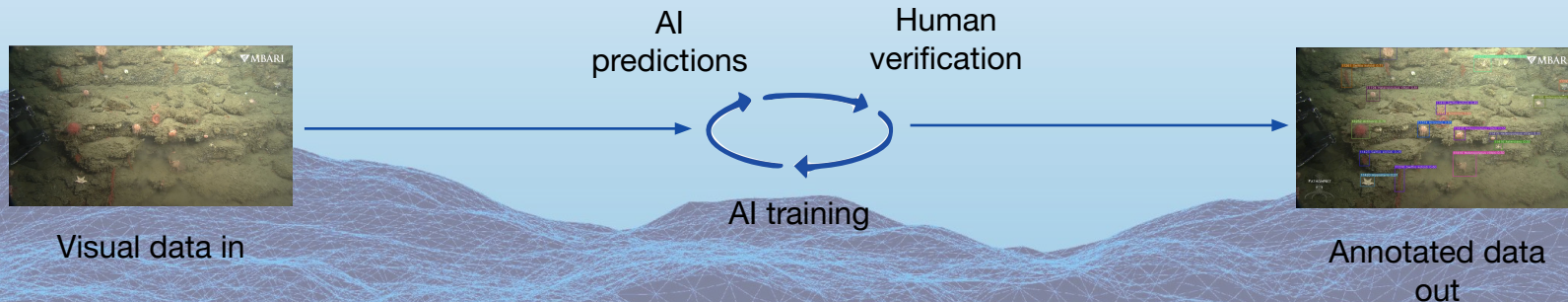
FathomVerse



EXPERTS

ENTHUSIASTS

Human-AI interfaces



FathomVerse

Crowdsourcing annotations through gaming

- Audience:
 - Primary: Ocean lovers, animal lovers, armchair explorers
 - Secondary: Underserved communities in ocean science
 - High school age and up
 - Driven by interests in animals & ocean facts
- Mobile phone app (IOS and Android)
- 32k players representing 176 countries generated >16.4M annotations since launching in May 2024*



www.fathomverse.game

 @fathomverse

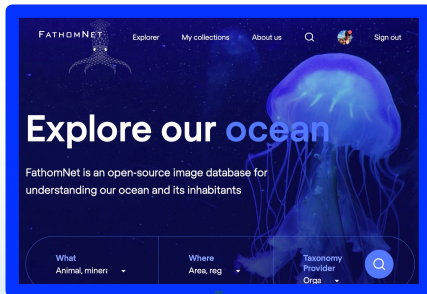




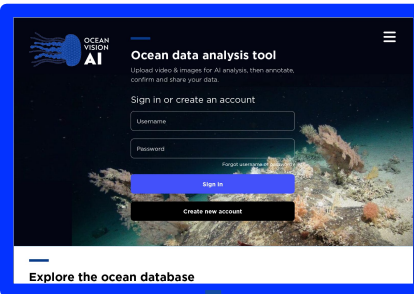
FATHOMNET

The Approach

FathomNet Database



FathomNet Portal



FathomVerse



Visual data in

AI
predictions

Human
verification

AI training

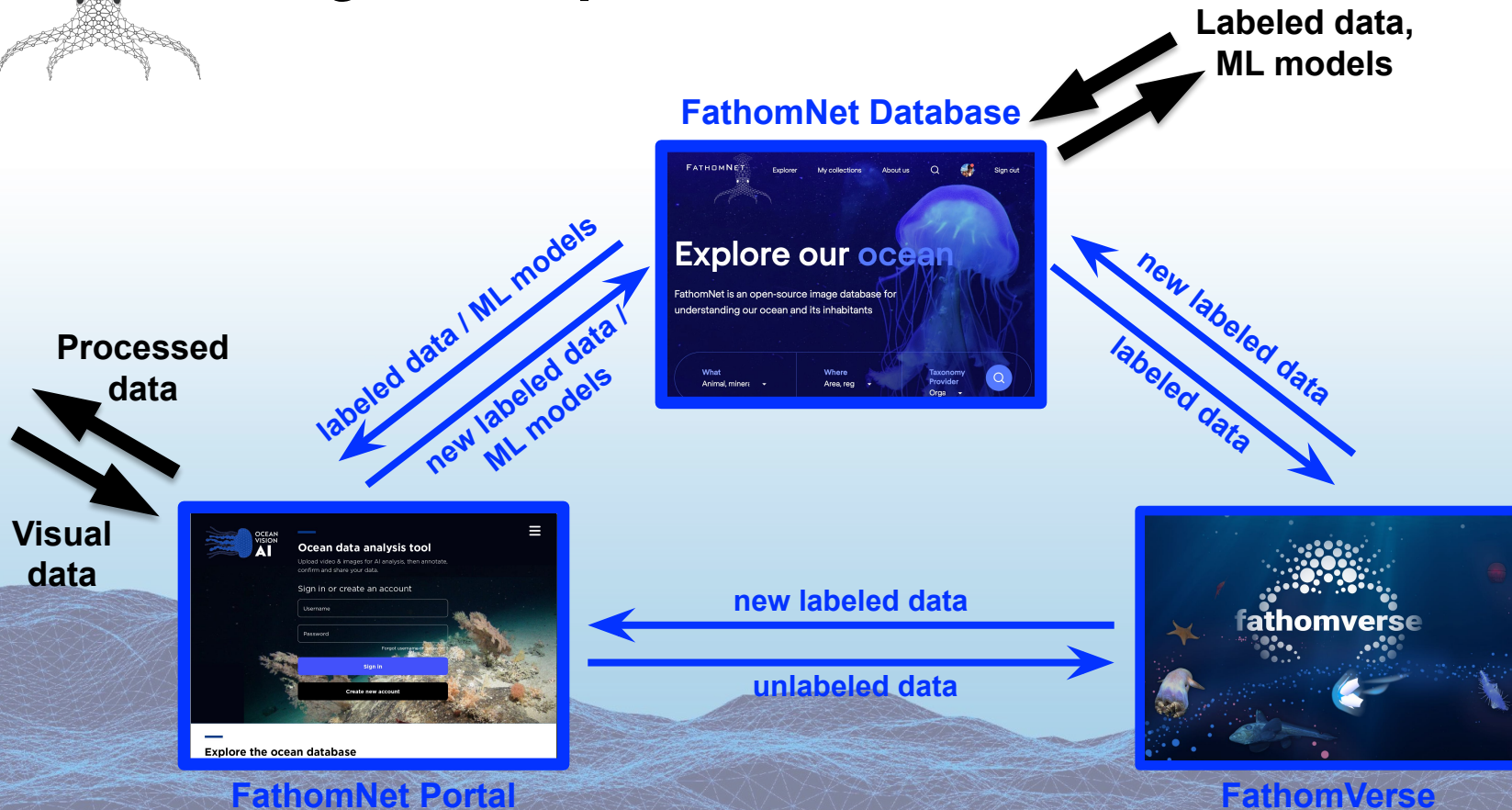


Annotated data
out



FATHOMNET

Integrated Pipeline





FathomVerse Content Management System: Prod

1.1.31:c5a4015

OAS 3.1

[/openapi.json](#)

OVAI Content Management Services for Admin, Game and Portal

Authorize



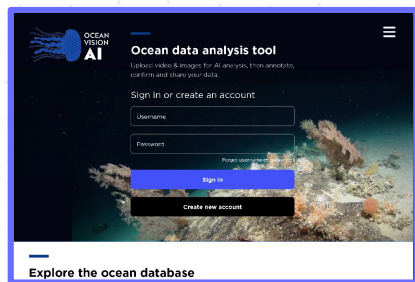
admin:v1:concepts

POST /admin/v1/concepts/ Create**GET** /admin/v1/concepts/count Get Fetch**POST** /admin/v1/concepts/fetch Post Fetch**GET** /admin/v1/concepts/{id} Get**DELETE** /admin/v1/concepts/{id} Delete

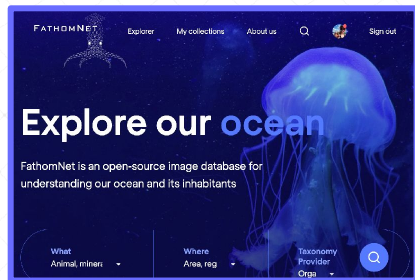
admin:v1:labelingRuns

POST /admin/v1/labelingRuns/ Create

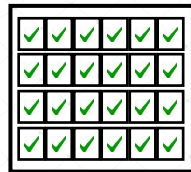
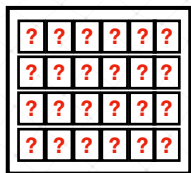
Content Management System (CMS)



FathomNet Database

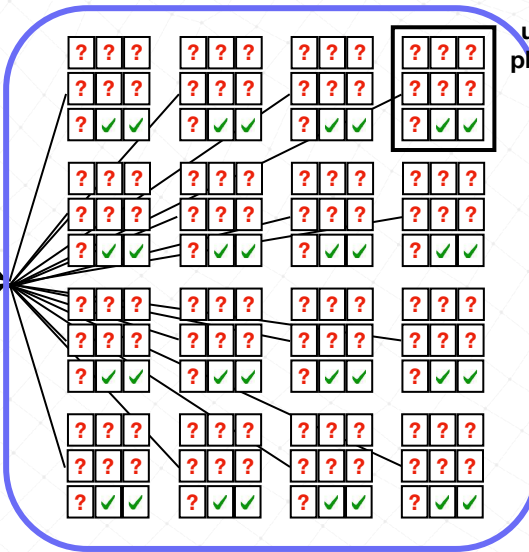


unlabeled data

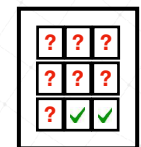


labeled data

CMS



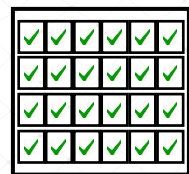
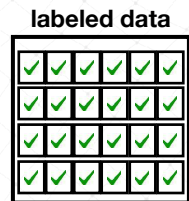
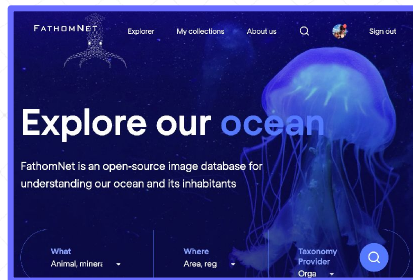
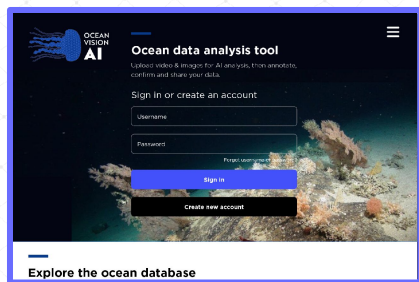
unlabeled
playcontext



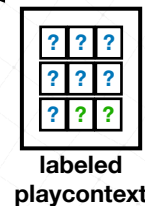
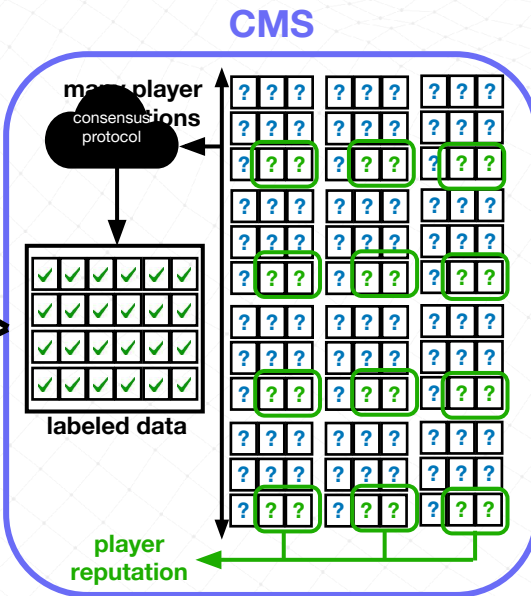
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playcontext



Content Management System (CMS)

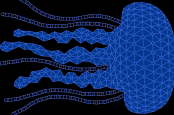


labeled data



Landscape Analysis



Platform	Web-based	Annot.	Local.	Deploy AI	Train AI	Data hosting	Gaming	Public Collab.
 BIIGLE	✓	✓	✓	✓				
 SQUIDLE+	✓	✓	✓	✓				
 VIAME	✓	✓	✓	✓	✓			
 OCEAN VISION AI	✓	✓	✓	✓	✓	✓	✓	✓

FathomNet Program Impact

10.5k

Followers & Subscribers

20k

Website Users

477M

Media Reach

1,626

Model Downloads

17k

Publication Accesses

56

Publication Citations

1,195

Workshop Registrants

1,610

Kaggle Competition Entrants

176

Countries

Database:

315k Annotations

111k Images

FathomVerse:

13M Annotations

869

Database
Users

38

HuggingFace
Members

32,644

FathomVerse
Players

71

Portal
Users

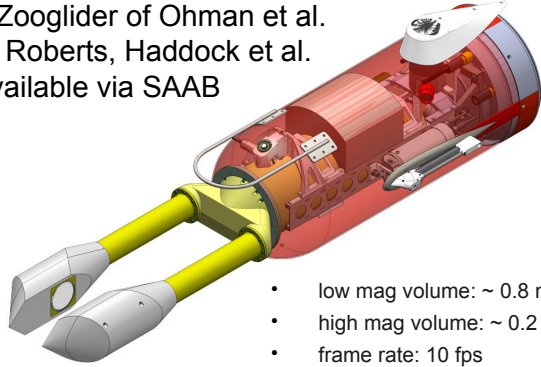
28,252

Total Platform
Users

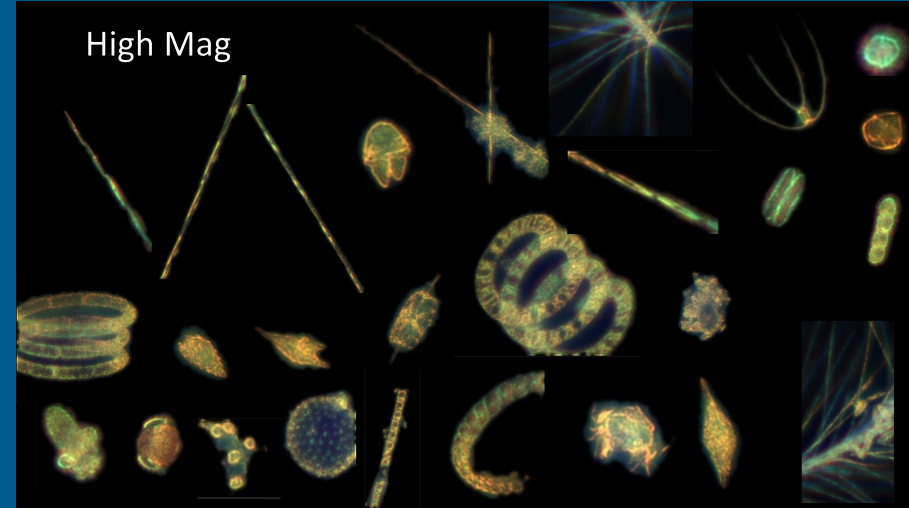
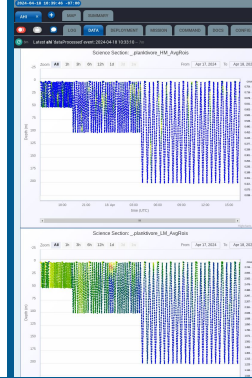


Planktivore on LRAUV

Buils on Zooglider of Ohman et al.
Maughan, Roberts, Haddock et al.
LRAUV available via SAAB



- low mag volume: ~ 0.8 ml
- high mag volume: ~ 0.2 ul
- frame rate: 10 fps





LRAUV Ahi CTD data from synchro cruise (Ahi_202404181737) (auv)

Add deployment to map +

Downloads

Visualization

Variables

Done



Leaflet | Base layer © MapBox

LRAUV Ahi CTD data from synchro cruise (Ahi_202404181737)

Date range

Apr 18, 2024 10:37 (PDT) - Apr 19, 2024 10:40 (PDT)

Metadata



Color palette

Rainbow

Visualize

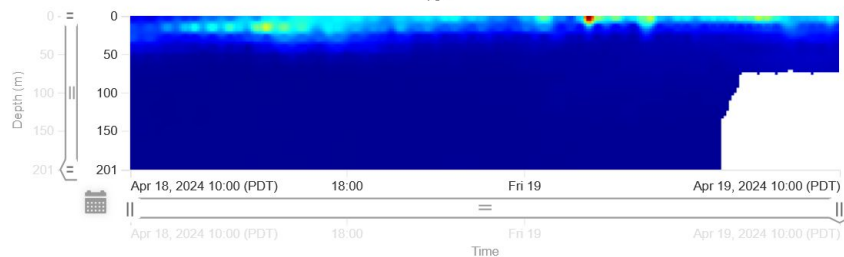
Chlorophyll a

Interpolation

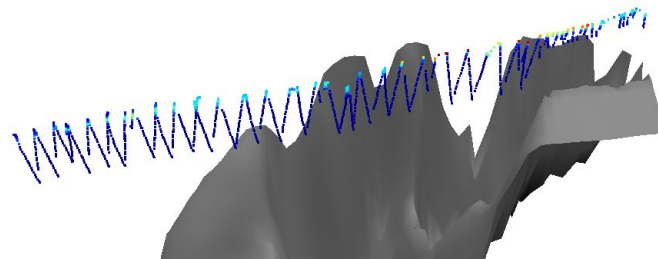
Inverse Distance Weighting (w/ z)



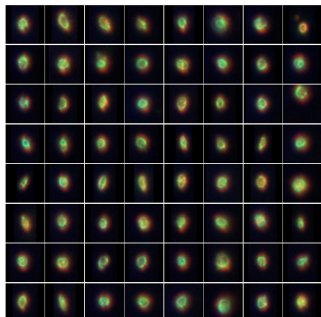
µg/L



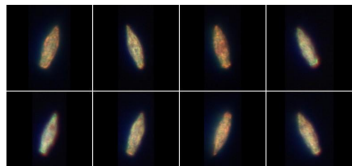
Auto-rotate



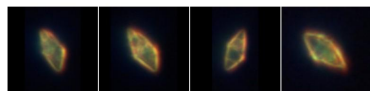
High Magnitude Planktivore



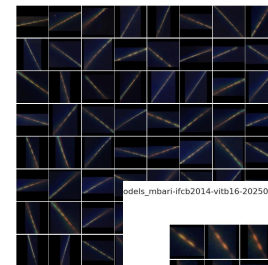
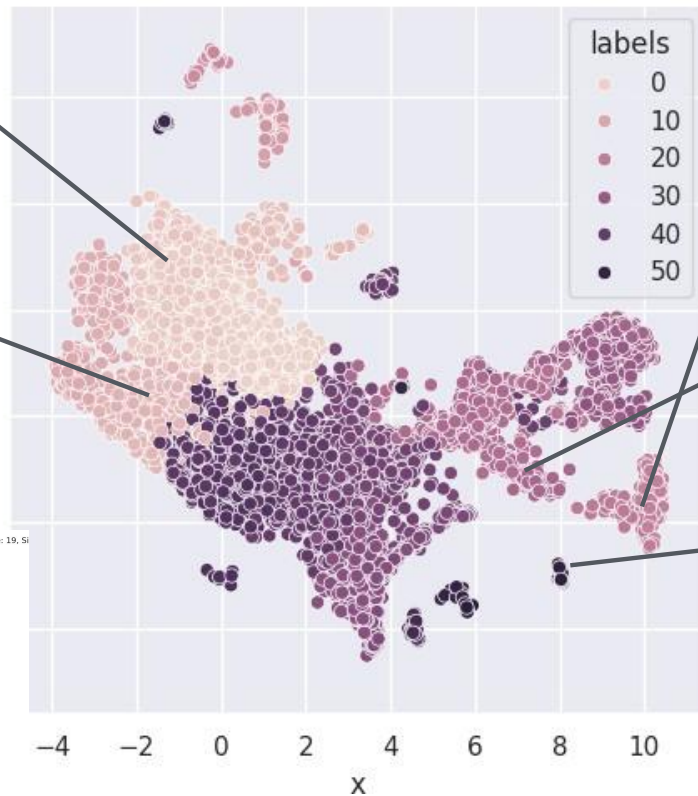
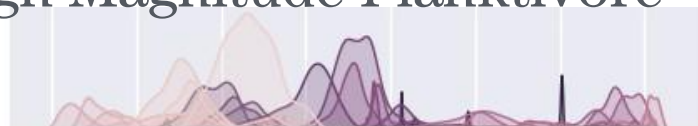
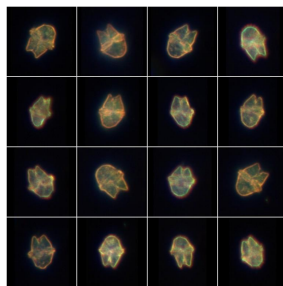
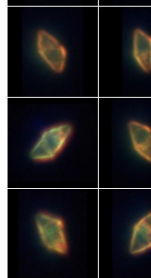
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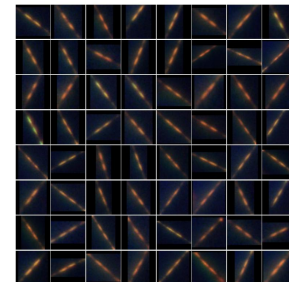
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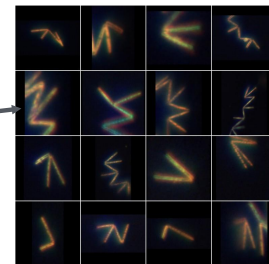
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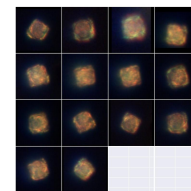
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models_mbari-icb2014-vitb16-20250318_20250320_055433 Cluster 51, Size: 33, Similarit



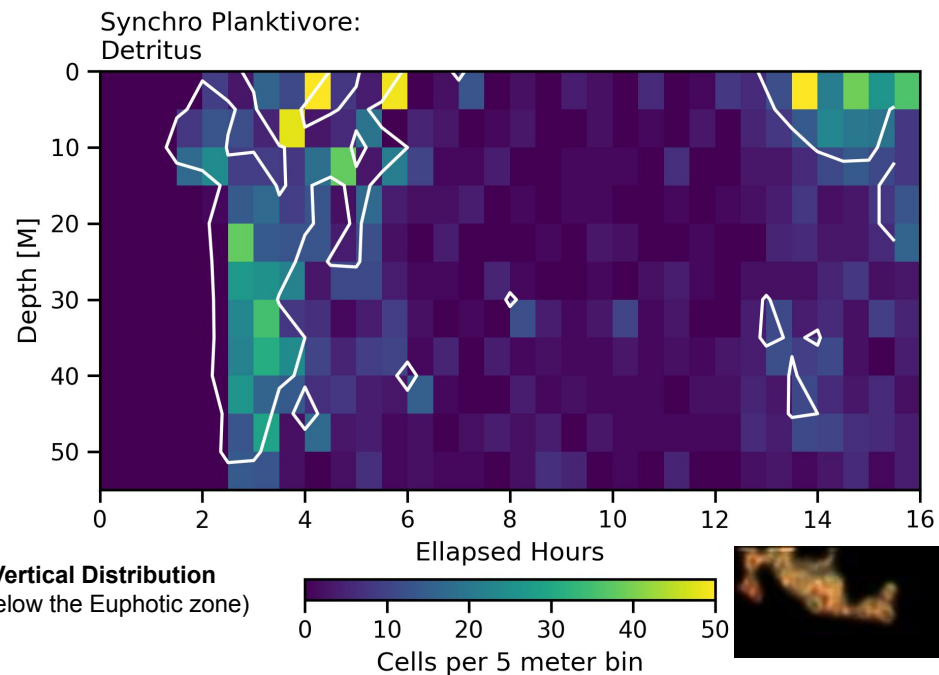
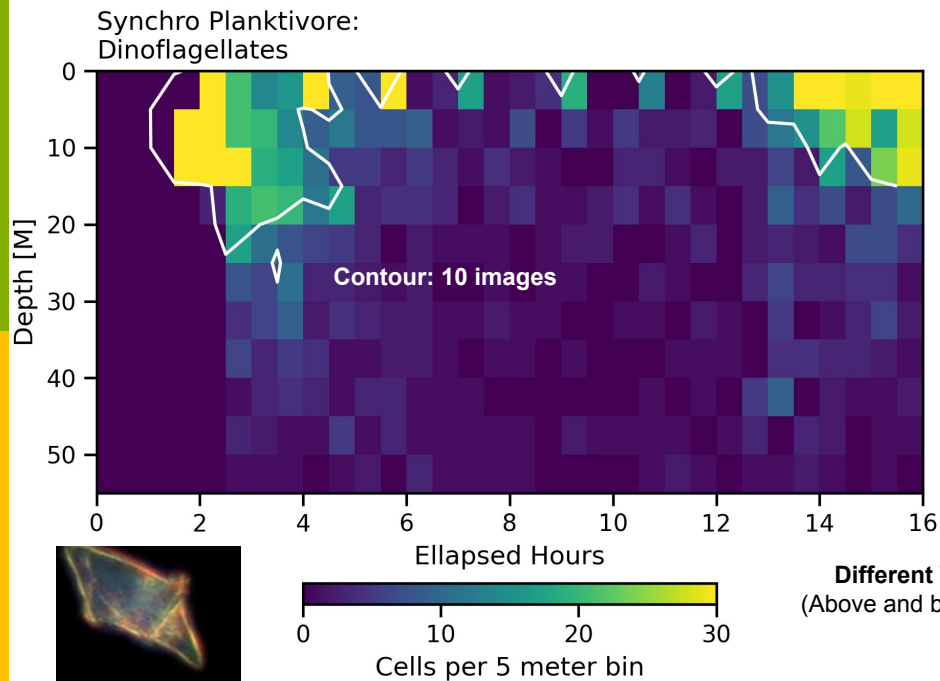
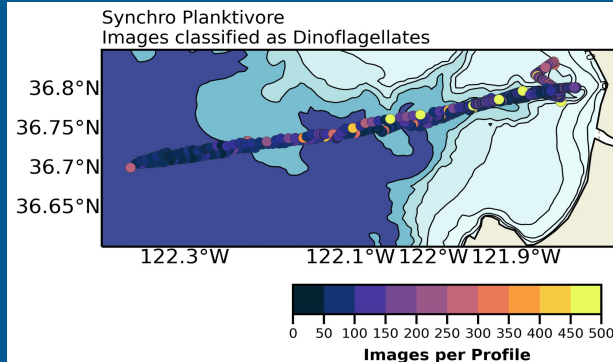
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Danelle Cline and MBARI
colleagues

Ocean sections of biological data for Place-based mgmt

~45 mile sections in ~2 days





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FathomNet



Monterey Bay Aquarium



Ocean Visions



NANOOS PNW



IOOS Association



All subscriptions

Explore



Trending



Shopping



Music



FathomNet

@fathomnet · 222 subscribers · 57 videos

FathomNet streamlines access to artificial intelligence and machine learning tools to access ocean data. [...more](#)

fathomnet.org



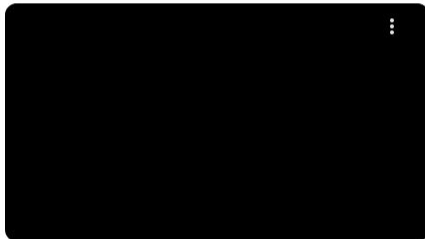
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Introducing FathomNet

781 views · 4 years ago

FathomNet is an effort to explore and discover life in our ocean using artificial intelligence. This video was presented to the US House Science Committee in June 2019.

Videos



Outreach with FathomVerse | FathomNet Workshop 2025

13 views · 2 weeks ago



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Accelerating Ocean Discovery

Collaborators and supporting
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OCEAN
DISCOVERY
LEAGUE



CENTRAL & NORTHERN
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&RANU



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Monterey Bay
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