



Ocean Observatories Initiative Facilities Board

Town Hall

Lightning Talks

December 9, 2019

Lightning Talks

one slide, one minute

Town Hall Lightning-Talk Presenters

(Presenter, Affiliation)

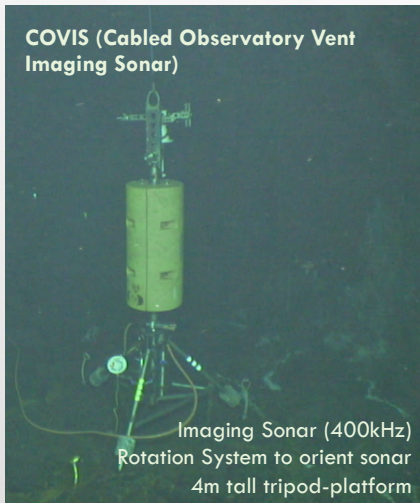
- Karen Bemis, Rutgers, The State University of New Jersey
- Bill Chadwick, Oregon State University
- Guangyu Xu, Applied Physics lab of University of Washington
- William Wilcock, University of Washington, School of Oceanography
- Dan Morris, Microsoft AI for Earth
- Dax Soule, Queens College CUNY
- Zackary Johnson, Duke University
- Martin Scherwath, Ocean Networks Canada
- Huaiyang Zhou, School of Ocean and Earth Science/Tongji University

THE INTERPLAY OF CURRENTS AND HYDROTHERMAL DISCHARGE AT ASHES: AN APPLICATION OF COVIS ACOUSTIC IMAGING DATA

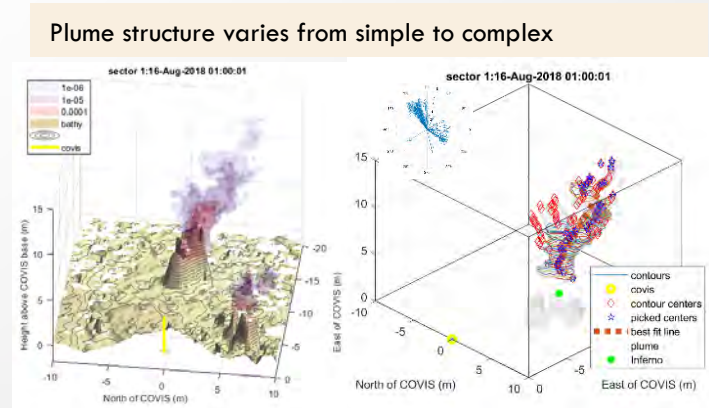
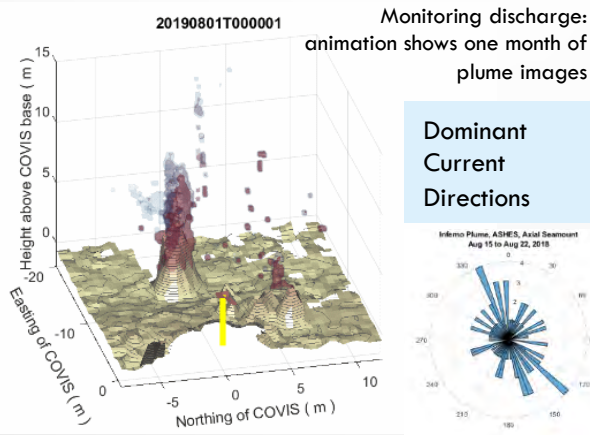
Karen Bemis¹, Guangyu Xu², Joshua Sacker³ and many others

¹Rutgers, The State University of New Jersey ²Applied Physics Lab, University of Washington ³Queens College
 bemis@marine.Rutgers.edu

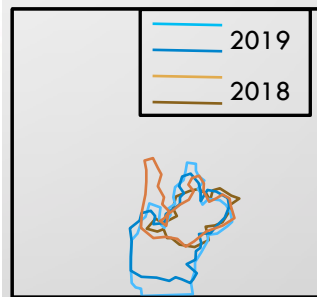
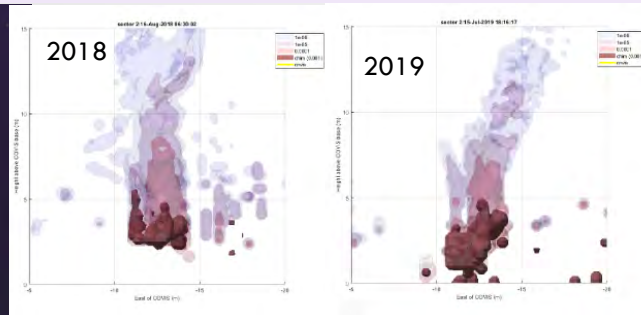
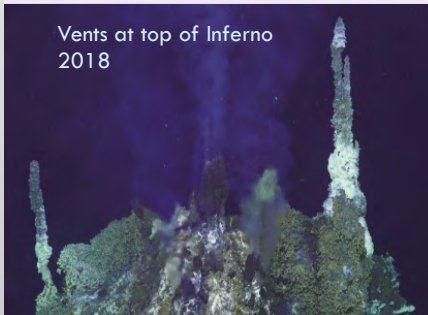
Data Source: COVIS



Data Products: Estimates of Discharge, Current Variability, Chimney Growth

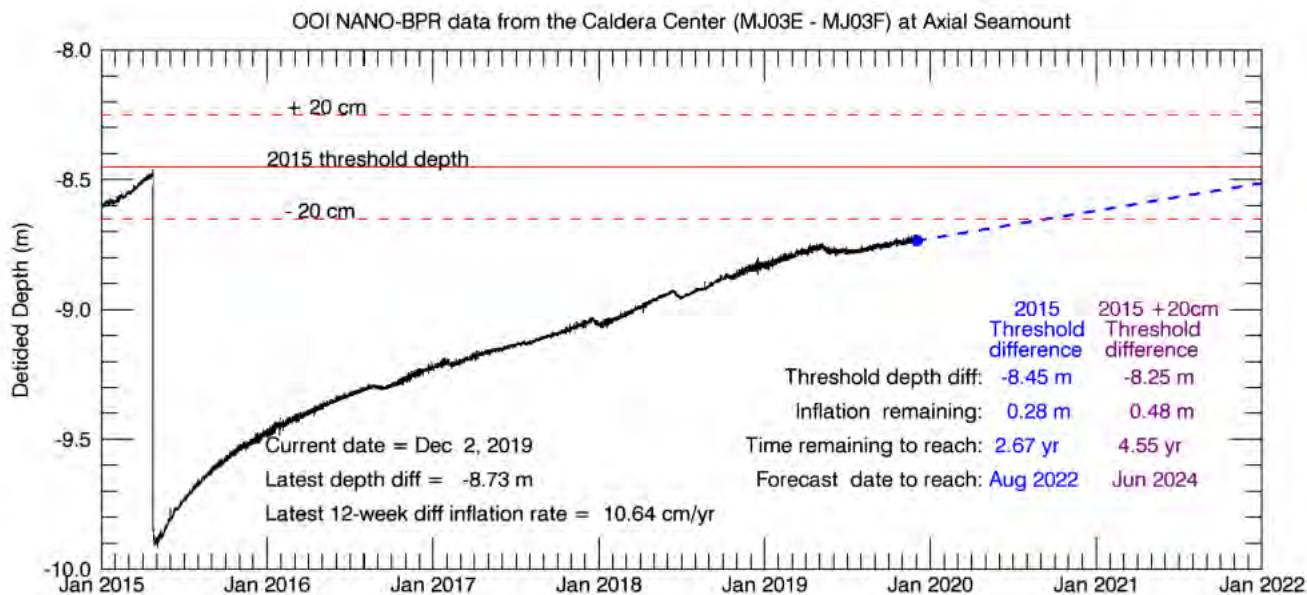
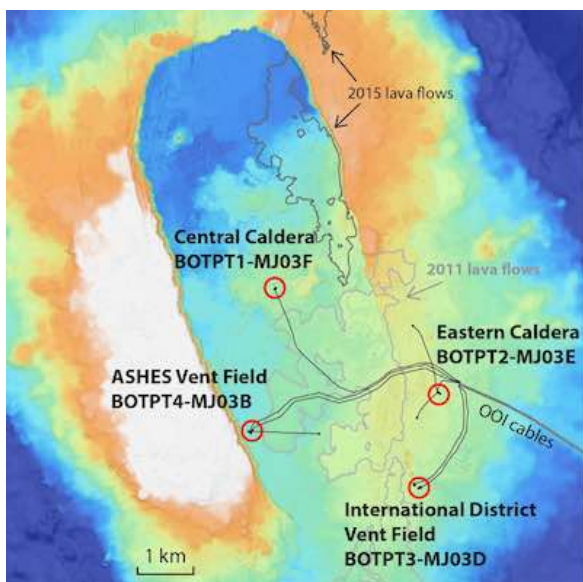


As locus of venting changes, chimneys fall and grow



See Posters 1492,1493,1494 in OS51B: Advances in Understanding Seafloor Volcanism and Life: Axial Seamount: A Wired Submarine Volcano Observatory I on Friday, 13 December 2019; 08:00 - 12:20

Axial Seamount OOI real-time BOTPT data: www.pmel.noaa.gov/eoi/rsn/
 Contact info: bill.chadwick@oregonstate.edu

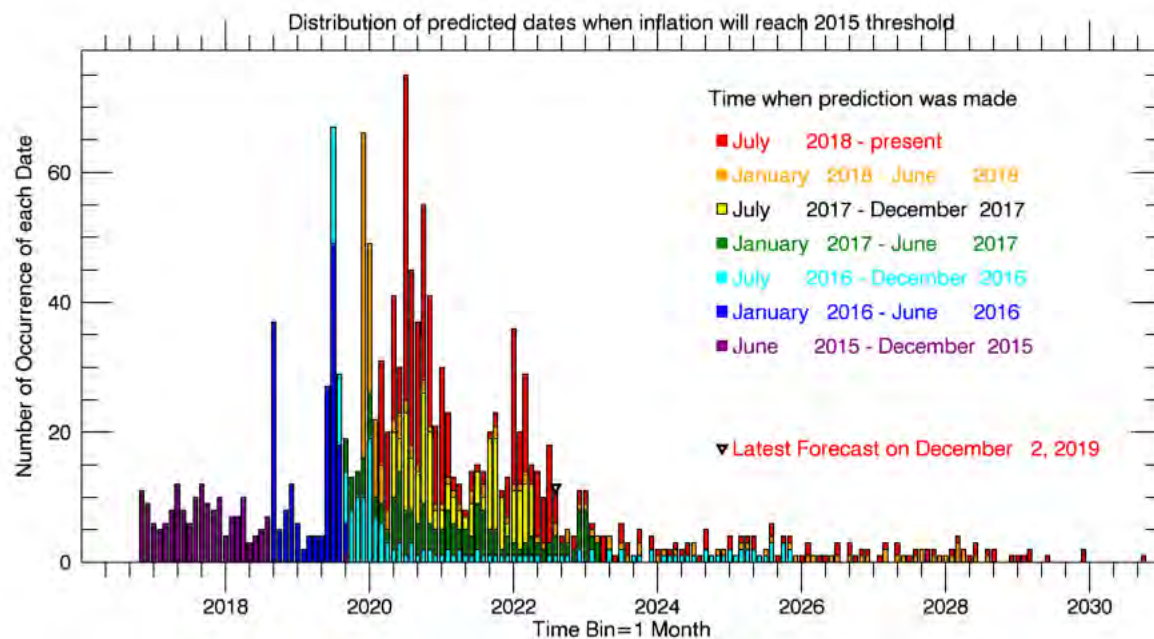


Related presentations at AGU this year:

Friday morning Poster Session:
 OS51B - Advances in Understanding Seafloor Volcanism and Life: Axial Seamount: A Wired Submarine Volcano Observatory I Posters

Fieldwork Next Summer:

- NSF-supported installation of 2 new seafloor CTDs on Cabled Array (currently one at ASHES)
- NSF-supported ROV & AUV dives to repeat geodetic surveys



NSF OCE 1736702, 1736393, 1726920, 1736621



Temperature and Spatial Variations of Hydrothermal Discharge at ASHES Observed by the Cabled Imaging Sonar COVIS



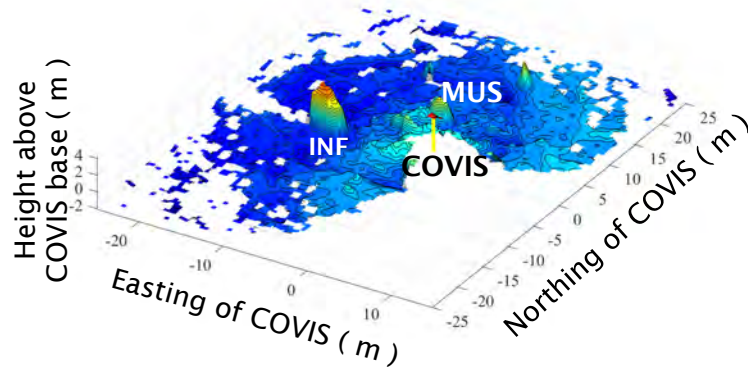
Guangyu Xu¹ (guangyux@uw.edu), Karen Bemis² (bemis@marine.rutgers.edu),

¹Applied Physics Lab of University of Washington

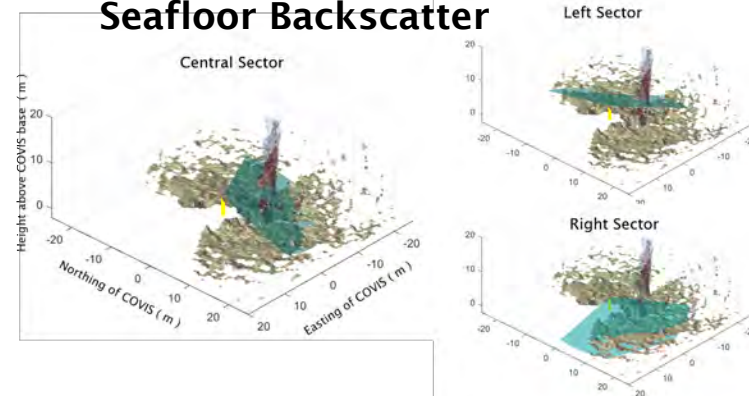
²Rutgers University



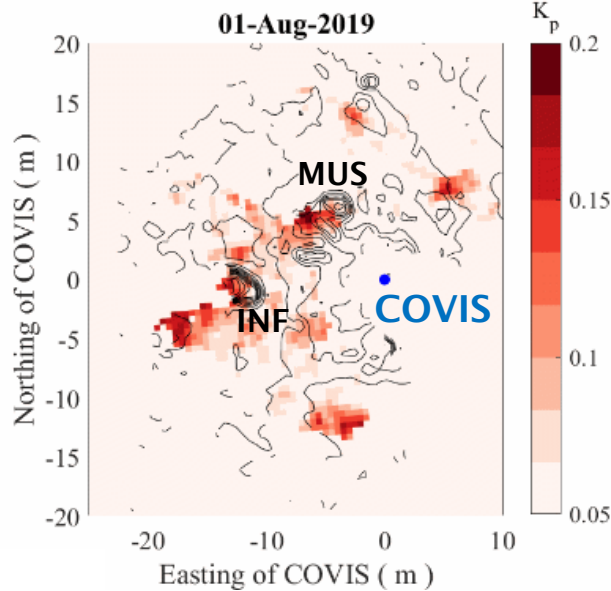
Seafloor Topography Measured by COVIS



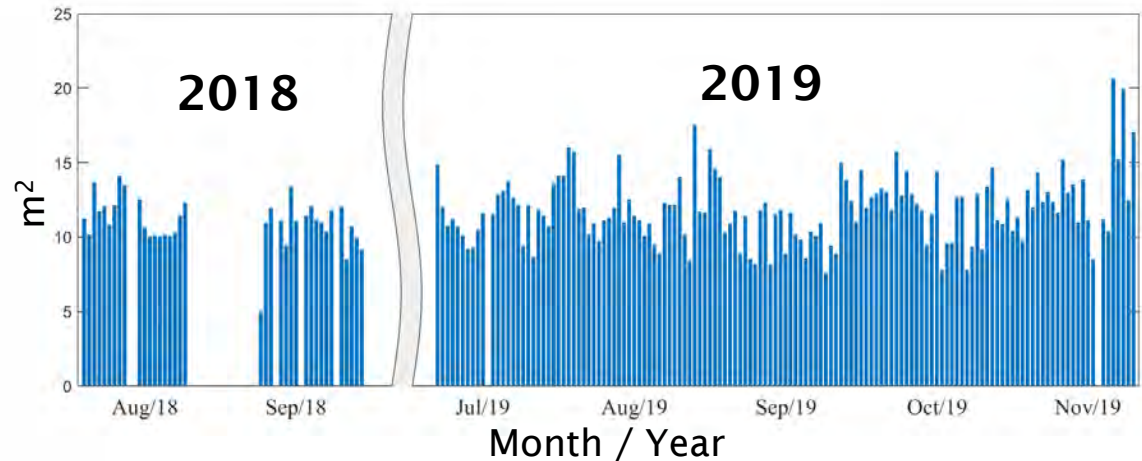
Detection of Diffuse Flows from Seafloor Backscatter



Diffuse-flow Map



Daily Averaged Diffuse-flow Area



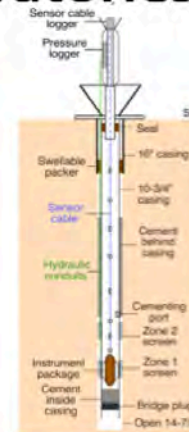
See Posters 1492,1493,1494 in OS51B: Advances in Understanding Seafloor Volcanism and Life: Axial Seamount: A Wired Submarine Volcano Observatory I on Friday, 13 December 2019; 08:00 - 12:20

IODP Proposals for Borehole Observatories on the OOI Cabled Array

Cascadia Subduction Zone

Multi-leg drilling off Vancouver Island and Oregon. Off Oregon:

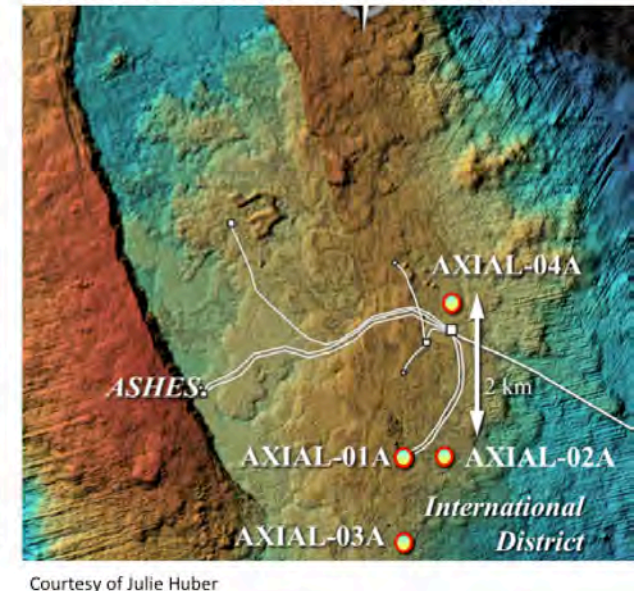
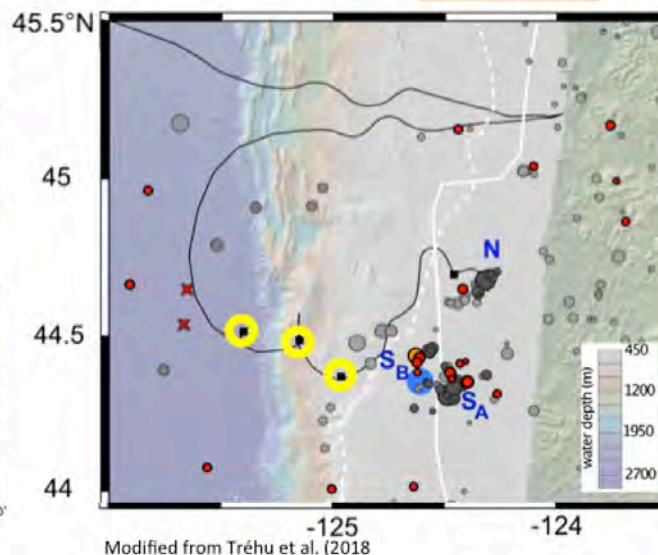
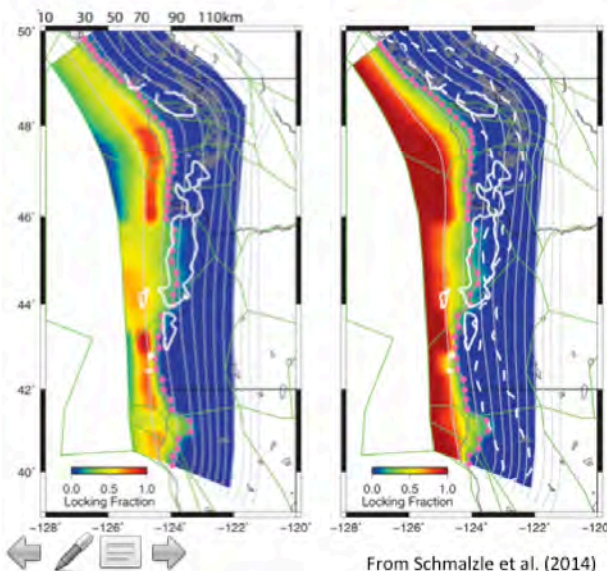
- Discriminate between 3 endmember hypotheses for partial locking
 1. Spatially uniform across the megathrust.
 2. Spatially heterogeneous.
 3. Accommodated by a narrow, fully locked zone.
- Understand how stress is transferred across the plate.



Axial Seamount

Effort led by Julie Huber

- Structure and composition of zero age upper oceanic crust.
- 3-D architecture of an active hydrothermal system.
- Distribution and composition of crustal subsurface microbial communities.



AI for Earth: Putting Microsoft's Resources to Work for Environmental Science



Grants




Data




Technology

Dan Morris, Microsoft AI for Earth
dan@microsoft.com
aka.ms/aiforearth
aka.ms/dmorris

ooicloud.org



CamHD generates large quantities of data



Nearly 200 TB to date!
Over 450 million frames
All data is now mirrored in Azure
Publicly accessible using Pangeo!

1) Open CamHD database on Pangeo (ooi.pangeo.io)

```

[3]: import pandas as pd
      dbcamhd = pd.read_json('dbcamhd.json', orient="records", lines=True)
      dbcamhd.tail(3)

```

	blob_url	blob_size	timestamp	frame_count	deployment
16544	https://ooiopendata.blob.core.windows.net/camh...	579571615	1564131610	26729	6
16545	https://ooiopendata.blob.core.windows.net/camh...	579658391	1564142410	26733	6
16546	https://ooiopendata.blob.core.windows.net/camh...	579007991	1564153210	26703	6

```

[3]: print("Total files: %i" % len(dbcamhd))
      print("Total frames: %i" % dbcamhd.frame_count.sum())

```

Total files: 16547
Total frames: 450267566

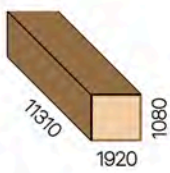
2) Load a subset of images as Dask array

```

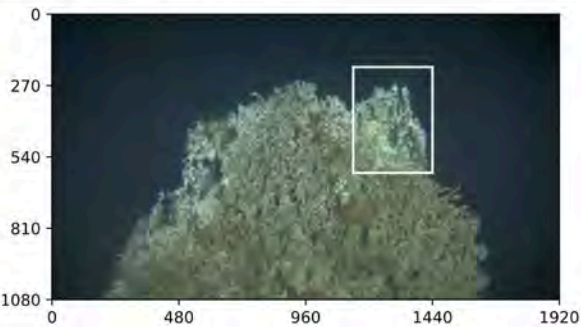
[15]: delayed_frame_array = dsa.stack(delayed_frame_list)
      delayed_frame_array

```

	Array	Chunk
Bytes	46.90 GB	4.15 MB
Shape	(11310, 1080, 1920)	(1, 1080, 1920)
Count	35815 Tasks	11310 Chunks
Type	uint16	numpy.ndarray



3) Do science in the cloud!



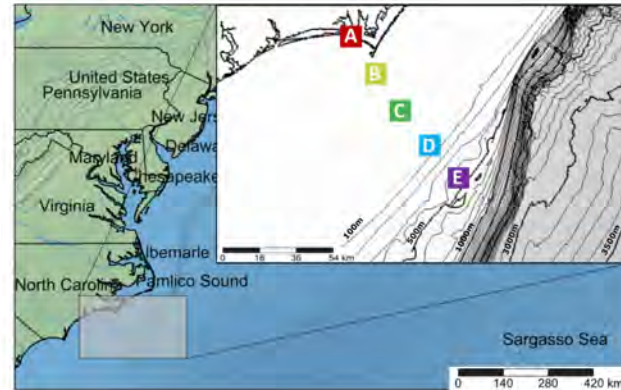
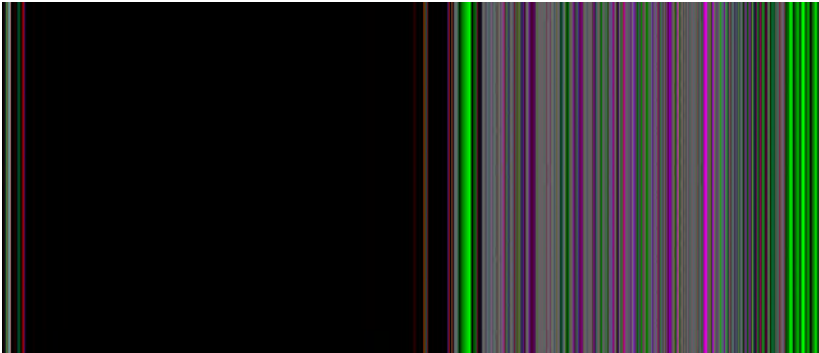
Potential applications:

- microfauna
- macrofauna
- geology
- hydrothermal processes
- geology
- volcanology
- machine learning!
- more!

Learn more: ooicloud.org

PICO – Pivers Island Coastal Observatory

Zackary Johnson & Dana Hunt

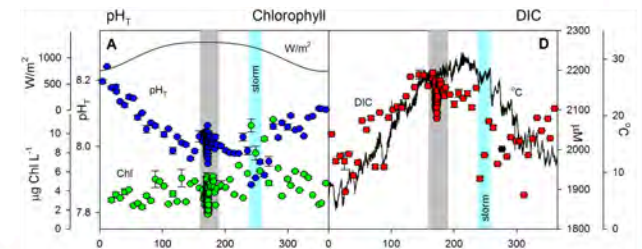
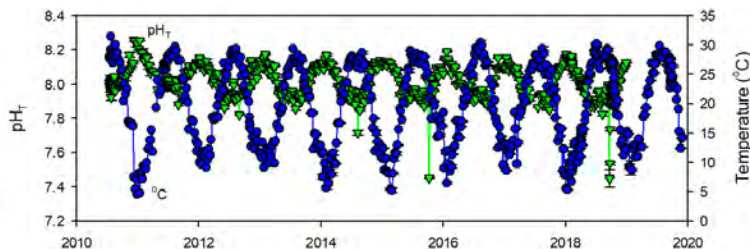


Key attributes:

- Data publically available BCO-DMO
- Continuous NOAA tides/met/physical oceanography (station 8658483)
- Weekly (or more frequent) discrete for ~10 years (ongoing)
 - **Physical** temperature, turbidity, Secchi, tides, etc.
 - **Chemical** PO_4 , NO_3 , NO_2 , NH_4 , SiOH_4 , salt, DIC, DOC, pH, O_2 , etc.,
 - **Biological** Chl, bacteria, phytoplankton, production/respiration, diversity, etc.
- Associated PICO-LOVE transect (~100 km offshore)



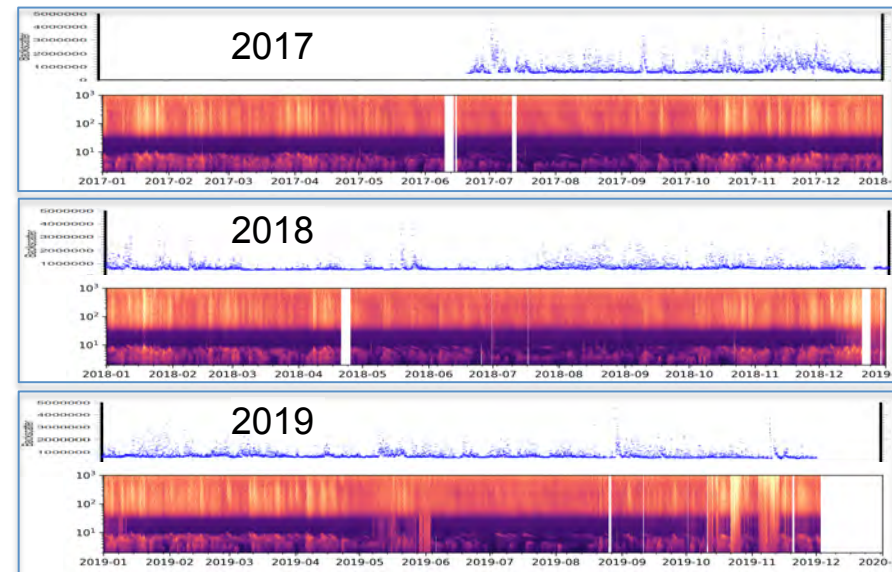
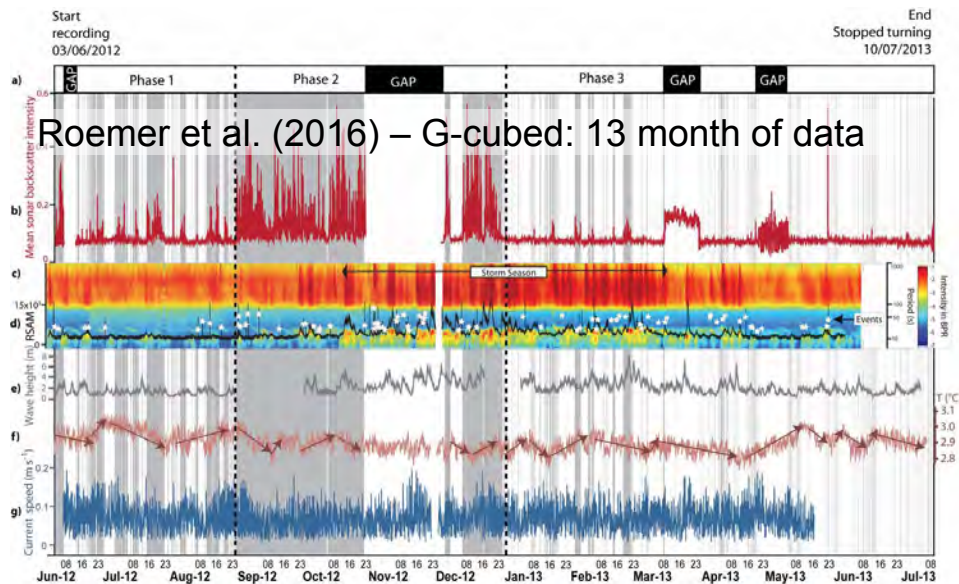
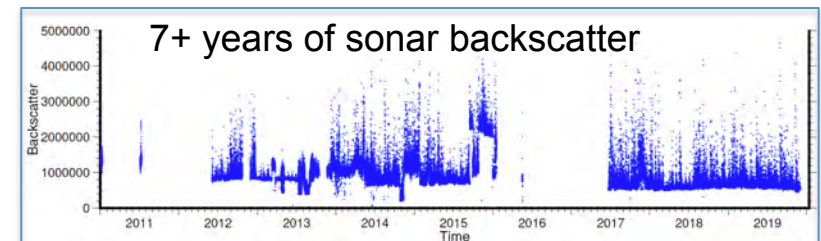
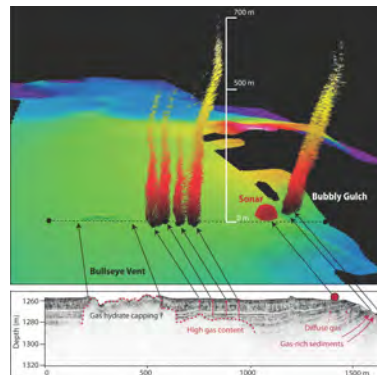
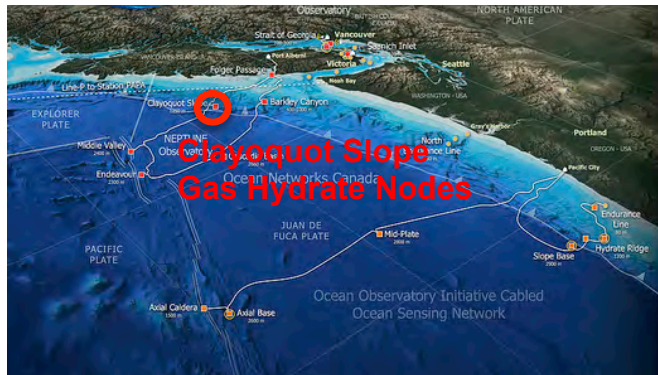
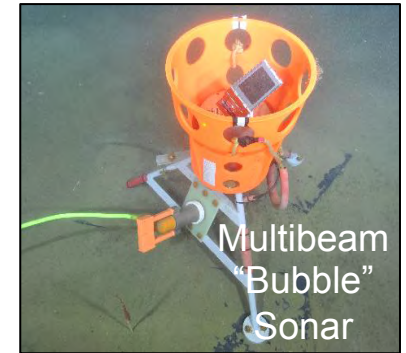
Microbial Oceanography @ Duke



Long-term sonar backscatter from methane bubbles at Ocean Networks Canada's Clayoquot Slope site

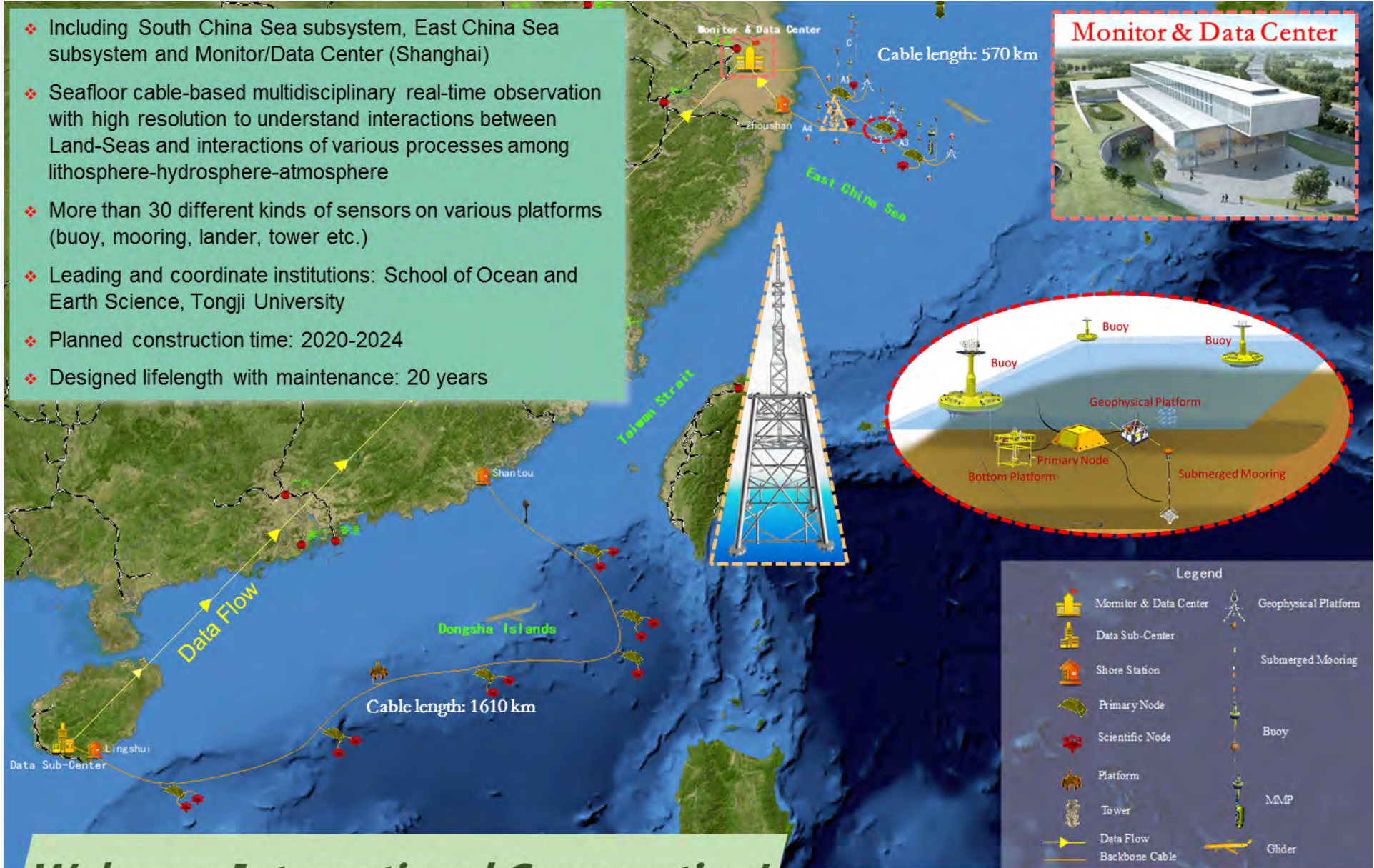
Potential for comparison with Southern Hydrate Ridge

Martin Scherwath, Ocean Networks Canada, Victoria, BC, Canada
 OOI Townhall, AGU Fall Meeting, San Francisco, 09 December 2019



China National Scientific Seafloor Observatory (CNSSO)

- ❖ Including South China Sea subsystem, East China Sea subsystem and Monitor/Data Center (Shanghai)
- ❖ Seafloor cable-based multidisciplinary real-time observation with high resolution to understand interactions between Land-Seas and interactions of various processes among lithosphere-hydrosphere-atmosphere
- ❖ More than 30 different kinds of sensors on various platforms (buoy, mooring, lander, tower etc.)
- ❖ Leading and coordinate institutions: School of Ocean and Earth Science, Tongji University
- ❖ Planned construction time: 2020-2024
- ❖ Designed lifelength with maintenance: 20 years



Welcome International Cooperation!

Huaiyang ZHOU, Tongji University, zhouhy@tongji.edu.cn