

Establishing Community Standards for Underwater Video Acquisition, Tagging, Archiving and Access

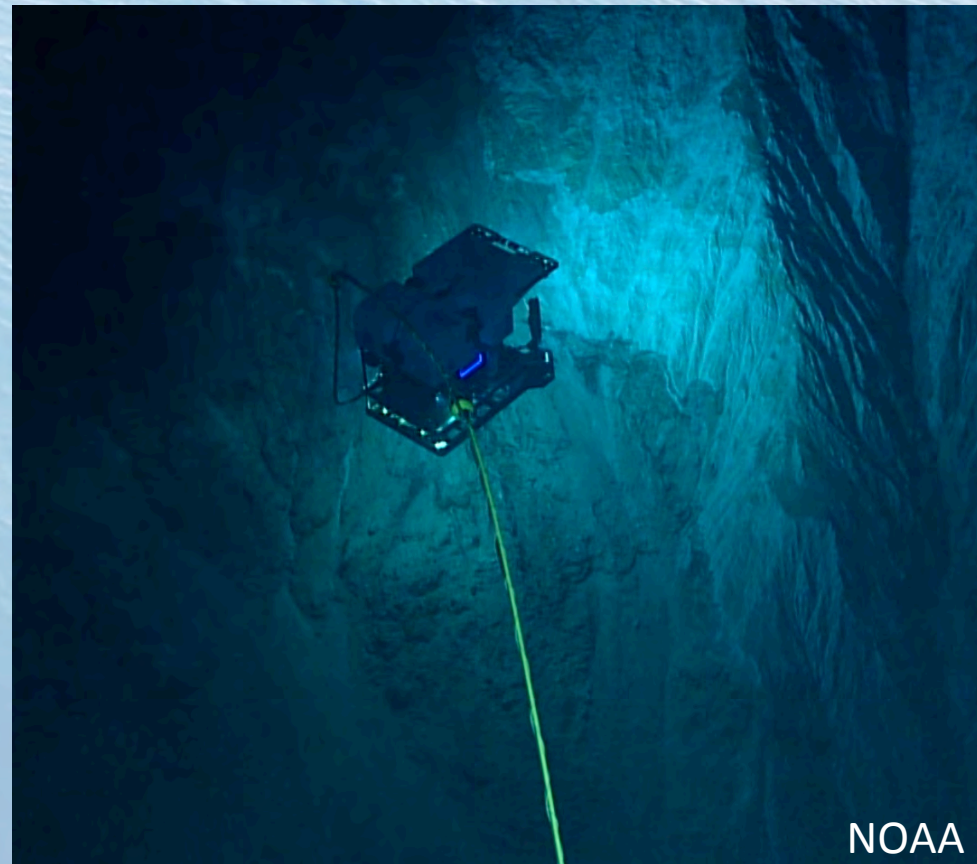
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Dwight Coleman (URI)

Adam Soule (WHOI)

Motivation

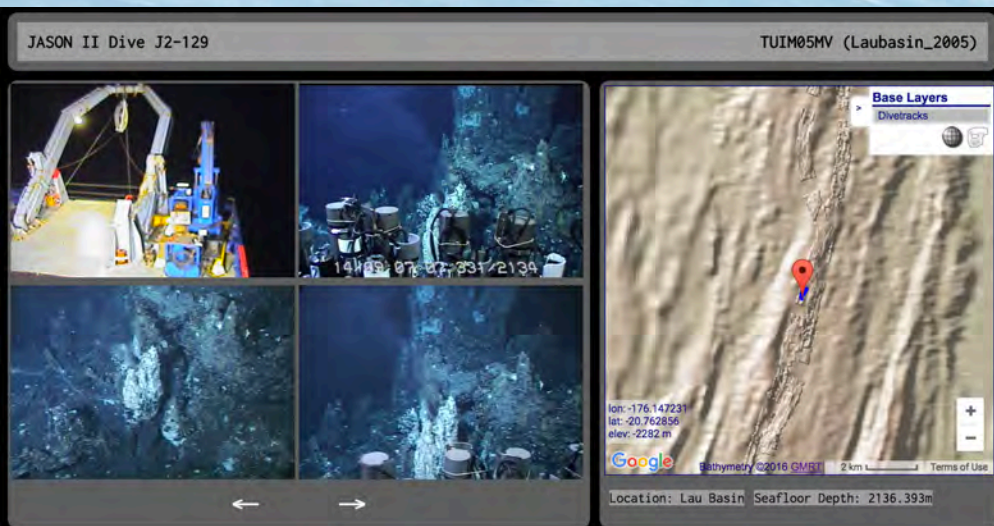
- **Underwater video imagery** has become *a critical data stream*
 - Guide sampling and exploration activities during dive operations
 - Acquired by many groups on many platforms: ROV, HOV, AUV
 - Fundamental observations for post-dive and post-cruise research



Motivation

- **Video archives** have the potential to:
 - provide broad *significant scientific benefits* long after data acquisition
 - *engage the public* in exciting ocean science research

JASON II Dive J2-129 TUI05MV (Laubasin_2005)



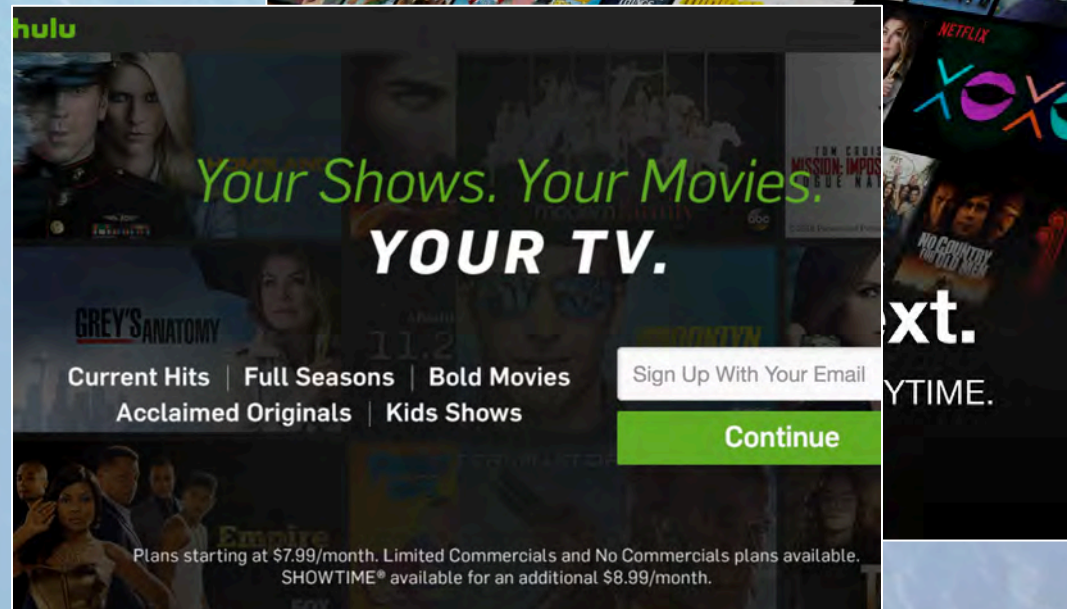
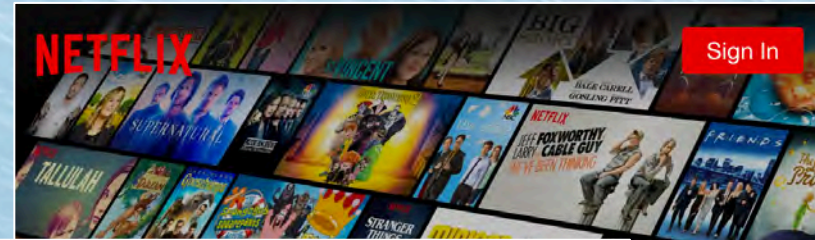
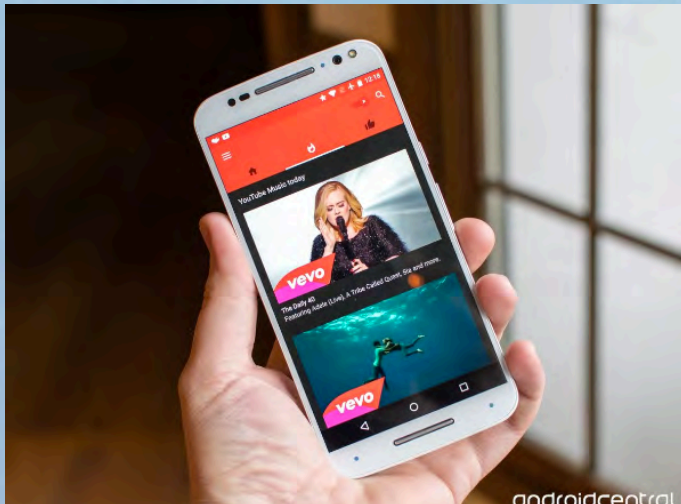
The screenshot shows a video archive interface. At the top, it displays 'JASON II Dive J2-129' and 'TUI05MV (Laubasin_2005)'. Below this are four video thumbnails: the top-left shows a robotic arm on a ship's deck; the top-right shows a deep-sea submersible with a timestamp '14:09:07.831/2134'; the bottom-left and bottom-right show underwater views of the seafloor. To the right of the thumbnails is a map showing a red location pin in the Lau Basin, with coordinates: lon: -176.147231, lat: -20.762856, elev: -2282 m. Below the map, it says 'Location: Lau Basin Seafloor Depth: 2136.393m'. At the bottom of the interface are navigation arrows.

Time (UTC)	2005/04/14 09:07:06	Navigation	
Event Text		Position	176.19287305000003°W 20.76606441°S (RVN.JAS2.LBL.v1)
Event Type		Original Position	7684.696°E 7450.112°N (JAS2)
DAQ Type	ASNAP	Local XY	7680.96m (X), 7447.3m (Y)
		Original Local XY	7684.696m (X), 7450.112m (Y)
		Roll	2.21°
		Pitch	-6.06°
		Heading	331.15°
		Vehicle Depth	2134.28m
		Altitude	2.113m
		Local Origin	
		Original Nav Source	JAS2



Motivation

- The oceanographic community has yet to fully ***capitalize on modern technologies*** for managing, streaming, discovering, tagging video for:
 - Scientific research
 - Citizen science
 - Public engagement



Goal

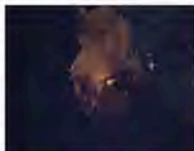
Move the community toward the common goal of broad public access to distributed video content for scientific research and public engagement.



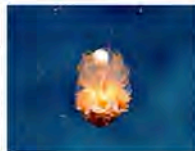
Dive 19: Octopus
During the last dive of the expedition on the eastern slope of Esmeralda Bank Crater, this small octopus was seen in a field of stalked crinoids. (Video)



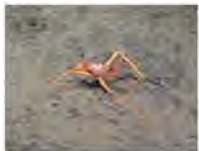
Dive 19: Sea Star Walking
A sea star uses its tube feet to move across the seafloor. (Video)



Dive 18: Octopus
This octopus was spotted tucked under an overhang during exploration of the outer slope of the Esmeralda Seamount. (Video)



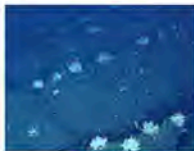
Dive 17: Siphonophore
A rare encounter with a swimming dandelion siphonophore on Dive 17 at Farallon de Medinilla. (Video)



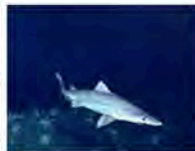
Dive 13: Hermit Crab
This hermit crab appears to be missing a pair of legs, but in fact, they are instead modified to hold this anemone in place. (Video)



Dive 13: Jellyfish
This unidentified jellyfish is seen floating through the water column, before quickly retracting its tentacles and swimming away. (Video)



Dive 12: Basket Star City
An aggregation of basket stars like this is a rare sighting. (Video)



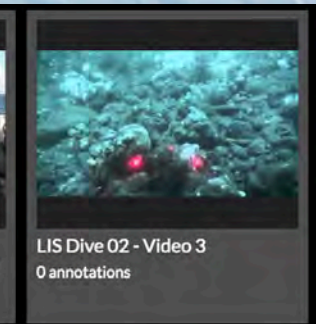
Dive 12: Sand Tiger Shark
A sand tiger shark was seen swimming amongst this rare aggregation of basket stars. (Video)



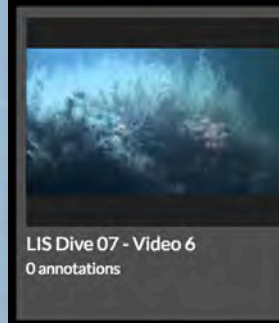
Alvin Port Recorder
327 annotations



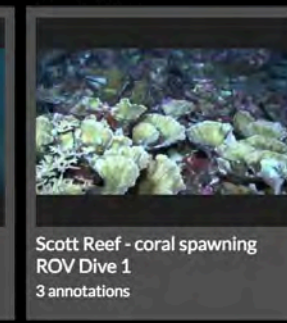
EX1504L4 VID 20150922T181348Z STREAM 1 600 EX1504L4 DIVE09
746 annotations



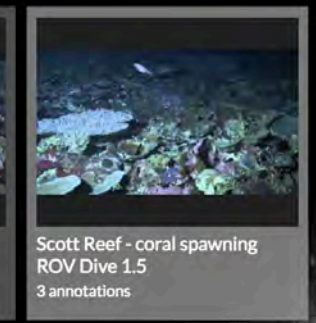
LIS Dive 02 - Video 3
0 annotations



LIS Dive 07 - Video 6
0 annotations



Scott Reef - coral spawning ROV Dive 1
3 annotations



Scott Reef - coral spawning ROV Dive 1.5
3 annotations

Understanding the Landscape

- Coordinate within the community of stakeholders to identify *current practices* and *needs*
 - Science Users, Data Professionals, Vehicle Operators, Education & Outreach Professionals
 - Community Survey (> 130 participants)
- What solutions exist outside our community?
 - Film & television industry
 - Commercial software
 - Pre-workshop input + workshop participation



June 2016 Workshop

- > 40 participants (+ ~30 remote)
- Consensus on best practices – full data life cycle
 - Acquisition, Formats, Naming Conventions, Media
 - Metadata, Annotation, Tagging
 - Storage, Archiving and Access
- Develop a roadmap
 - Short-term (low-cost) solutions
 - Longer-term (higher-cost) solutions
 - Sharing ideas, tools, workflows, vocabularies, etc.



Outcomes

- Workshop Report [Oct. 2016]
 - Currently focused on underwater video but recommendations can be applied to other video
- Collaborative space
 - GitHub + Slack
 - Workshop Presentations & Materials
 - Survey Results
 - Ongoing discussions

[https://github.com/underwatervideo/
UnderwaterVideoWorkingGroup](https://github.com/underwatervideo/UnderwaterVideoWorkingGroup)