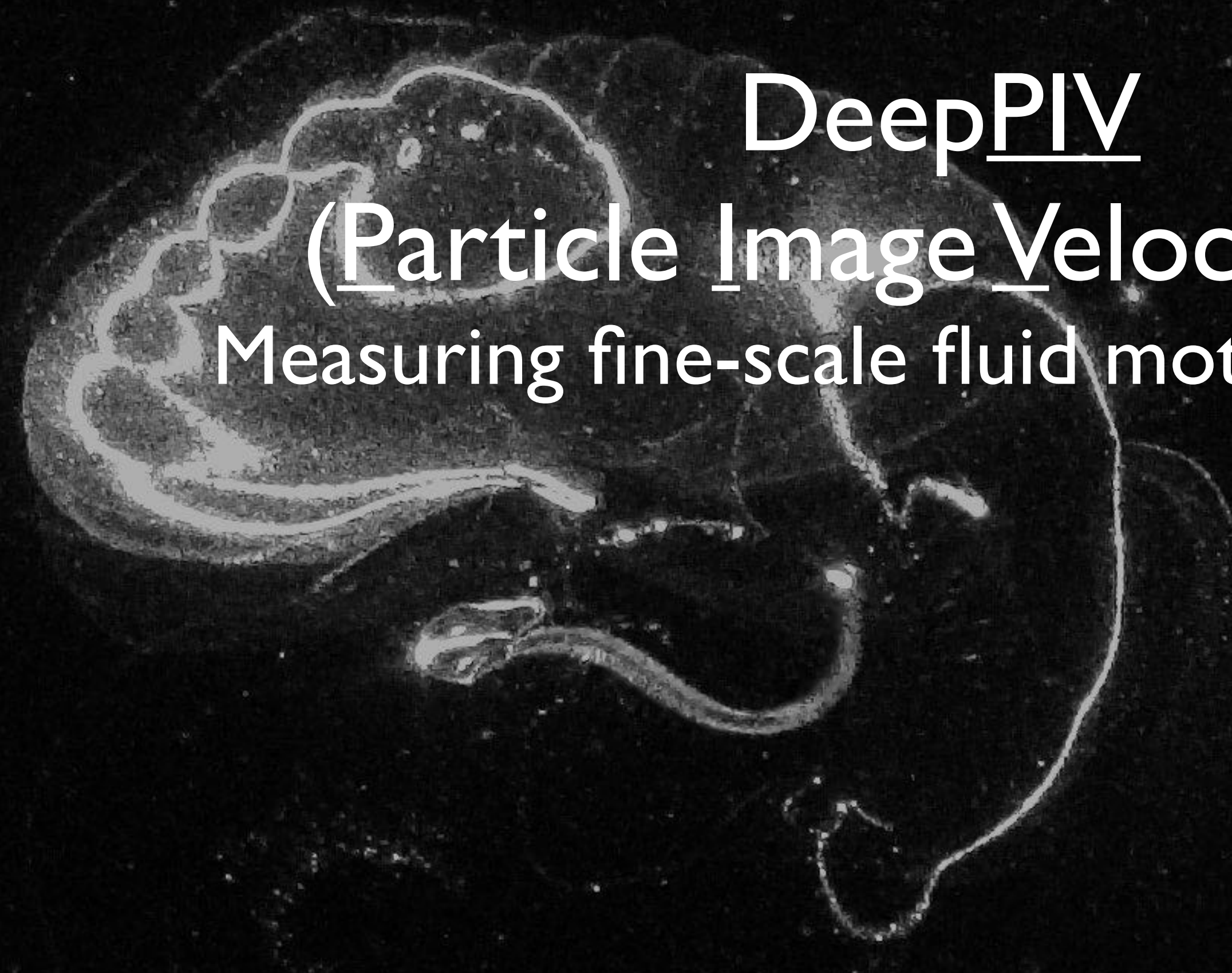




DeepPIV

(Particle Image Velocimetry)

Measuring fine-scale fluid motion at depth

Alana Sherman, Dale Graves, Denis Klimov, Chad Kecy, Jon Erickson,
Kakani Katija, Bruce Robison, and Jim Barry

What is DeepPIV:

DeepPIV is an instrument that optically captures the motion of suspended particles in deep sea environments using a laser sheet, high-resolution camera, and an ROV.

Current and future use cases:

- Filtration feeding impact of giant larvaceans (B. Robison)
- Vertical transport of microplastics by giant larvaceans (A. Choy)
- Sponge filtration rates (J. Barry)
- *Coral polyp feeding ecology (Univ. of Hawaii)*
- *Vent field biogeochemical fluxes (Dalhousie Univ., NOAA)*



MBARI relevance:

- Varied use cases illustrate how DeepPIV touches on all four themes of MBARI's Strategic Plan: Exploration and discovery, ocean visualization, ecosystem dynamics, and ocean biogeochemistry
- 2018 goals directly align with MBARI's Technology Roadmap: developing tools for visualization in the ocean and developing systems that can be used by the oceanographic community

Deploying DeepPIV on ROV *MiniROV* during Midwater Cruise (Summer 2015)

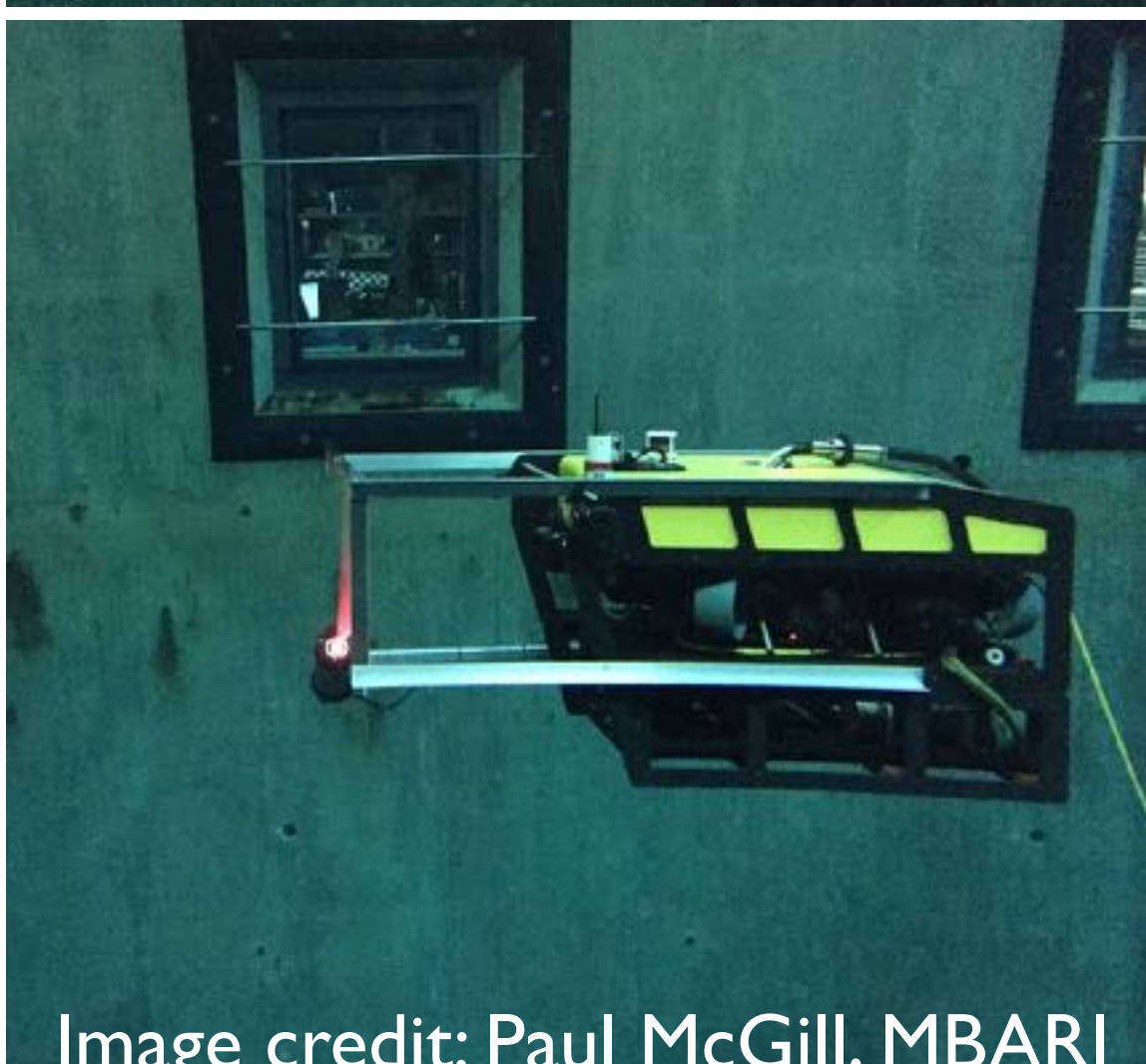
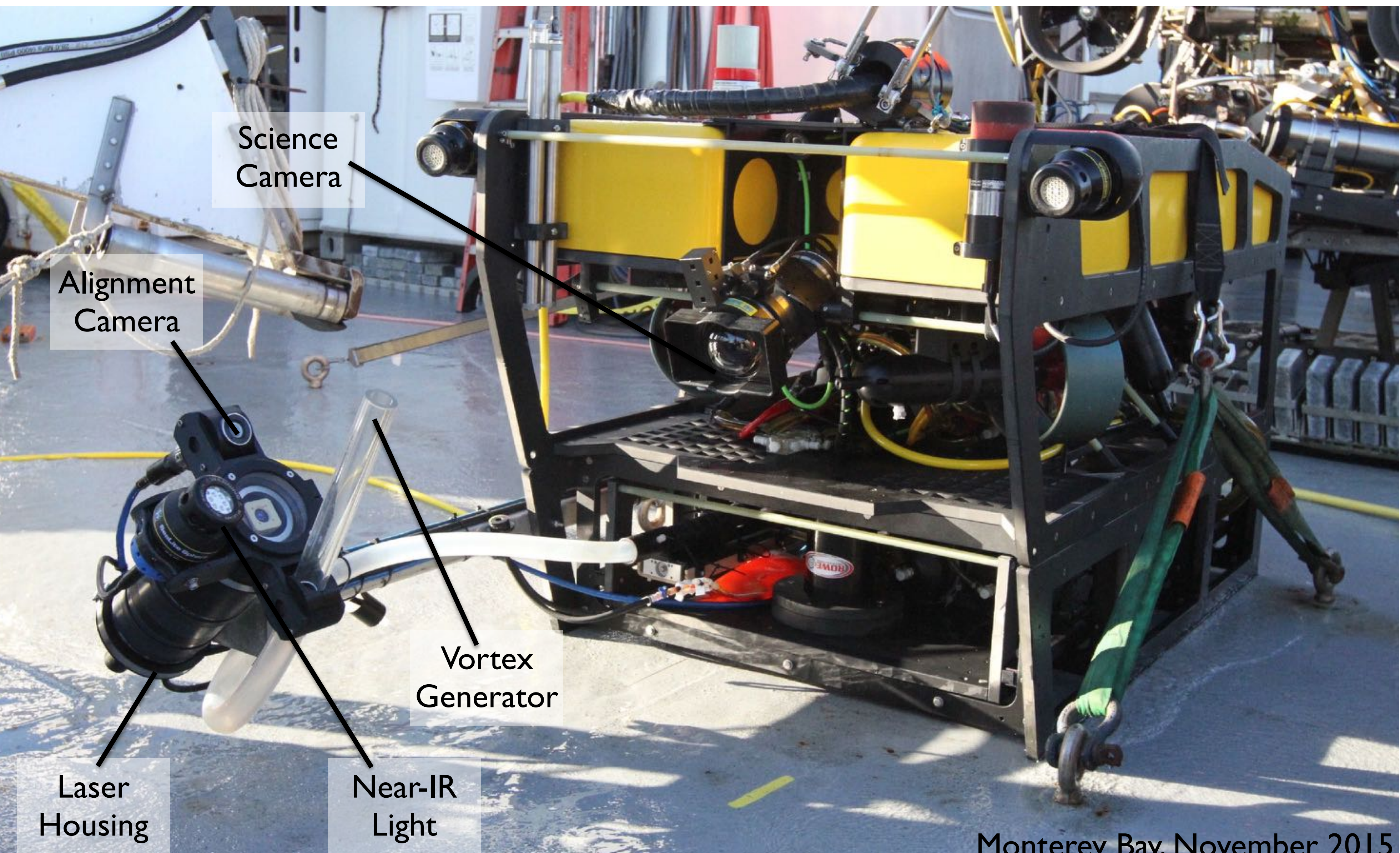
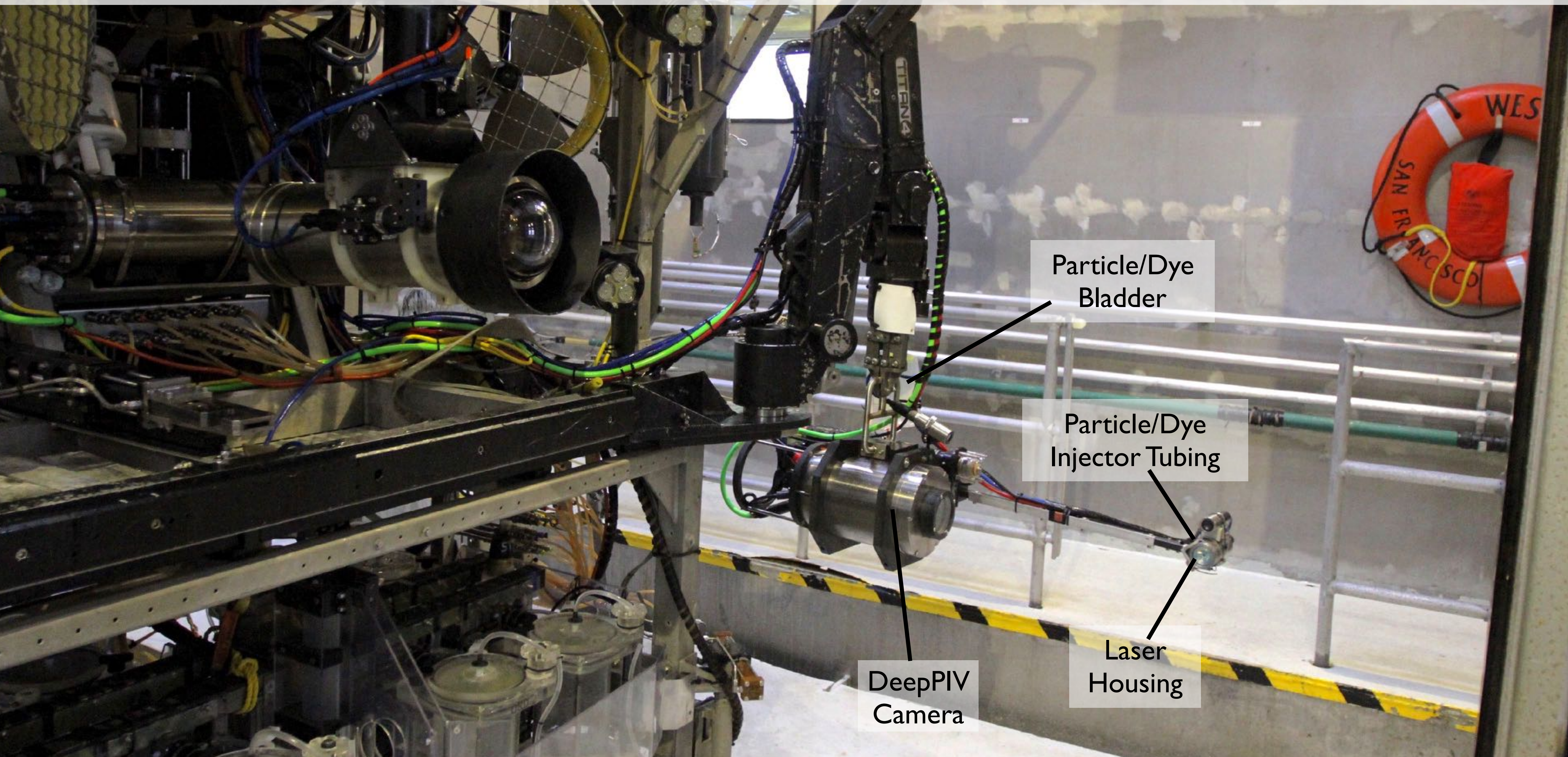


Image credit: Paul McGill, MBARI

DeepPIV on *ROV Doc Ricketts* during Midwater and Benthic Ecology Cruises (Summer 2016)



Particle/Dye
Bladder

Particle/Dye
Injector Tubing

DeepPIV
Camera

Laser
Housing

Current status of DeepPIV - Development

- New camera (with zoom and focus capability; improved HD video) on schedule for first deployment in July 2017
- Testing of galvanometer in laboratory complete; integration of galvanometer in deployed package underway with first deployment in December 2017

Current status of DeepPIV - Deployment

- 58 total deployments since 2015
- 14 deployments so far in 2017
- ~30 more dive days by the end of 2017

Current status of DeepPIV

- Publications: (1) published in *Science Advances*, (1) conditionally accepted in *Science Advances*, (3) manuscripts in preparation

- Outreach: The New York Times, BBC, Science Friday, e1

Science Advances

RESEARCH ARTICLE | OCEANOGRAPHY

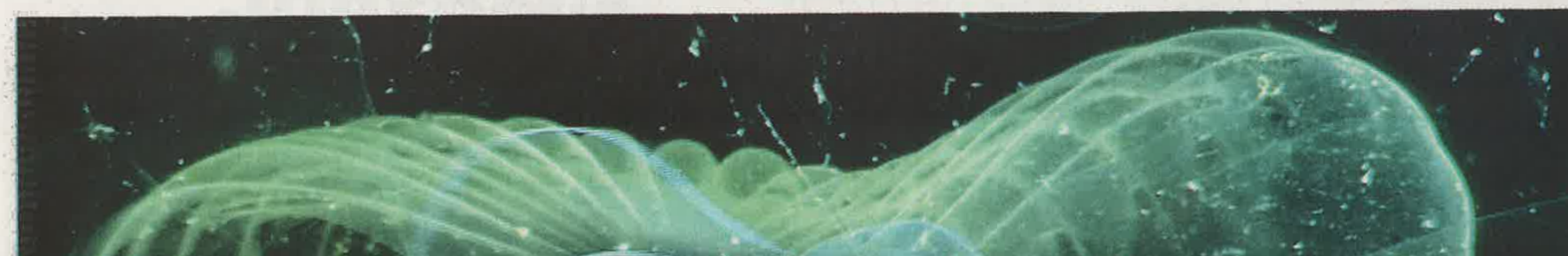
New technology reveals the role of giant larvaceans in oceanic carbon cycling

Kakani Katija*, Rob E. Sherlock, Alana D. Sherman and Bruce H. Robison

+ See all authors

Science Advances
Vol. 3, no. 5, e160
DOI: 10.1126/sciadv

Observatory
FINDINGS, EVENTS AND MORE



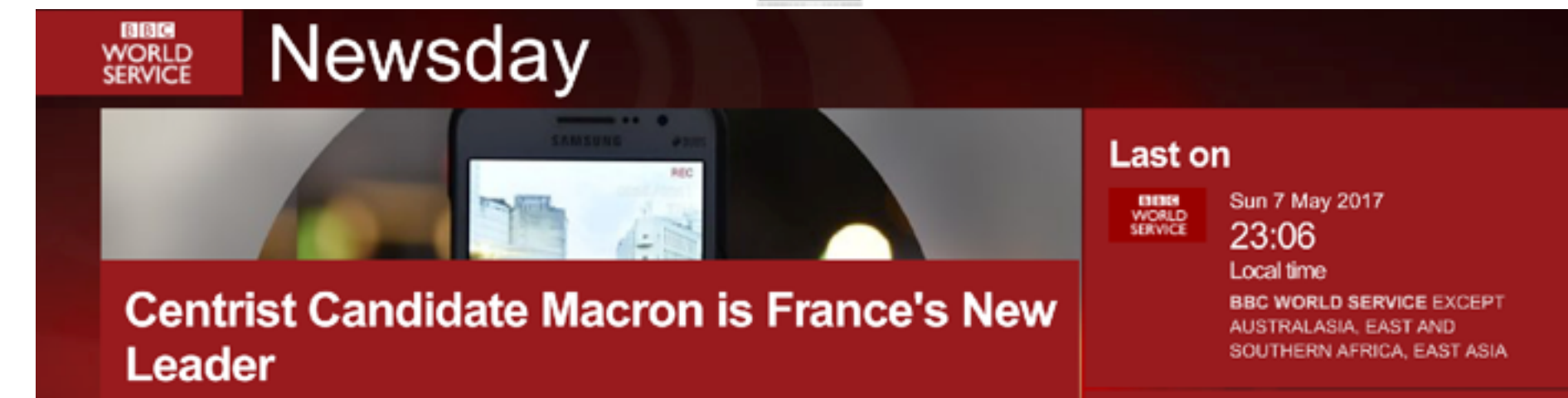
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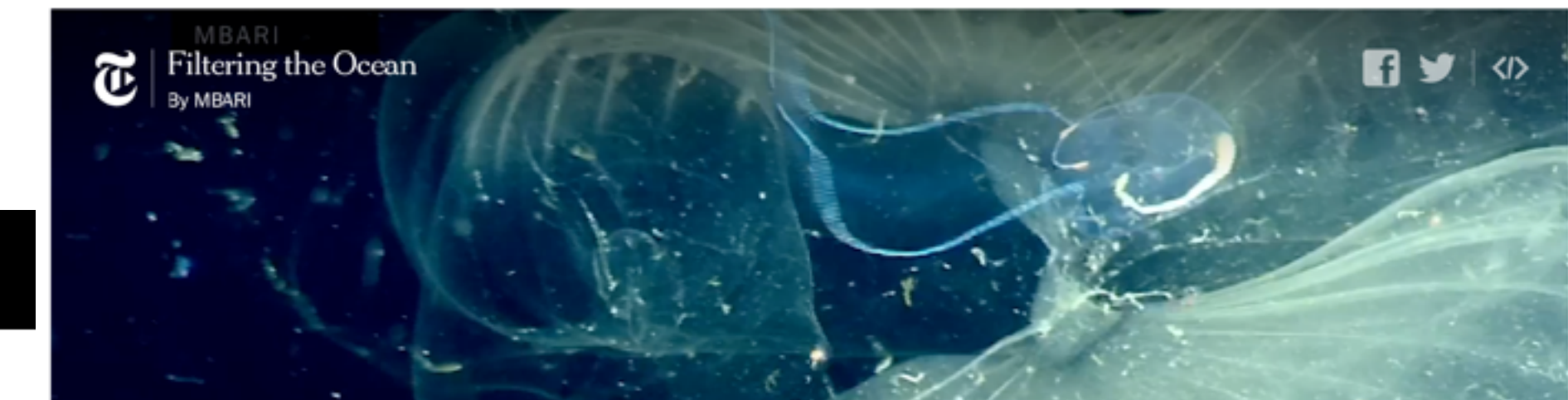


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Trilobites
By STEPH YIN MAY 3, 2017



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15:40 minutes



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2018 DeepPIV Project Scope

1. Integrating new illumination technique (backlighting) to enable measurement of flow near reflective surfaces
2. Miniaturizing and replicating the instrument (work has already begun in 2017)
3. Building an interface housing between DeepPIV and vehicles of opportunity
4. Integrating DeepPIV with VARS data stream using Video Asset Manager

DeepPIV resource needs

- Ship time: 4 days on Rachel Carson (2 days to test new illumination, 2 days to test duplicate system)
- Engineering time: 400 hrs EE, 400 hrs ME, 150 hrs machine shop, 100 hrs ME Tech, 100 hrs EE Tech
- Data and video management: 5 TB storage space on Atlas, 50 hrs SE for Video Asset Manager

Questions?