

3D Oceanographic Data Visualization

*Using open source STOQS & X3D
Case Study*

We build robots to understand the ocean...

Sometimes the ocean bites back!



 **Monterey Bay Aquarium Research Institute (MBARI)**
July 25 at 9:01 AM · 🌐

MBARI engineers made a startling discovery yesterday while recovering the autonomous underwater vehicle (AUV) Brizo. 🐡

Brizo survived with some minor damage, and the team managed to pull a few shark teeth from the housing! Swipe to see the extraction and dental souvenirs. Thanks to MBARI engineers Brian Kieft and Ben Raanan for sharing the images, video footage, and fantastic story!



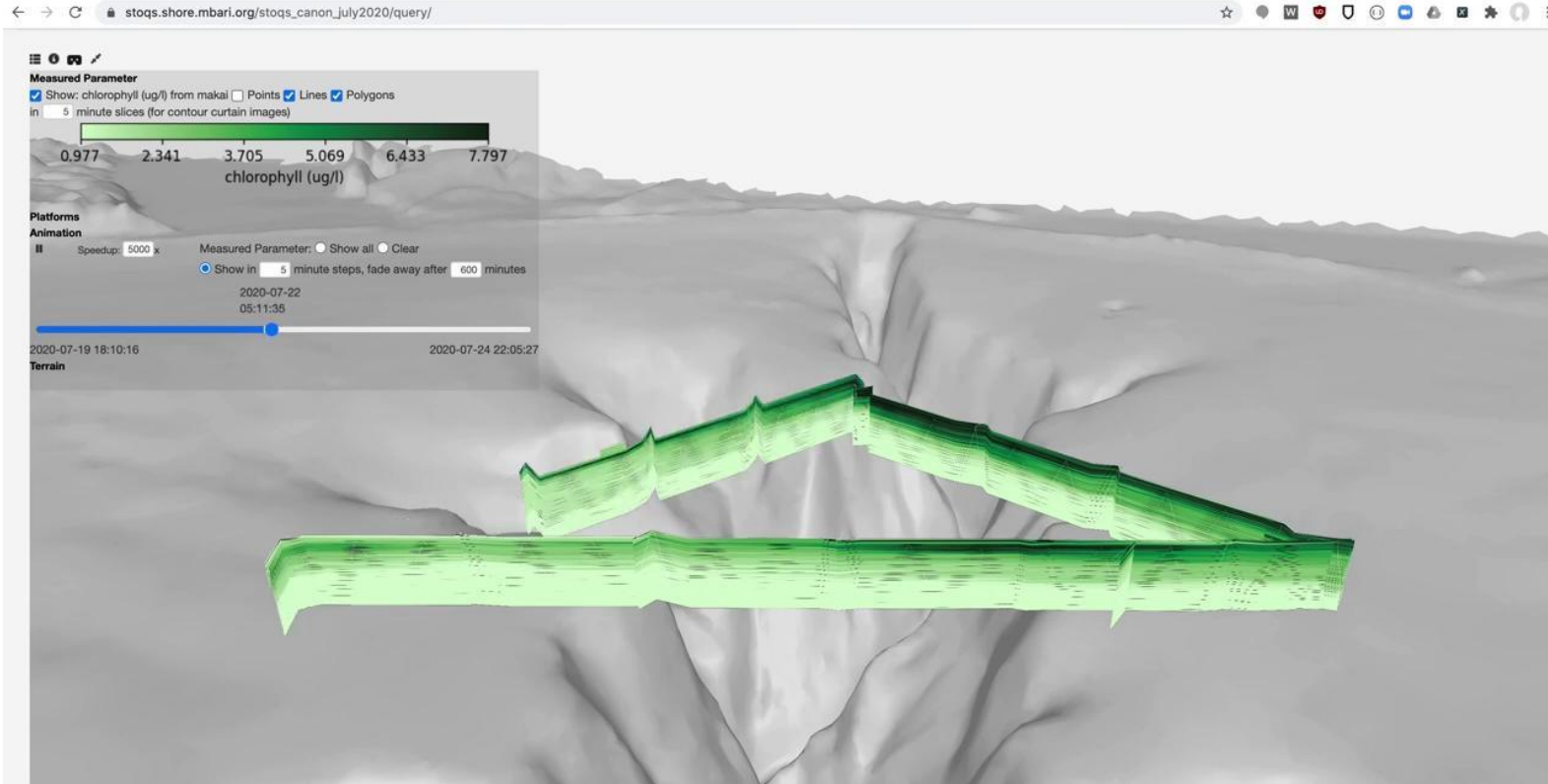
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AUV Shark Bite Animation



Sensor Data Visualization



Feature Desiderata

- Transition bathymetry processing from SRC to .glb
- Timesensor VCR style playback/pause/scrub simplification
- Tileservers for extremely large scene exploration
- Automated camera animation around interesting features
- Improving 3D navigation user experience

From: <https://www.mbari.org/canon-2020/>

Although MBARI engineers have had great success building robots that communicate effectively with one another, Pitz noted that one of the biggest challenges in this experiment is keeping lines of communication open among the humans involved. “We need to decide the best times and places to collect samples while making sure the LRAUV doesn’t burn out its battery or hit the bottom. This requires lots of communicating between the scientists, engineers, and marine operations staff. As a scientist at MBARI, one of the things I’ve learned is that, in order to get good scientific data, you need to work closely with the engineers to understand and adapt to the limitations of the equipment.”

The Summer 2020 CANON experiment is a prime example of how researchers can collect vast amounts of useful data by sending robots instead of people out to sea. “This mode of operation will increase dramatically in the future,” said Chavez. “Not only because of COVID but because of the need for persistent and globally distributed observations of life in the sea.”



Studying the ocean can be risky for robots as well as for humans. During the Summer 2020 CANON experiment, one LRAUV was bitten by a shark. Researchers pulled several fragments of shark teeth from the hull of the vehicle. Top image: Brian Kieft © 2020 MBARI; Bottom image: Ben Yair Raanan © 2020 MBARI