

Ocean Twilight Zone

2019 Q1 REPORT

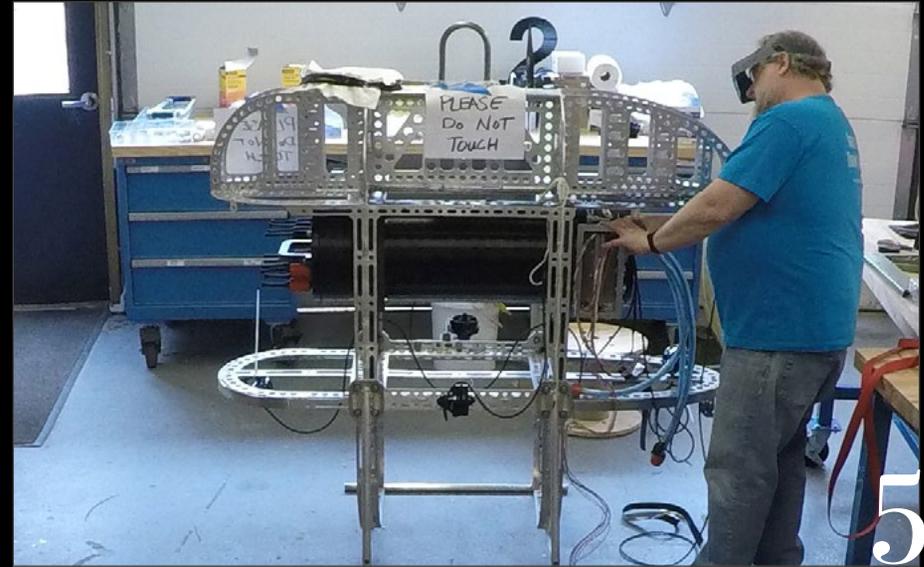


Key accomplishments



3

Took advantage of an unusual, late-breaking opportunity to **rapidly mobilize a research cruise** on M/V *Alucia*, with its 1,000-meter-capable submersible.



5

Began construction of *Mesobot* and tested critical systems on a **multi-institutional expedition** aboard the MBARI research vessel *Rachel Carson*.



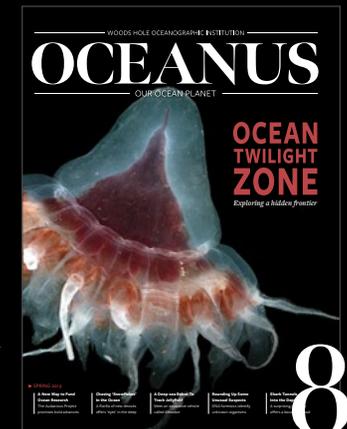
6

Attended United Nations Biodiversity Beyond National Jurisdiction (BBNJ) negotiations to **raise the profile of the twilight zone among international policymakers**.



7

Partnered with OceanX, BBC, and the Avatar Alliance Foundation to build a stunning oceans exhibit featuring the **OTZ at the TED2019 conference** in Vancouver.

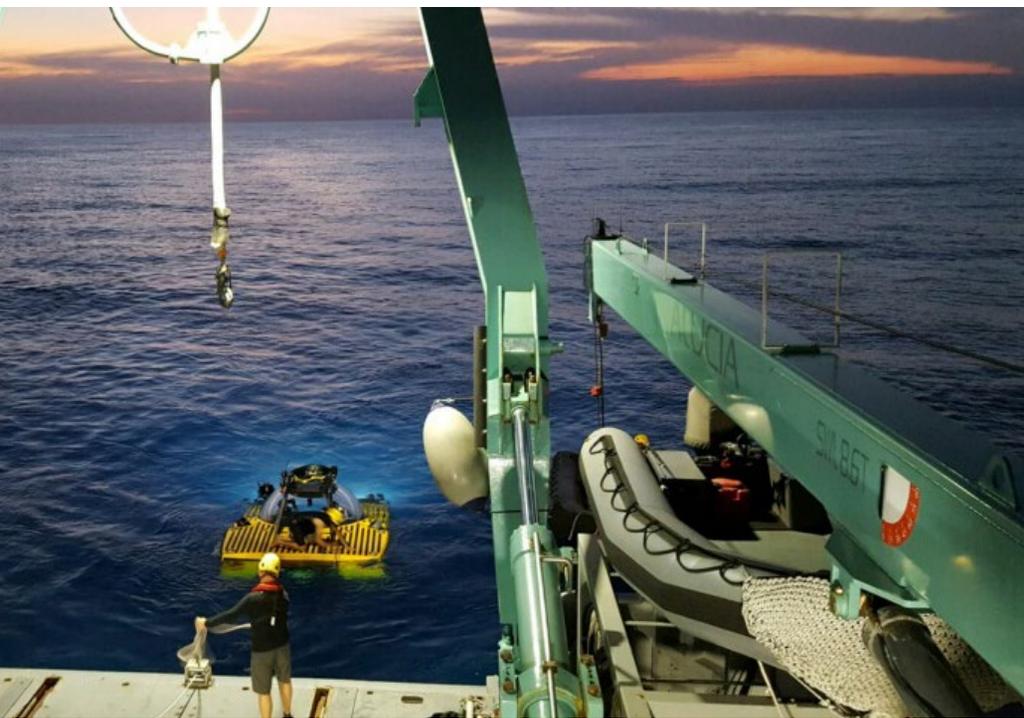


8

Published a **dedicated Ocean Twilight Zone edition** of *Oceanus*.

In the field

Accelerating the pace of OTZ science and engagement



The OTZ team took full advantage of an opportunity to conduct a rapid-response scientific expedition aboard M/V *Alucia* from March 10-19 after we learned of the ship's availability ten days before it sailed. Project lead Heidi Sosik and biologist Joel Llopiz served as co-chief scientists on the six-day mission in deep waters of the Tongue of the Ocean and the Sargasso Sea. We also augmented the expedition with a highly skilled team of outreach professionals from OceanX, Quartz Media, and WHOI, resulting in an impressive suite of high-quality photos and videos of ocean life and expeditionary science that we are now using to support the objectives of our OTZ Engagement Plan.

An Audacious Effort

Normally, planning and mobilizing for a mission like this would take months. But because WHOI is home to assets that include dedicated marine operations and seagoing technical teams, as well as scientists with extensive at-sea experience, we were able to pull together a mission plan and the necessary resources in record time.

Preliminary Results

The results from this unanticipated mission have advanced our understanding of the twilight zone faster than anticipated and also expanded our exploration of the twilight zone into a new geographic region of the ocean.

Other Recent Accomplishments

- » Preliminary eDNA analyses complete
- » Fish and other organisms from *Bigelow* cruise completely dissected
- » Working to identify pathways for near-real-time analysis of acoustic data
- » Isotopic analysis of marine snow complete from 2018 EXPORTS cruise

M/V Alucia cruise social media

Woods Hole Oceanographic Institution (WHOI)
March 26 · 🌐

Most of creatures in the #OceanTwilightZone are spineless. Invertebrates, like zooplankton and jellies, make a massive contribution to life on our planet as a key link in the food chain and by helping move carbon and other nutrients throughout our oceans. #ImageOfTheDay



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Quartz News
March 28 · 🌐

Sunlight barely reaches the unknown life forms in a rarely seen, barely explored, layer of the deep sea — the ocean's twilight zone. Scientists are eager to learn about its mysteries and potential riches. This week Quartz News takes a submarine deep into the Pacific Ocean to get up close with some weird looking organisms.

Follow Quartz News for weekly dives into the stories shaping our future and tune in every Thursday at 12pm eastern for new episodes.

Woods Hole Oceanographic Institution (WHOI)
March 17 · 🌐

"Amazing—over 570 meters below the ocean's surface, it was pitch black below but I could still look up and see twilight filtering down from the mid-day sun far above us. By 650 m down, it was pitch black in every direction!" —Heidi Sosik on entering the #OceanTwilightZone with OceanX



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WHOI @WHOI · Mar 17

WHOI biologist Heidi Sosik and postdoc researcher Paul Caiger begin their descent into the #OceanTwilightZone from Alucia. With OceanX

#NewsGoesOld #BackFromTheField #OceanTwilightZone



👍👎👁️ 1,254 views

Quartz News
March 28 · 🌐

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THIS IS THE OCEAN TWILIGHT ZONE

Quartz News for Facebook Watch

Quartz News
Scientists explore the ocean's eerie twilight zone

👍👎👁️ You, Dorothy Elion and 106 others 2 Comments 183 Shares

Scientists explore the ocean's eerie twilight zone

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111K Views · about a month ago · 🌐

Sunlight barely reaches the unknown life forms in a rarely seen, barely explored, layer of the deep sea — the ocean's twilight zone.

Scientists are eager to learn about its mysteries and potential riches.

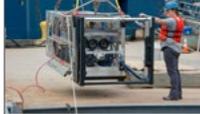
This week Quartz News takes a submarine deep into the Pacific Ocean to get up close with some weird looking organisms.

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OceanX

Woods Hole Oceanographic Institution (WHOI)

Groundbreaking technology for the #OceanX and #Alucia grant us all a glimpse into this world and a window, allowing us to explore the #OceanTwilightZone with #OceanX clarity. <http://www.whoi.edu>



👍👎👁️ 28 1 Comment 18 Shares

woodshole_ocean "Amazing—over 570 meters below the ocean's surface, it was pitch black below but I could still look up and see twilight filtering down from the mid-day sun far above us. By 650 meters down, it was pitch black in every direction!" —Heidi Sosik on entering the #OceanTwilightZone with @oceanx



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woodshole_ocean · Following

sharksavvy facts 🦈
6w Reply

outermoststacey Take me!!!!
6w Reply

i_dig_it_fossils How amazing!
6w Reply

portmender Neat!
5w Reply

g2visionsart Wow, that looks amazing!
5w Reply

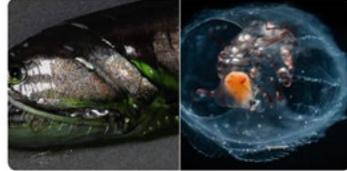
👍👎👁️ 4,933 views
MARCH 19

Add a comment...

Oceans at MIT and 3 others liked

Simon Thorold @SimonThorold · 24 Aug 2018

Successful first science cruise for @WHOI @TheAudaciousPyl #oceanTwilightZone highlighted in @sciencemagazine - initial results already beginning to question conventional wisdom and point way forward [gsc @TGSFPZ](https://doi.org/10.1126/science.1254444)



👍👎👁️ 2 12 34 1 1 1

Woods Hole Oceanographic Institution (WHOI)
March 17 · 🌐

"It was so incredible to see the ocean twilight zone up close and personal." —WHOI biologist Dr. Heidi Sosik, With OceanX.



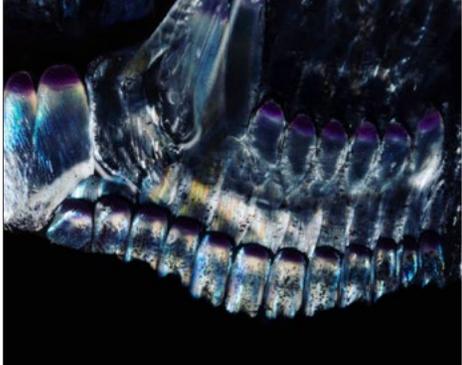
👍👎👁️ 1.5K 3 Comments 7 Shares

woodshole_ocean · Following

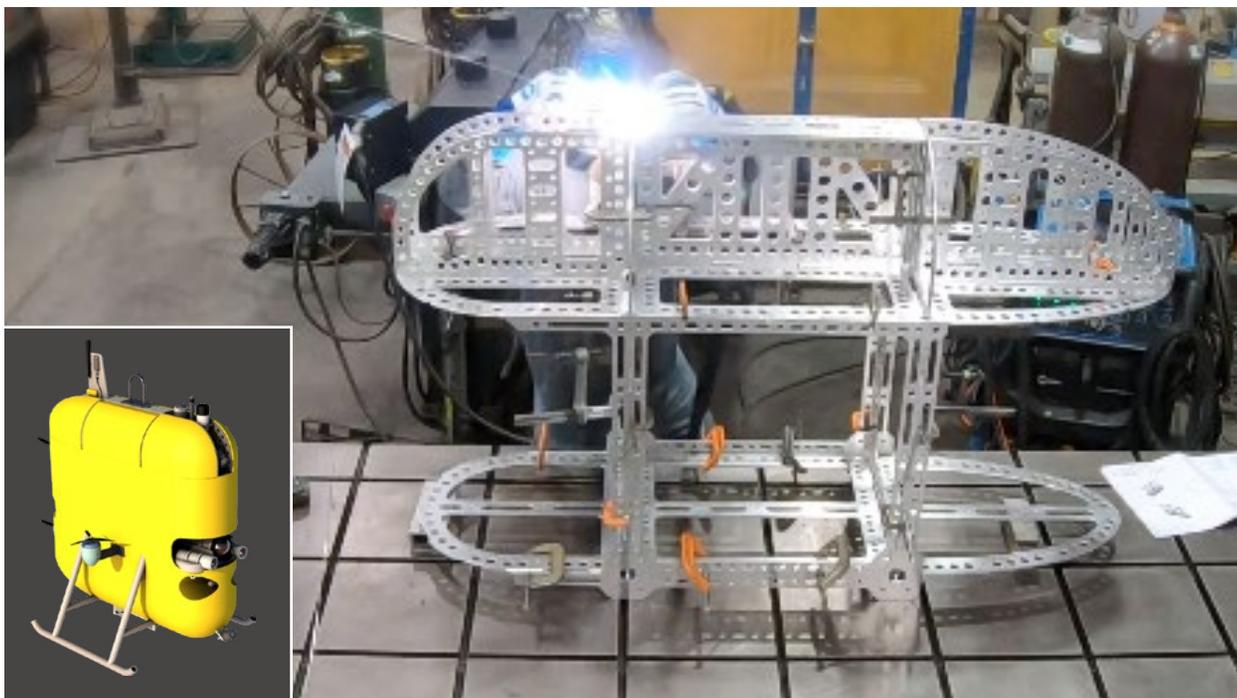
woodshole_ocean Dotted along the underside of a hatchfish's belly are photophores, light producing organs which help the creature hide from predators below. The hatchfish can adjust the color and luminosity of their #photophores to mimic the shifting light from the ocean's surface.

This ability is called counterillumination and is found in many #OceanTwilightZone creatures. Counterillumination makes hatchfish almost invisible from below. Amazing photography by #WHOI postdoc @paulcaiger

👍👎👁️ Liked by all_jay_and_ry and 749 others
APRIL 15



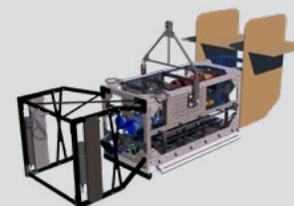
Advancing technologies



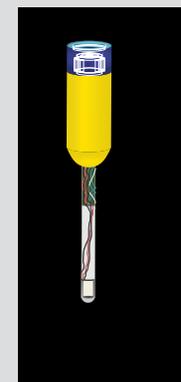
Accelerating Mesobot

Our latest audacious innovation, *Mesobot*, is in the final stages of construction. Even as it was being assembled at WHOI, OTZ engineer Jonathan Howland was in the Pacific on board the research vessel *Rachel Carson* with scientists and engineers from the Monterey Bay Aquarium and Research Institute and Stanford University to test *Mesobot's* lights, cameras with tracking software developed by our collaborators. Using one of MBARI's remotely operated vehicles, the team demonstrated the vehicle's ability to track zooplankton for several hours using only dim red light that minimizes disturbance to the animals. This next quarter will also see the first ocean test of the *Mesobot*, likely back on board the *Rachel Carson*.

TECH UPDATES



Deep-See is receiving a complete overhaul and upgrade based on its first successful expedition in August 2018. Its camera system is greatly improved, the acoustic sensors are synced, the entire electrical system has been rebuilt, and the processors that upload data have been improved. The vehicle will be reassembled and well tests will begin in June.



MINIONS—small floats that measure sinking rates of marine snow to help us understand how carbon moves through the twilight zone—are well on their way to becoming a reality, with continued development of the sensor and tracking modules, as well as a shift to an all-glass housing. Prototypes have been made to fit the new housing with anticipated field tests as early as the OTZ summer cruise of 2019.

Policy

Making the case for the ocean twilight zone



While some OTZ members were at sea, others were promoting the importance of twilight zone sustainability on land—at the United Nations (UN). Much of the twilight zone lies in the “high seas”—waters beyond national jurisdiction where relatively few laws or international agreements apply. With exploratory fishing activities by several nations already underway, ensuring that the twilight zone is included in all ocean policy discussions is one of the OTZ Project’s highest priorities.

From March 20 to April 5, OTZ marine policy expert Porter Hoagland and his student Aria

Ritz Finkelstein attended the 2nd Session of the Intergovernmental Conference on the conservation and sustainable use of marine biodiversity of areas beyond national jurisdiction (BBNJ) at the UN in New York City. They distributed the dedicated OTZ edition of WHOI’s flagship magazine, *Oceanus*, with a cover letter outlining how the twilight zone is directly linked to BBNJ objectives.

In addition to one-on-one meetings introducing the twilight zone to delegates, Finkelstein gave a statement to the entire BBNJ plenary about the importance of the twilight zone. These efforts

laid the groundwork for emerging twilight zone science to inform the treaty negotiations focused on the governance of marine biodiversity outside of any nation’s exclusive economic zone.

“It’s clear that delegates are getting the message, that it’s not just about the surface fisheries or deep seabed mining,” said Hoagland. “There’s a vertical dimension to the ocean and a big part of that is the twilight zone. It might be out of sight, but we’d like to make sure that it’s not out of mind.”

Diving deeper at TED



After Heidi Sosik's successful TED talk last year, we wanted to make sure attendees of the 2019 conference kept the ocean as a whole, and the twilight zone in particular, forefront in their minds. With support from the Avatar Alliance Foundation and the Dalio Foundation, WHOI teamed up with OceanX and the BBC to create an immersive ocean experience at TED2019 in Vancouver (April 14-19). The installation included a massive video wall consisting of five, 14-foot pillars showcasing stunning underwater footage, as well as displays that represented the breadth and depth of WHOI's effort to expand human knowledge about the ocean.

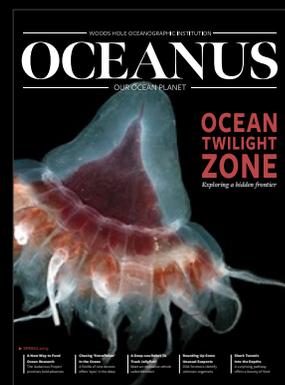
The exhibit reached thousands of conference goers, with hundreds stopping to explore and engage with participating OTZ team members—Heidi Sosik, Andy Bowen, and Sam Harp. Building strategic partnerships is a key OTZ engagement goal and the contacts we established at TED2019 will considerably broaden our reach.

Increasing awareness of the Ocean Twilight Zone Project



The Ocean Twilight Zone Project headlined three high-level events this past quarter with great success.

- Phil Renaud and Ken Buesseler presented updates about the OTZ Project to the Robertson Foundation staff and to its Board of Directors.
- Heidi Sosik told the OTZ story and shared some early results with WHOI's New York Chapter at the New York Yacht Club.
- After Larry Madin returned from the research cruise on *M/V Alucia*, he updated a Trustee and Friends reception in Florida at the Sailfish Club about the OTZ Project's recent successes.



WHOI published a dedicated Ocean Twilight Zone edition of *Oceanus* magazine. This issue had a distribution of 12,000 print copies and over 15,000 views of related web content.

Media and social media highlights

FEATURED MEDIA



QUARTZ MEDIA

7,000,000



GOTHAMIST

700,000

OVERALL STATS

300+

EARNED MEDIA STORIES

130,000,000

POTENTIAL REACH

175

SOCIAL MEDIA POSTS

2,000,000

SOCIAL MEDIA REACH

15,330

WEB VIEWS

TOP POSTS

Woods Hole Oceanographic Institution (WHOI)
March 17

"It was so incredible to see the ocean twilight zone up close and personal!" --WHOI biologist Dr. Heidi Sosik, With OceanX.

1,500+ FACEBOOK REACTIONS

woodshole_ocean "Amazing--over 570 meters below the ocean's surface, it was pitch black below but I could still look up and see twilight filtering down from the mid-day sun far above us. By 650 meters down, it was pitch black in every direction!" --Heidi Sosik on entering the #OceanTwilightZone with @oceanx

4,933+ INSTAGRAM VIEWS

oceanx A gallery of faces from the #OceanTwilightZone by environmental biologists. The depth between 200-1000 meters might be the richest of all, but it's under threat. @oceanx oceanx wants to know how it can be fished sustainably before it turns into a fish for all that threatens the health of our oceans. Our latest mission was covered by @qz; link in bio. #oceanx

2,225 INSTAGRAM LIKES

WHOI @WHOI - Mar 19

The comb jelly, a kind of ctenophore (pronounced teen-o-f-ore, meaning to bear combs) swims by fluttering tiny rows of paddling combs. When sunlight strikes the paddles, it creates flickering rainbows along the creature's body.

4,161 RETWEETS 95 RETWEETS 214 LIKES

Woods Hole Oceanographic Institution (WHOI)
March 26

Most of creatures in the #OceanTwilightZone are spineless. Invertebrates, like zooplankton and jellies, make a massive contribution to life on our planet as a key link in the food chain and by helping move carbon and other nutrients throughout our oceans. #ImageOfTheDay

452 FACEBOOK REACTIONS

Quartz News Sunlight barely reaches the unknown life forms in a rarely seen, barely explored, layer of the deep sea -- the ocean's twilight zone. Scientists are eager to learn about its mysteries and potential riches. This week Quartz News takes a submarine deep into the Pacific Ocean to get all close with some world-leading scientists. ... Read More

393 FACEBOOK REACTIONS

Woods Hole Oceanographic Institution (WHOI) Can you just build the robot that can swim me what I missed after I've run out of all? -- Larry Levin, WHOI Marine Biologist

211 FACEBOOK REACTIONS

oceanx Like a cake, the ocean is divided into layers, mostly defined by how much sunlight each one receives. The ocean twilight zone is the layer from 200-1000 meters (650-3,300 feet) where, as its name would suggest, light begins to fade. It's also thought to be the most abundant in terms of sea-creatures. It's mostly cold, mostly dark waters. But so little is known about the ocean twilight zone that @woodshole_ocean was one of the recipients of a special TED grant (generously supported by @oceanx) called the #OceanTwilightZone, to spend six years mapping, sampling, and reporting on it. Here are some highlights from our most recent joint mission from the Atlantic, featuring

2,205 INSTAGRAM LIKES

1ST QUARTER SOCIAL MEDIA STATS - COMPARISON OF REACH FROM LAST QUARTER

f **15,335** ENGAGEMENT \uparrow 177%

273,138 REACH \uparrow 263%

t **2,543** ENGAGEMENT \uparrow 580%

413,867 REACH \uparrow 672%

i **5,002** ENGAGEMENT \uparrow 111%

47,201 REACH \uparrow 83%

The Ocean Twilight Zone Project is embarking on a journey to explore and understand one of our planet's hidden frontiers—the ocean twilight zone. Our project will combine exacting science, innovative technology, and broad engagement to turn knowledge into actions that improve understanding of our planet and how to live sustainably on it.

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