PACE SAT Meeting

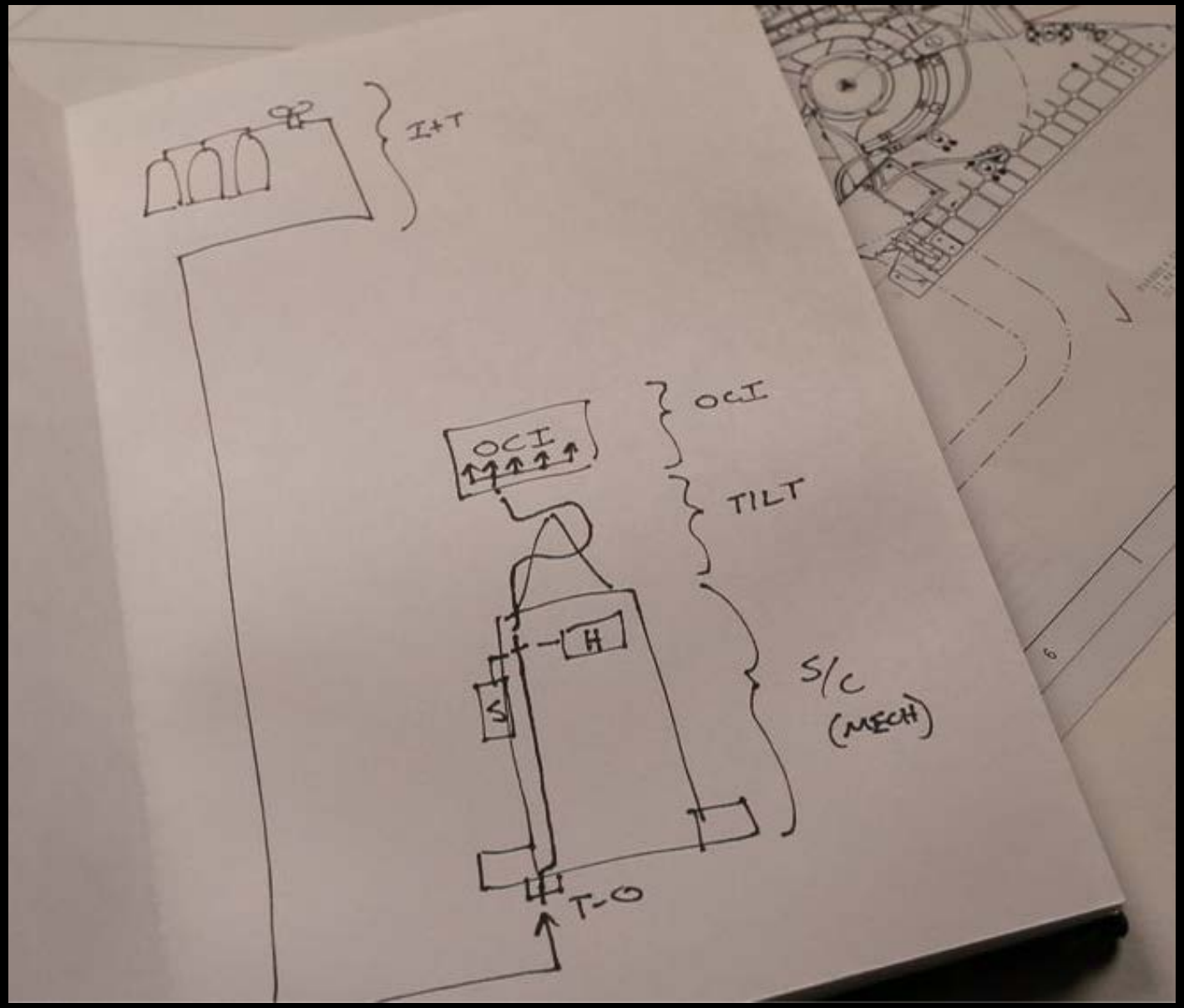
1:00 -1:20 Project Update (Werdell, Dierssen)
1:20-1:40 Odele Coddington –New Solar Irradiance Reference Spectrum
1:40-2:00 Lorraine Remer – Update on PACE UV Working Group
2:00-2:30 Kevin Ruddick -- Can we estimate more than just chlorophyll a and suspended particulate matter concentration in turbid waters by hyperspectral remote sensing? (the HYPERMAQ project)

PACE mission update
Jeremy Werdell

to the SAT on 15 January 2021

News

- Launch date to be decided upon on March 9
- OCI SWIR detector assembly in thermal vacuum for characterization
- SPEXone to be delivered to GSFC in mid/late March
- UMBC cleanroom back in operation to support HARP2 assemblies/integrations (late 2021 instrument delivery to GSFC)
- 5-days of OCI L1B simulations (low fidelity MODIS/VIIRS version) generated & in review; documentation & plan for release underway
- Applications Workshop (held Sep 2020) reports available:
  - *NASA Earth Observer*
    https://eospso.nasa.gov/sites/default/files/eo_pdfs/Nov_Dec_2020_color_508.pdf#page=18
  - *The Oceanographic Society*
    https://doi.org/10.5670/oceanog.2020.416

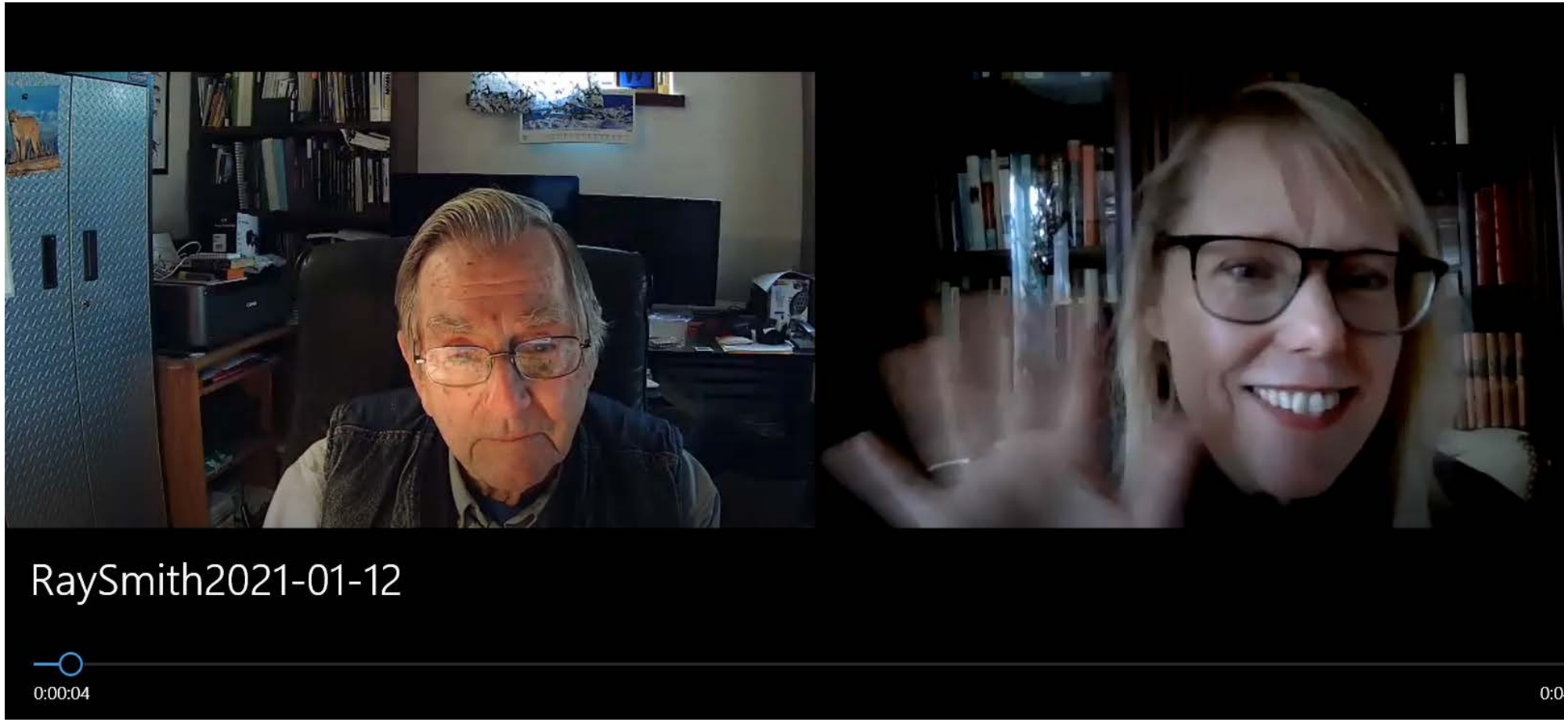


OCI

TILT

S/C

Personal Update from Ray Smith



PACE Early Adopters Report

> WORKSHOP REPORT

Leveraging Design Principles to Inform the Next Generation of NASA Earth Satellites

By Joel P. Scott and Erin Urquhart

On September 23 and 24, 2020, NASA convened a virtual 2020 Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) Applications Workshop to establish a transdisciplinary dialogue about how the PACE mission will support both applied research and societal needs, including managing water resources, safeguarding human health, supporting air quality monitoring, responding to a changing climate, and mitigating natural and anthropogenic disasters. The PACE mission is NASA's next great investment in Earth science, continuing its legacy of over 40 years of satellite ocean color measurements (Figure 1). Expected to launch no

ogy, and innovation. Applied science is the use of scientific knowledge to advance society in support of stakeholder needs and to optimize decision-making processes. An integral component of applied research is design thinking—an iterative, problem-solving framework that integrates human perspectives, needs, and experiences at every step of the process. The 2020 PACE Application Workshop was the first in a series of annual PACE applied science events that will integrate design thinking principles into the mission, engaging stakeholders and leveraging user feedback to inform mission outcomes and deliverables.

data, (2) to foster working partnershi
between data producers and data users
support of open communication and c
laboration, and (3) to identify potential
applications of PACE data not curren
being pursued. These objectives int
grated *desirability* by assessing the nee
of potential PACE data users and und
standing their perceptions of satell
remote-sensing capabilities; *viability*
evaluating the utility of the PACE missi
for health, economic, and environmen
applications; and *feasibility* by assessi
potential applied science projects with
the scope of the PACE mission's anti
pated performance and deliverables.

desirability, viability, and feasibility-

FIGURE 2. Workshop participants ranked, on a one-to-five Likert scale, a series of statements gauging their levels of stakeholder awareness and involvement via an interactive audience polling activity during the first day of the workshop.

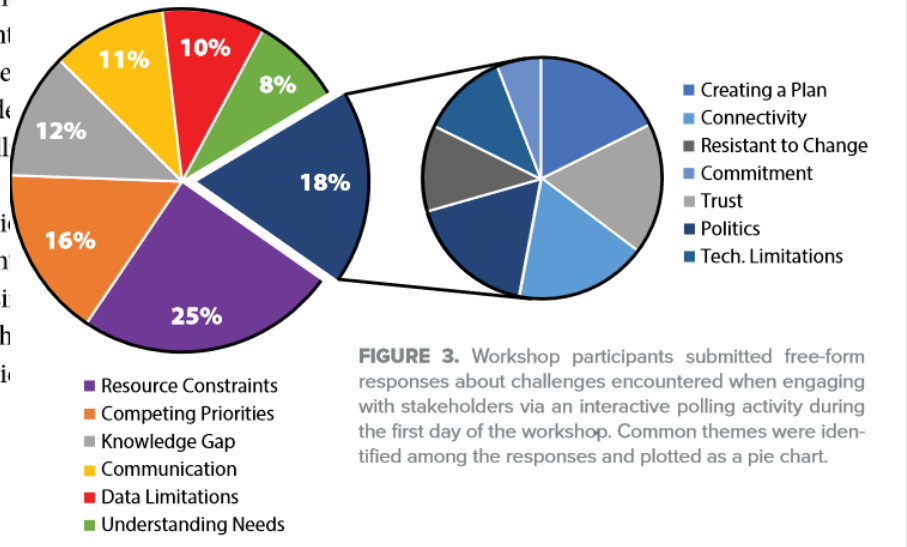


FIGURE 3. Workshop participants submitted free-form responses about challenges encountered when engaging with stakeholders via an interactive polling activity during the first day of the workshop. Common themes were identified among the responses and plotted as a pie chart.

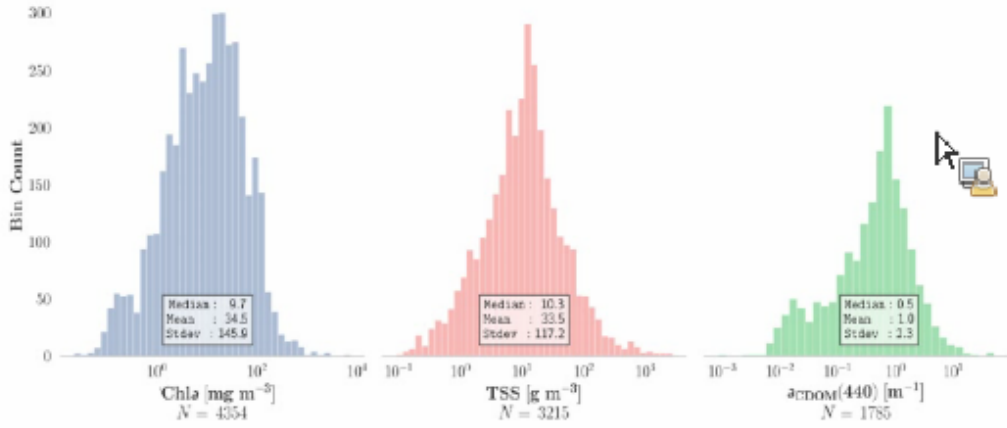
Early Adopters: Nima Pahlevan

In situ Dataset

SeaBASS NASA

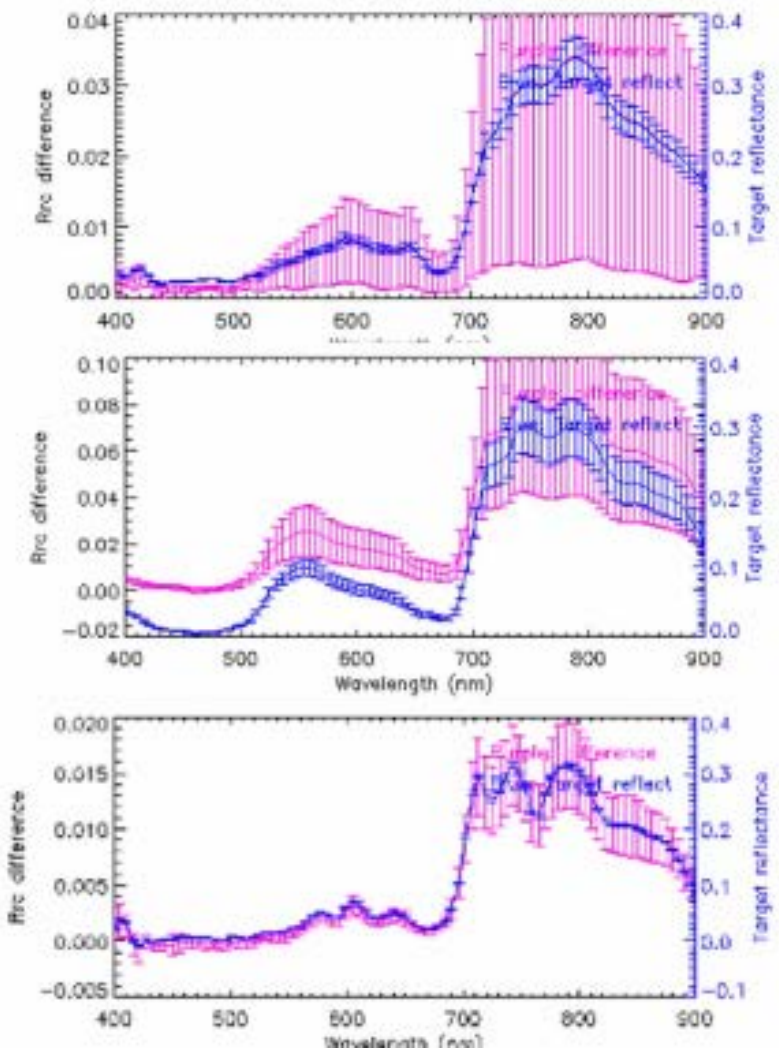
- A community-wide data sharing exercise led to a compilation of a major database

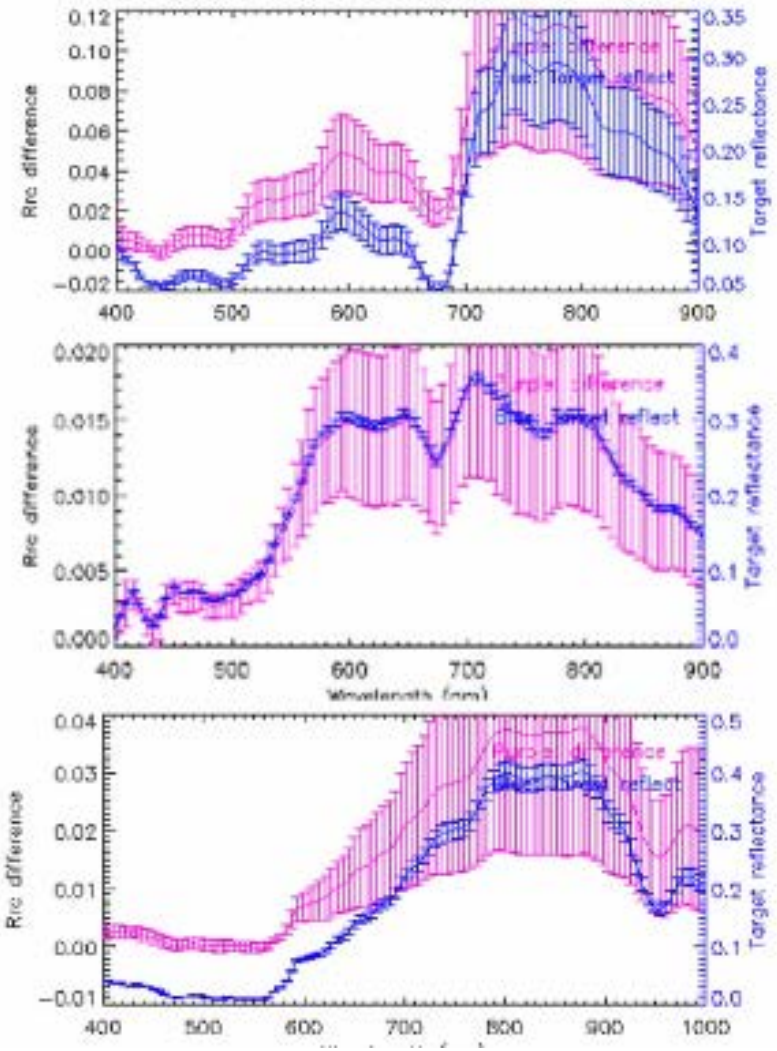
	Data Pairs					
	R_{rs} - Chl*a*	R_{rs} - a_{cdom}	R_{rs} - TSS	R_{rs} - PC	R_{rs} - a_{ph}	R_{rs} - a_{nap}
N	~ 4300	~1800	~ 3200	~ 800	~ 1300	~ 450



University of Nebraska Lincoln · XERRA · NOAA · EOM Earth Observation and Modeling · Wisconsin Dept. of Natural Resources · Creighton University · VNU · KIOST · IUPUI · NIGLAS · National Research Council of Italy · University of Tartu Tartu Observatory · University of California Santa Cruz · University of Georgia · 筑波大学 University of Tsukuba

Early Adopters: Chuanmin Hu





Feature Article for March

Sensing a More Colorful Ocean with NASA's PACE Mission

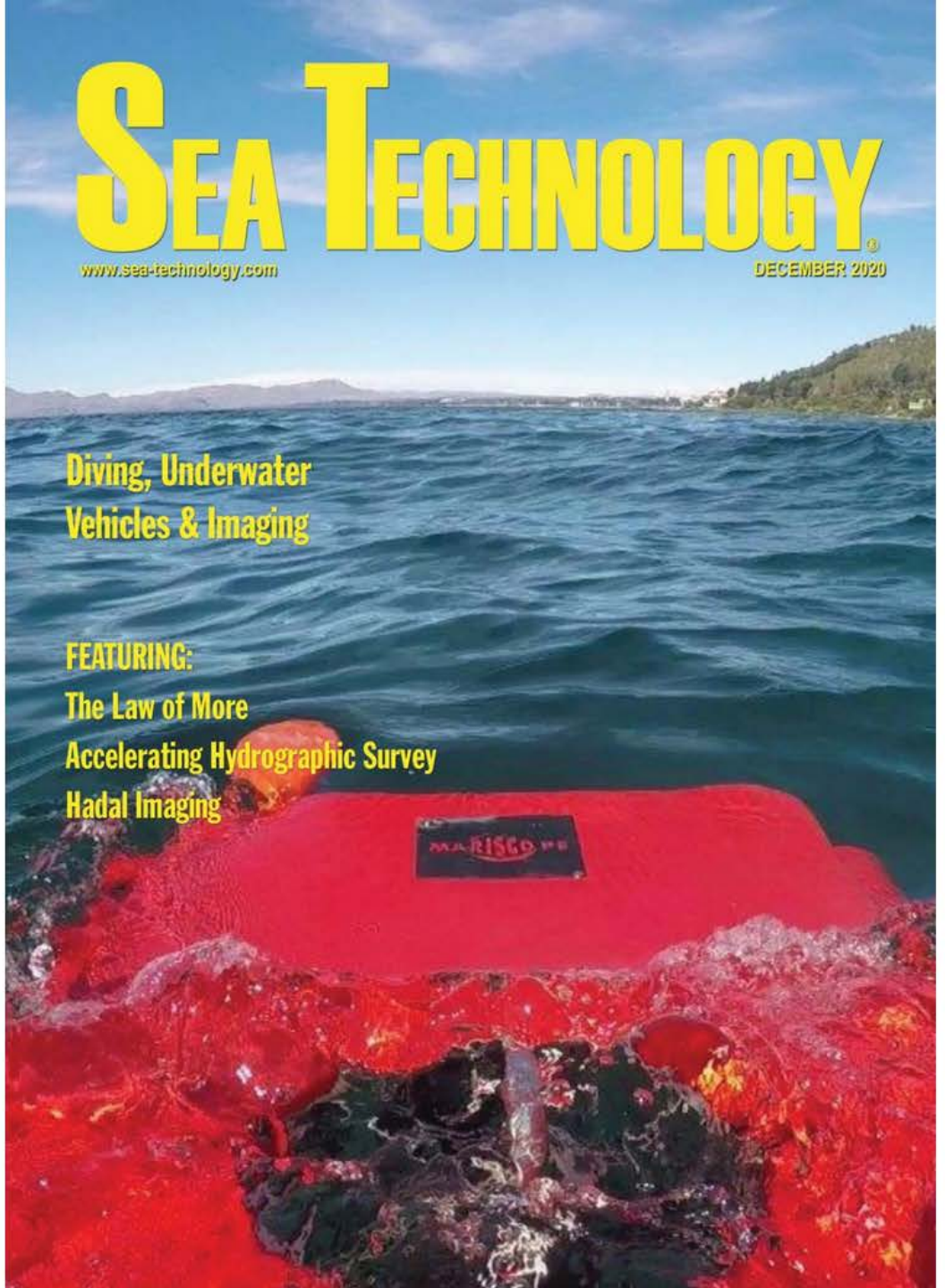
New satellite will improve monitoring of coasts and harbors

Satellites provide unprecedented views of the swirling, dynamic patterns of ocean life. Even though we cannot directly see the microscopic phytoplankton that fuel the ocean food web from space, we can see how they absorb light as they photosynthesize. The sea changes from blue, to green, brown or even red as pigments like chlorophyll-*a* harvest light in different parts of the electromagnetic spectrum. The evolution of chlorophyll-*a* derived from satellites over the last twenty years has outlined fronts where fish congregate, intense algal blooms that can be toxic, and changes in productivity of the vast deserts in the center of ocean gyres. However, this colorful view of the oceans is about to get even more colorful with the launch of the next generation of "hyperspectral" ocean color satellites. NASA's upcoming Plankton Aerosol Cloud and ocean Ecosystem (PACE) mission will be the first of its kind, featuring a suite of cutting-edge optical sensors to monitor the atmosphere and ocean.

Sensor technology has improved considerably over the last few decades and space-borne sensors that provided only 3 to 8 channels of information in visible wavelengths are now "hyperspectral" with 60 channels across the same visible spectrum of light. The PACE mission scheduled to launch in 2023 will host the Ocean Color Imager (OCI) consisting of two spectrometers spanning the ultraviolet, visible and near-infrared spectral regions at 5 nm resolution, as well as seven additional detectors to collect measurements at longer shortwave infrared useful for monitoring the atmosphere and turbid harbor waters. The entire globe will be imaged every 1-2 days with a pixel size of 1 km^2. The mission will simultaneously measure the polarization state of the reflected light with the Hyper Angular Rainbow

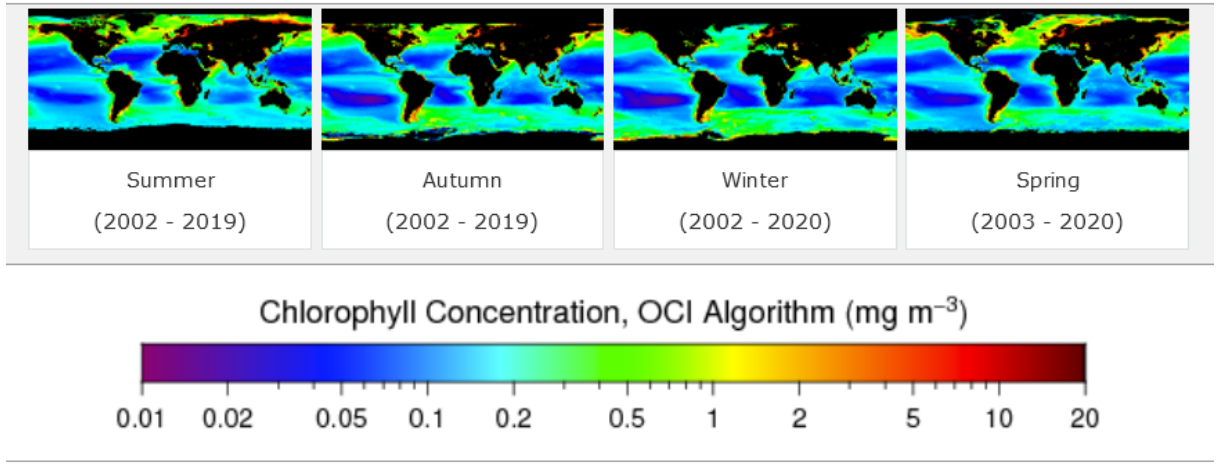
Chuanmin Hu: Sargassum and Oil Emulsion Detection

Matteo Ottaviani: Oil Spill Detection & Surface Index of Refraction

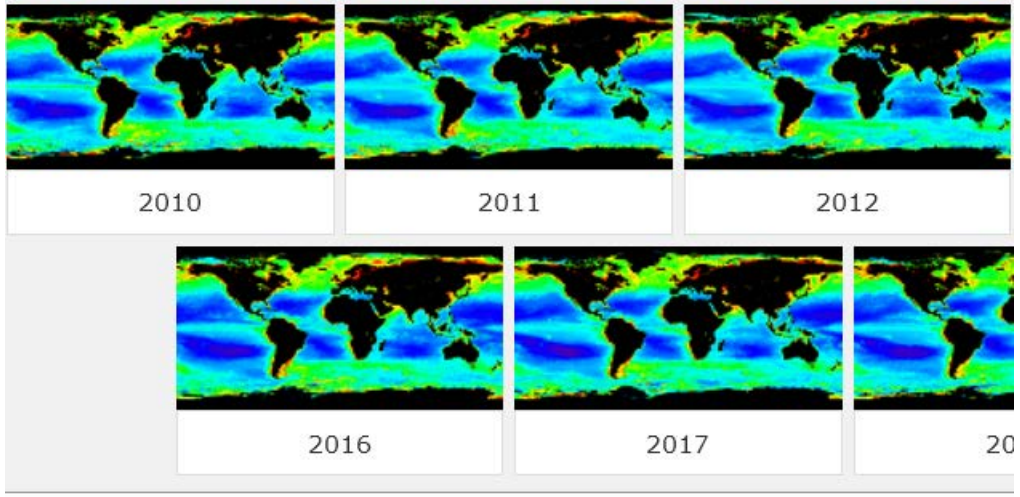


Time-Averaged Composites

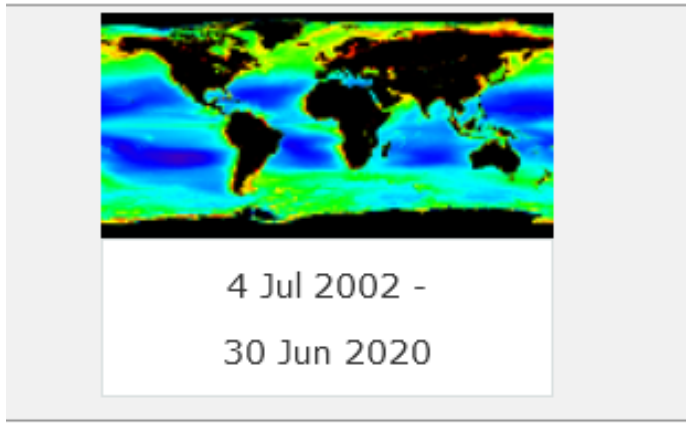
SEASONAL →



ANNUAL



MISSION "CLIMATOLOGY"



But average only months with DATA!!! So poles overestimated greatly!

Seasonal, Annual, Mission Composites

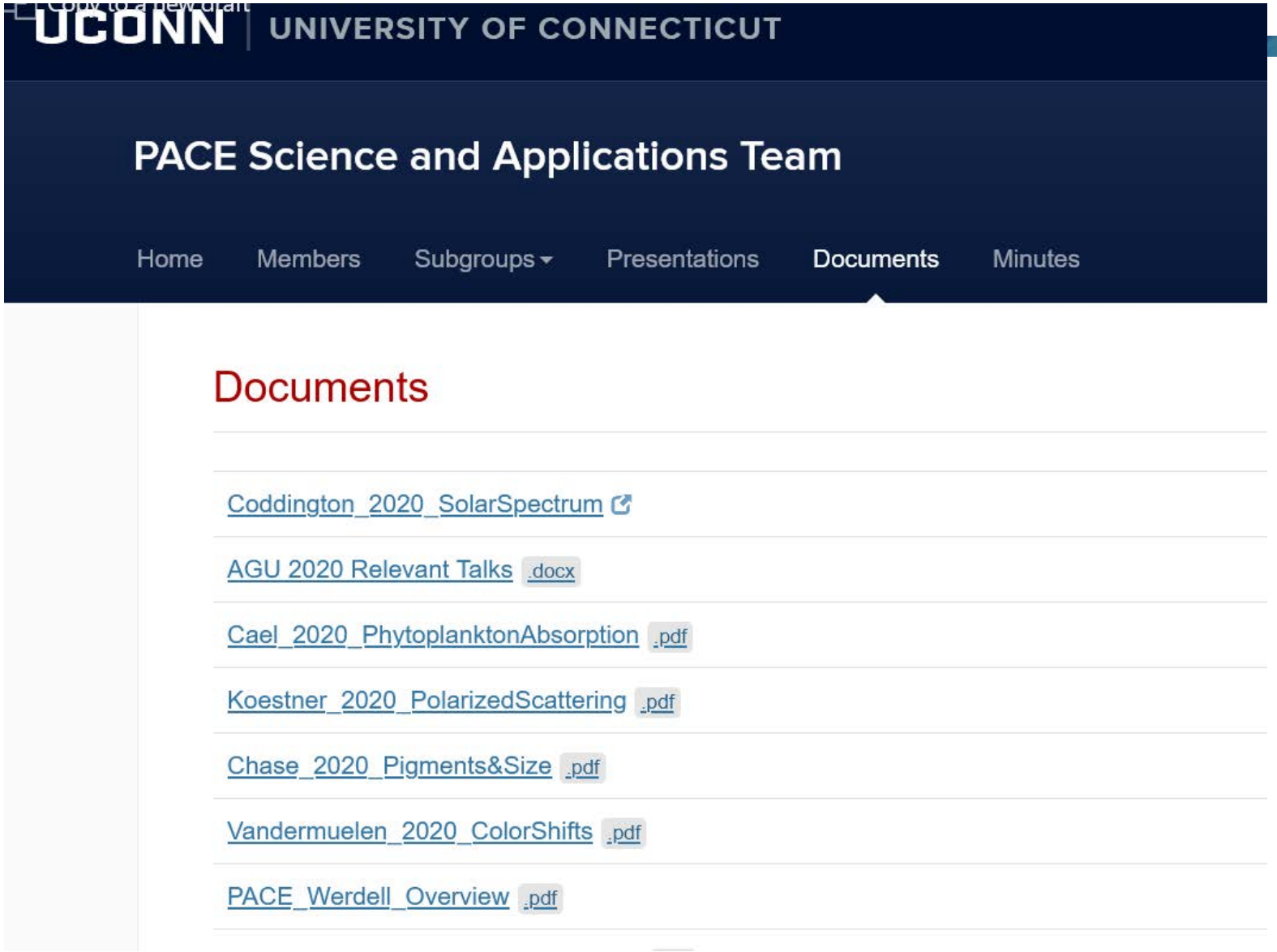
- Produced by ocean color but not by aerosol or cloud? community.
  - Useful?
  - Which, if any, products should have long-term composites?

- I am proposing to not produce Level 3 seasonal, composite products at latitudes where we are missing a month of data due to polar darkness and/or sea ice.
  - Presently these months are “ignored” in the calculations leading to strong summer bias in the data that is commonly misinterpreted as an average.
  - Any latitudes subject to no data due to insufficient light should not be included in a seasonal or annual composite.
  - Level 3 would be limited

- Propose to push pole-to-pole global products to Level 4 using GMAO model results.
  - Quote from Cecile Rousseaux: “And yes we can provide Level 4 data products for all state variables (so chl, phytoplankton composition, nutrient, PP etc).“

Odele Coddington (Link to Paper and Data provided on PACESAT website)

https://pacesat.marinesciences.uconn.edu/documents/



THANK YOU TO ALL SPEAKERS!

Next Meeting

19 Feb. 2021, 1 pm ET

- Nima Pahlevan
- Amir and Andy on Uncertainties
- You?