



## Plankton, Aerosol, Cloud, ocean Ecosystem Science and Applications Team

### ***PACE Simulated Data Presentations:***

1:00 -1:15 Project Update

1:15-1:30 Pengwang Zhai

1:35-1:50 Bastian Van Dierenhoven

1:50-2:00 Wrap up on Simulated Data Questions and Needs

5 min. slides from Hubert Loisel (recap)

2:00-2:30 20 min. FLEX mission – Jose Moreno



# WELCOME to PACE SAT Meeting!

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- PACE Update from Jeremy Werdell

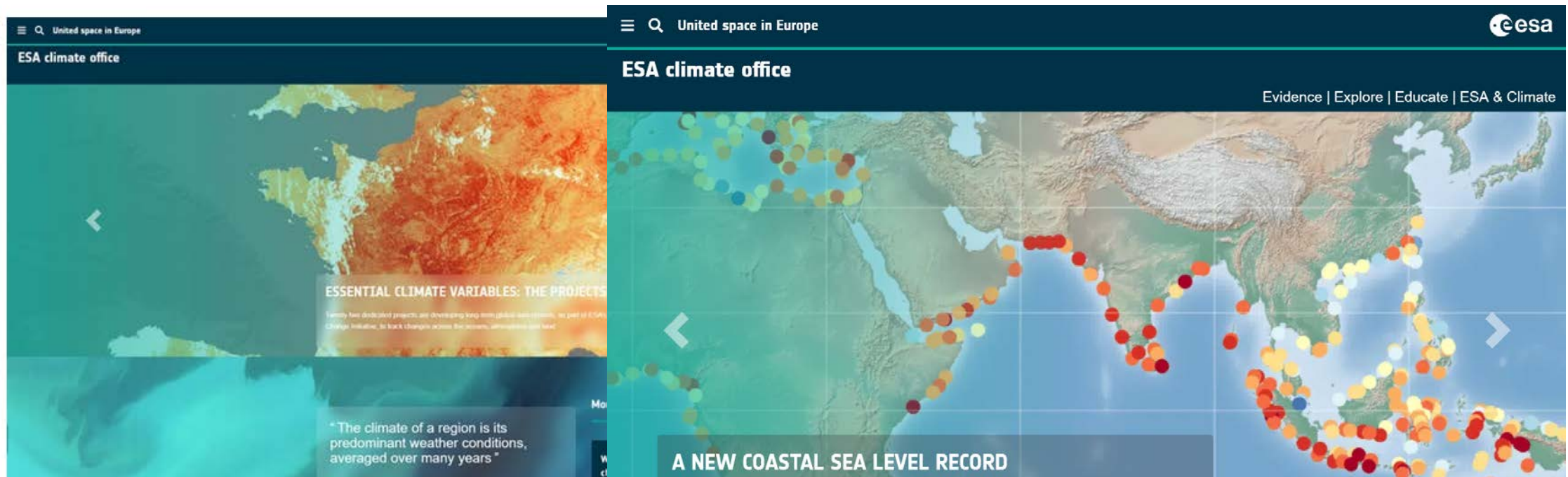
# <https://climate.esa.int/en/>



The European Space Agency (ESA) just launched a brand new, gorgeous website dedicated to climate research and education.

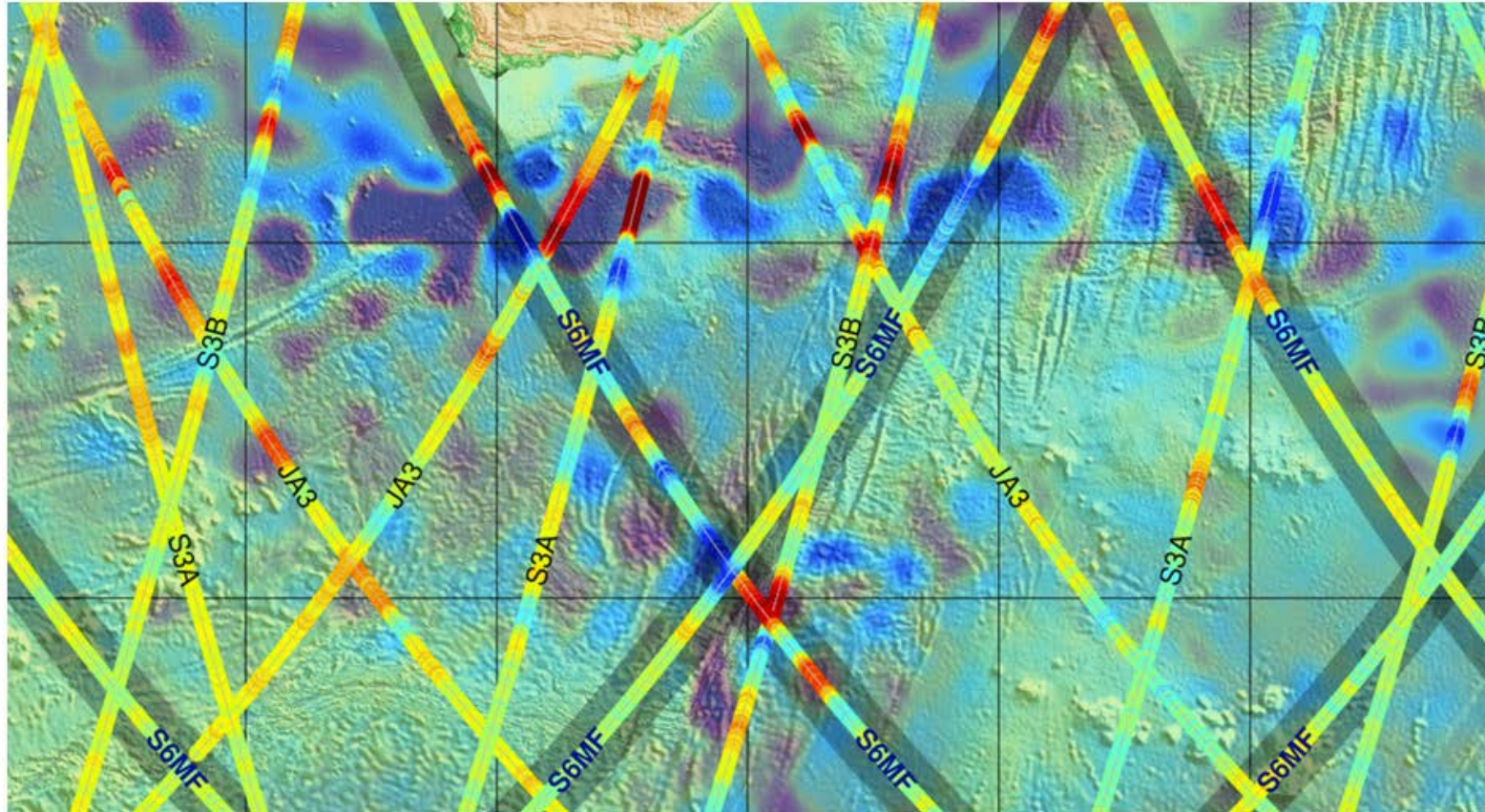
The website is organised around four themes.

- **Evidence** is aimed at giving visitors an overview of the overwhelming evidence for the changing climate gathered by satellites, from rising greenhouse gas levels over shrinking ice sheets to rising sea levels.
- **Explore** allows visitors to discover climate data in an attractive and interactive way.
- **Educate** lists resources on climate and climate change that can be used in the classroom.
- And finally, in **ESA & Climate** you'll learn how ESA helps in monitoring our climate and how it is evolving.



# Sentinel 6 is giving high quality altimetry

On 30 November, flight operators switched on Sentinel-6's Poseidon-4 altimeter instrument, which was developed by ESA. Analysing its initial data, specialists were astonished by the quality. These first data were presented today, by way of three main images, at the European Space Week.



First sea-level height results from Copernicus Sentinel-6 (click to view at full resolution)



# Survey on Radiometric Products still open

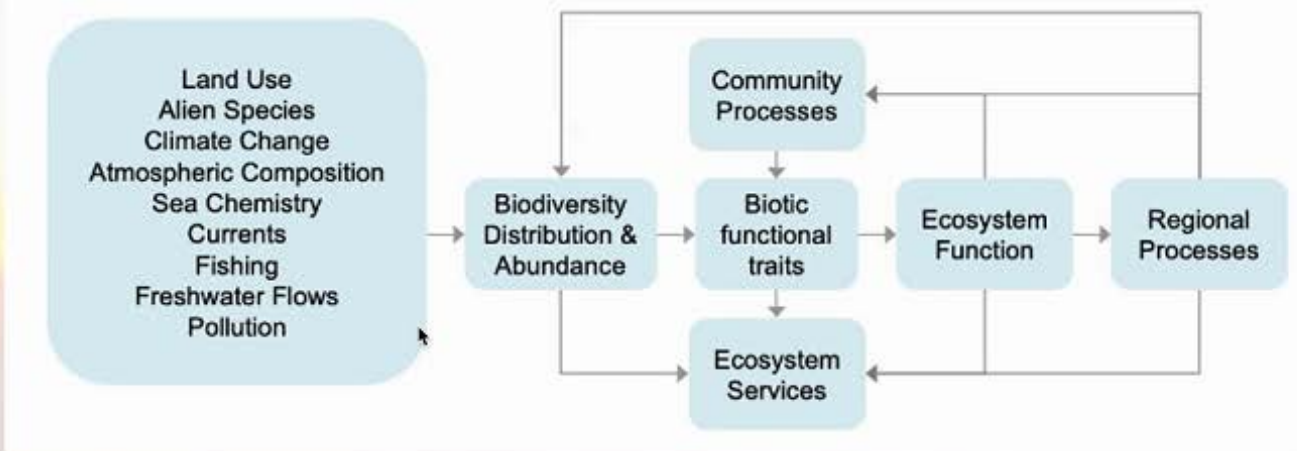
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- Could you please share the link below with your email-lists subscribers. It concerns radiometric products for the upcoming PACE mission that may be of interest to your constituency (should interest, among many others, scientists engaged in IPCC modeling to those interested in in-situ rates of photo-oxidation and warming).
- [https://docs.google.com/forms/d/e/1FAIpQLSf3rmVXuekPIp4X8GdYTKRBdWclWJuLAKNGPL\\_p5RZaC5weAQ/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSf3rmVXuekPIp4X8GdYTKRBdWclWJuLAKNGPL_p5RZaC5weAQ/viewform?usp=sf_link)
- 55 responses and counting!

Woody is working on the BioSCape RFP for ROSES 2021  
 Cecile Rousseaux has stepped forward to lead a PACE effort

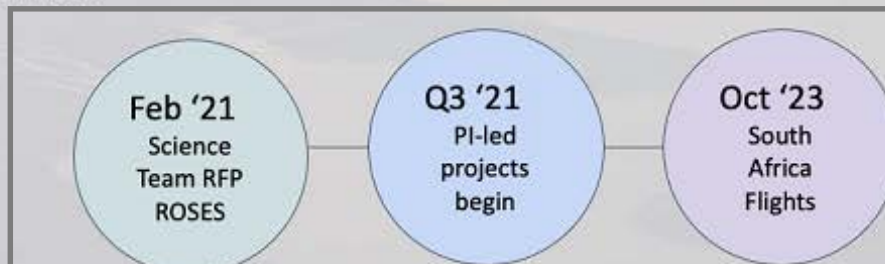
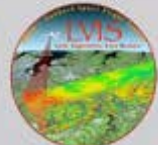


NASA's *first biodiversity-focused airborne campaign:*  
 Biodiversity Survey of the Cape (BioSCape)



**Research Themes**

- Distribution and abundance of biodiversity
- Role of biodiversity in ecosystem functions
- Feedbacks between global change, biodiversity change, and ecosystem services





# Dierssen Seeking Postdoc

**Posting Title:** Postdoctoral Research Associate in Ocean Optics

The Dierssen Coastal Ocean Lab for Optics and Remote Sensing (COLORS) in the Department of the Marine Sciences at the University of Connecticut invites applications for a 2-year postdoctoral research position. The candidate will evaluate hyperspectral algorithms for differentiating phytoplankton groups in Antarctic Peninsula waters and apply approaches to existing airborne PRISM imagery of the region as a proof-of-concept for future global hyperspectral missions like PACE and SBG. The candidate will work in conjunction with international team involved with the Palmer Long Term Ecological Research Project and the Drake Passage Time-series and consider their research within the context of air-sea carbon flux, sea ice and mixed layer dynamics in a changing climate.

The position is flexible in terms of relocation and remote work options will be considered.

## **DUTIES AND RESPONSIBILITIES**

- Compile and analyze pigment and optical data collected in conjunction with the Palmer Long Term Ecological Research Project.
  - Become familiar with different techniques for using hyperspectral reflectance to estimate pigment composition and associated phytoplankton groups.
  - Evaluate model performance using existing observational data.
  - Apply algorithms to existing airborne hyperspectral imagery from PRISM and other comparable or simulated imagery for the region.
  - Interact with the interdisciplinary team of researchers to explore hypotheses related to carbon dynamics and phytoplankton groups.
  - Publish research in peer-reviewed journals and present results at national and international conferences.
- <https://jobs.hr.uconn.edu/en-us/job/494889/postdoctoral-research-associate-marine-sciences>

# AGU Talks of Relevance (Kirk and Matteo)

<https://agu.confex.com/agu/fm20/meetingapp.cgi/Paper/692428>

## **Airborne High Spectral Resolution Lidar-2 Measurements of Enhanced Depolarization in Marine Aerosols**

Rich Ferrare is finding evidence of sea salt aerosols that are nonspherical when relative humidity is low. This is in the context of lidar data, but I wonder if it is relevant to the assumption of spherical sea salt aerosols in our atmosphere correction.

<https://agu.confex.com/agu/fm20/meetingapp.cgi/Paper/661780>

## **A091-0003 Analysis of AERONET Extended Wavelength Retrievals of Aerosol Absorption Parameters Including 380 nm and 500 nm for Detection of Brown Carbon in Biomass Burning and Iron Oxides in Desert Dust**

Thomas F Eck et al regarding brown carbon measurements by AERONET

<https://agu.confex.com/agu/fm20/meetingapp.cgi/Paper/737991>

## **A029-03 - Designing the NASA Air Quality Data System of the Future: User Responsiveness and Data Accessibility for the Multi-Angle Imager for Aerosols (MAIA) Project (Invited)**

Abigail Nastan MAIA has an Early Adopter program like PACE, here is a progress report

## **A091-0007 Preliminary results from HARP CubeSat and a look ahead towards future HARP missions and concepts**

*Jose Vanderlei Martins<sup>1</sup>,*

## **A091-0009 Semi-autonomous Target Selection for Orbital Remote Sensing Platforms as applied to the Hyper-Angular Rainbow Polarimeter (HARP) CubeSat**

*Noah Christian Sienkiewicz*

## **A210-0003 Cloud-edge and in-cloud parallax effects in the polarimetric cloud property retrievals***Chamara Rajapakshe*

## **A210-0010 Evaluation of Distributed System Mission (DSM) Architectures for Cloud Bow Retrievals using the Hyper-Angular Rainbow Polarimeter (HARP)***Sabrina Thompson<sup>1,2</sup>,*

## **A091-0010 Synergy between UV and VIS-NIR sensor to improve aerosol retrievals of optical depth, absorption and height: Examples from collocated observations of OMPS and VIIRS***Santiago*

*Gassó<sup>1,2</sup>,*

## **A091-0005 Development of a common Level-1C product to facilitate multi-sensor science from the NASA PACE Mission***Kirk D Knobelspiesse<sup>1</sup>*

## **A100-01 Death, Taxes and Aerosol (Invited)***Nick Schutgens,*

## **A135-02 Closing the Aerosol Forcing Uncertainty Gap (Invited)***Ralph A Kahn*

## **A135-05 How Consistent Are Satellite Retrievals of Smoke From the 2019-2020 Australian Fires?***Andrew M Sayer,*

## **A141-0013 Cloud Top Observations of the Droplet Size Distribution in Drizzling Stratiform Clouds***Kenneth Sinclair<sup>1</sup>,*

## **A158-07 Using remotely sensed cloud top properties to look at drizzle formation***Brian Cairns<sup>1</sup>,*

## **A211-0008 A Combined Lidar-Polarimeter Inversion Approach for Aerosol Remote Sensing over Ocean***Feng Xu<sup>1</sup>*

## **A208-03 Retrieval of aerosol properties from HARP observations***Anin Puthukkudy<sup>1</sup>,*

## **A208-04 Exploring the capabilities of synergistic passive and active remote sensing with a new aerosol retrieval testbed***Reed Espinosa<sup>1</sup>,*

## **A208-05 The PACE-MAPP Algorithm: Coupled Ocean/Aerosol Products***Snorre Stamnes<sup>1</sup>*

## **A208-07 Simulated Proxy Data for PACE OCI Pre-Launch Inversion Algorithm Development***Amir Ibrahim<sup>1</sup>*



# AGU cont.

[A231-04 Remote sensing of the ocean surface refractive index](#) *Matteo Ottaviani*,

[A231-05 Droplet Size Tomography Using Multi-View Polarimetric Measurements](#) *Aviad Levis*,

[A231-06 Application of Radon Transform to Multi-angle Measurements Made by the Research Scanning Polarimeter: Test of a Cloud Tomography Concept](#) *Mikhail D Alexandrov*,

[A243-02 Observations of Atmospheric Aerosol Absorption and Their Use to Constrain Models at Various Scales \(Invited\)](#) *Jens Redemann*,

[A249-04 A Necessary Step Toward Cloud Tomography from Space using MISR and MODIS: Understanding the Physics of Opaque 3D Cloud Image Formation](#) *Anthony B Davis*

[A249-07 Atmospheric correction for hyperspectral radiometers over the ocean using multi-angle polarimetric retrievals](#) *Neranga Prasadi Kaluappuwa Hannadige*,

[C002-0005 Measuring the Effect of Forest Fires on Daily Snow Albedo Across Spatial and Temporal Scales Using MODIS Data](#) *Max Gersh and Kelly Gleason, Portland State University, Portland, OR, United States*

[C004-0010 Multimodal Dataset Integration for Cloud Masking of ICESat-2](#) *Facundo Sapienza*<sup>1</sup>, *Tasha Snow*<sup>2,3</sup>, *Alice Cima*<sup>1</sup>, *Shane Grigsby*<sup>4</sup>, *Lindsey Justine Heagy*<sup>1</sup>, *Fernando Perez*<sup>1</sup>, *Matthew Siegfried*<sup>5</sup> and *Jonathan Taylor*<sup>6</sup>, (1)University of California, Berkeley, Statistics, Berkeley, CA, United States, (2)University of Colorado Boulder, Boulder, CO, United States, (3)Cooperative Institute for Research in Environmental Sciences, Boulder, CO, United States, (4)University of Colorado at Boulder, Boulder, CO, United States, (5)Colorado School of Mines, Geophysics, Golden, CO, United States, (6)Stanford University, Stanford, United States

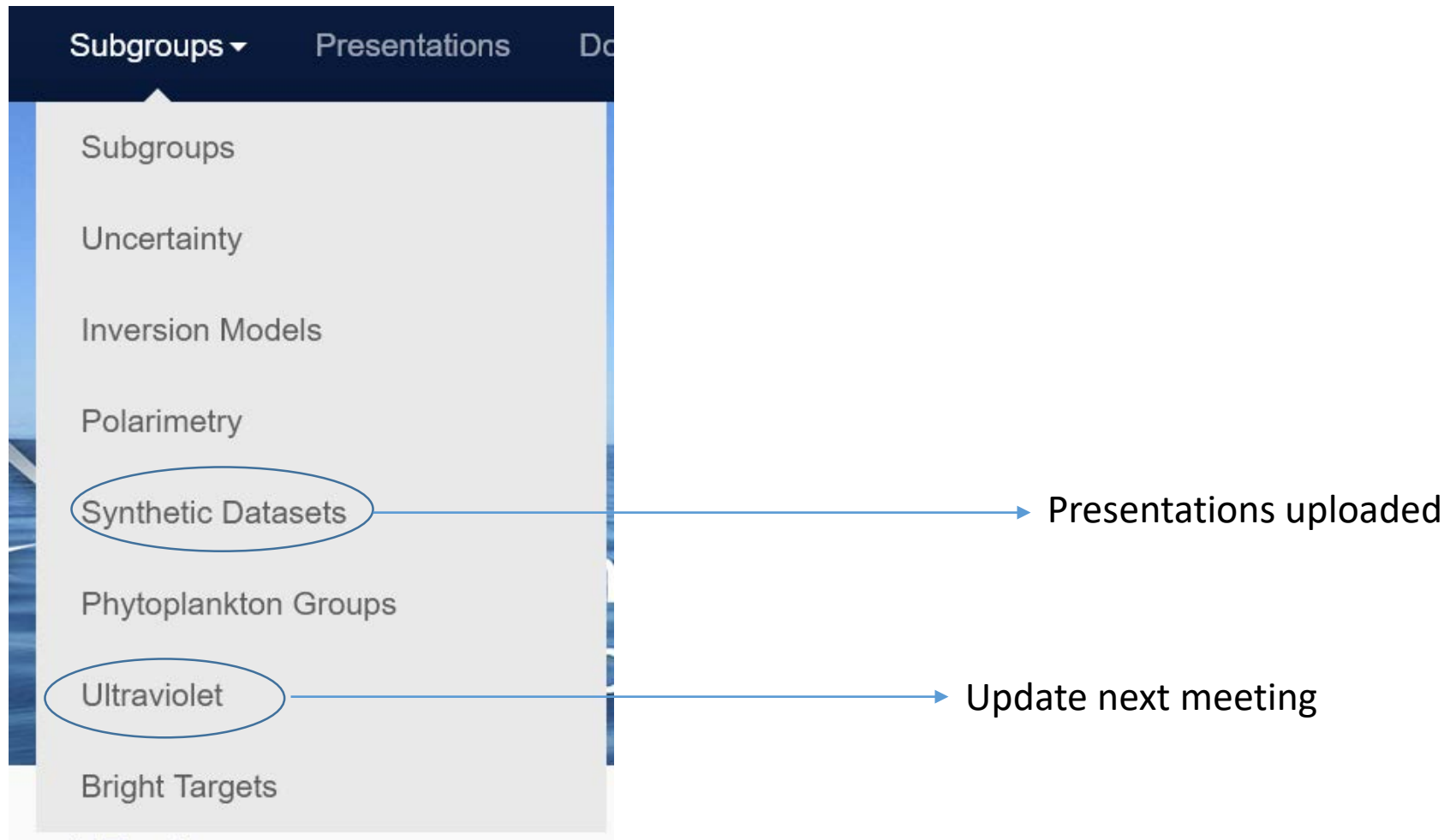
OS004 - William S. and Carelyn Y. Reeburgh Lecture:

File is uploaded to pacesat website under Documents

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



# Looking for PACE Subgroup Updates





# Validation Working Group

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- In January, we will be having disciplinary meetings to discuss validation needs and concerns
  - Aerosols
  - Clouds
  - Oceans
- Please think about your validation needs and hopefully you can join one or more of the meetings.



# Bryan Franz Presentation



## PACE OCI Data Simulation Efforts

Not to be used for  
Algorithm-testing  
(Morel 2002 model)

### SDS low-fidelity (SDS/ProjSci)

- basis: VIIRS Level-3 products coupled with precomputed OCI aerosol/Rayleigh LUT
- utility: capable of generating large data volumes for testing software mechanics and throughput
- computational cost: modest

### SDS high-fidelity (SDS/ProjSci)

- basis: VLIDORT VRT simulations using GMAO atmosphere nature-run and OASIM ocean radiometric model inputs
- utility: high-fidelity radiometry and realistic geographic distributions for testing ocean color, aerosol, and (maybe) cloud algorithm throughput and retrieval performance, validation and vicarious cal strategies
- computational cost: high

### UMBC (SAT/Zhai)

- basis: SOS VRT with prescribed inputs, very high-fidelity ocean simulation with in-elastic scattering and polarization
- utility: testing ocean bio-optical retrieval algorithms, vicarious calibration strategies, capable of generating compatible observations from all three instruments for testing retrieval algorithm performance from individual or combined PACE instrument suite
- computational cost: high



viewing Bryan Franz's appri...



## OCI Low-Fidelity Simulator

- Produces TOA radiance in OCI Level-1B netCDF4 format, following standard format specs for file organization and meta-data.
- Includes 239 spectral bands (120 blue FP, 120 red FP, 9 SWIR) based on latest spectral response models ([https://oceancolor.gsfc.nasa.gov/docs/rsr/OCI\\_RSR\\_2.5nm\\_v7.nc](https://oceancolor.gsfc.nasa.gov/docs/rsr/OCI_RSR_2.5nm_v7.nc)).
- Includes realistic OCI swath geometry and tilt based on nominal PACE orbit and ops plan
- TOA radiance over oceans based on existing Rayleigh & aerosol LUTs as used for heritage atmospheric correction approach, effectively running the AC in reverse.
- Hyperspectral ocean water-leaving radiance derived from Morel 2002 model and Morel and Gentilli BRDF model, using VIIRS L3 chlorophyll fields as input.
- Land reflectance based on JPL spectral library weighted with a variable spectral slope from OMI.
- Clouds are located based on VIIRS L3 cloud albedo, and radiance is derived using a fixed cloud spectral shape scaled to VIIRS TOA radiance at 551.



Viewing Bryan Franz's applic...



## Distribution

- Project/OB.DAAC will support distribution of in-house (and contributed) simulated data sources and documentation for PACE instruments.
- Links to centralized webpages for simulated/proxy data sources and prelaunch calibration/characterization data **will be available** soon from here:

<https://oceancolor.gsfc.nasa.gov/data/pace/>

- In the interim, some sample files from the low-fidelity sim are available here:

[https://oceancolor.gsfc.nasa.gov/fileshare/sean\\_bailey/pace/](https://oceancolor.gsfc.nasa.gov/fileshare/sean_bailey/pace/)

[PACE\\_OCI\\_SIM.20190321T031000.L1B.V5.nc](#)

[PACE\\_OCI\\_SIM.20190321T131000.L1B.V5.nc](#)

[https://portal.nccs.nasa.gov/datashare/G5NR/c1440\\_NR/OBS/PACE/](https://portal.nccs.nasa.gov/datashare/G5NR/c1440_NR/OBS/PACE/)



National Aeronautics and Space Administration



## Simulated PACE L1B Granule

- Data hosted on public website:
  - [https://portal.nccs.nasa.gov/datashare/G5NR/c1440\\_NR/OBS/PACE](https://portal.nccs.nasa.gov/datashare/G5NR/c1440_NR/OBS/PACE)
- Organized by Levels
  - LevelA: Raw inputs (very large datasets)
  - LevelB: Inputs subsampled to PACE granule
    - e.g. T, P, RH, aerosol mass profiles
  - LevelC: RTM optical input/outputs
    - e.g. Rayleigh optical depth, AOD, surface reflectance, TOA radiance
  - LevelC2: TOA radiance in PACE L1B file format
- Version 1
  - 5 nm step
  - No trace gas absorption



# Presentations

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- Pengwang Zhai
- Bastiaan Van Dierenhoven
- Pdfs in Synthetic Data Subgroup Folder





# Next Meeting 1/15/2021

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- Lorraine Remer – UV subgroup update
- Odele Coddington – a new solar irradiance reference spectrum
- Nima Pahlevan – project update
- Kevin Ruddick – HyperMaq Project results