PACE Applications & Early Adopter Program

Leveraging Science to Advance Society

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Definitions :

- **Accessible** data is approachable, free of charge, understandable, with unrestricted access, and in machine-readable formats.

- **Useable** data are delivered in form that meets the needs of different user audiences, is ready for the tasks that the user needs to accomplish, and that has been adapted to the user needs.

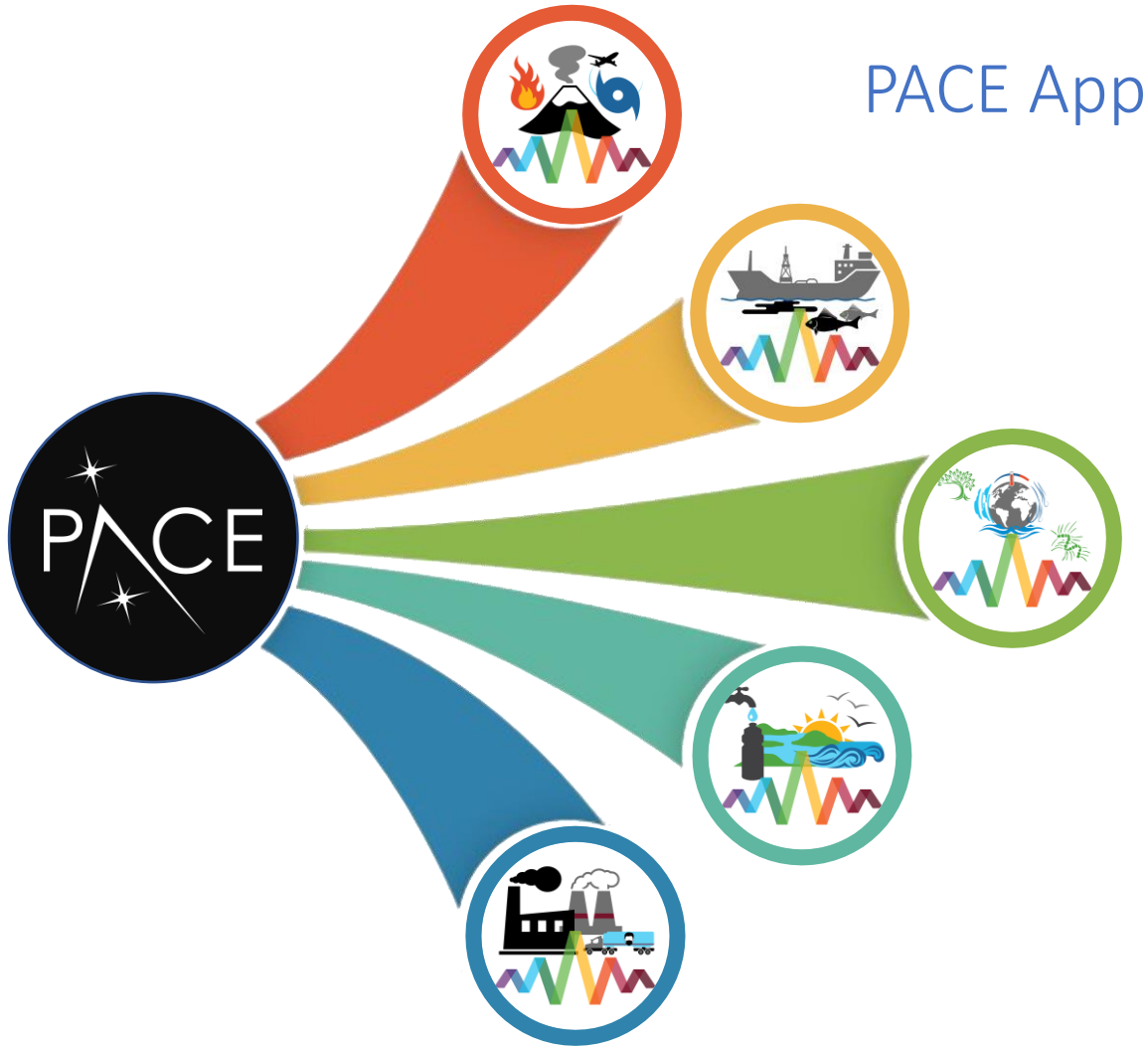
- **Actionable** data is info. that can be acted upon or that gives enough insight into the future that the actions that should be taken become clear for decision makers.

Terminology reminder:

- **Applications** are innovative uses of NASA PACE data products to complement and improve *decision-making activities and provide practical solutions to meet societal needs.*

- **Applied Research** provides *fundamental knowledge* of how PACE data products may be scaled & integrated into *users'* policy, business, and management activities to improve decision-making.

- **End-user communities** include
  - Individuals & groups
  - Public & private sectors
  - National & international organizations
  - Local & global scales



PACE Applications Program

PACE Applications Plan

PACE

Ver. 1.2

July 2019

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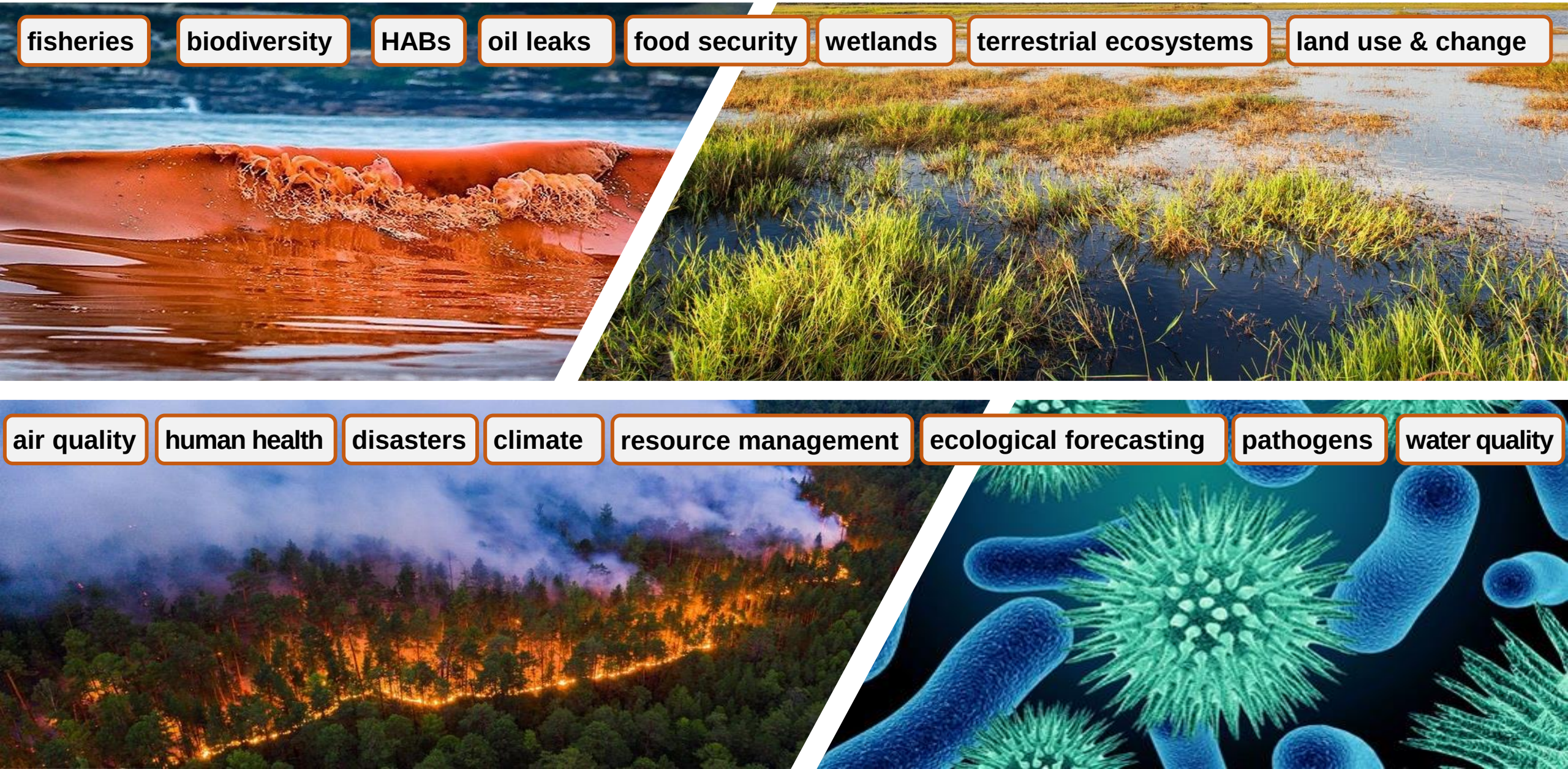
Goddard Space Flight Center
Greenbelt, Maryland

- *Address community user needs* & concerns with PACE data products
- *Grow relevance* & sustainability of PACE
- *Demonstrate the societal value* & utility of PACE

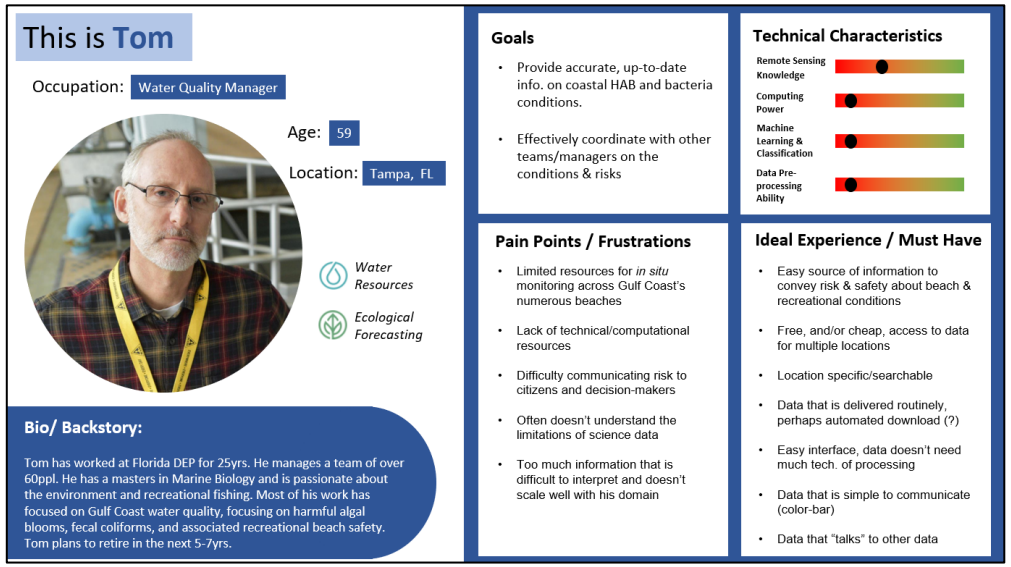
The goal of the PACE Applications Program is to foster new partnerships and out-of-the-box thinking that will generate inventive solutions that aid society.

PACE: Interdisciplinary applied science objectives



PACE Applications Program (*a year in review*)

https://pace.oceansciences.org/app_community_focus.htm



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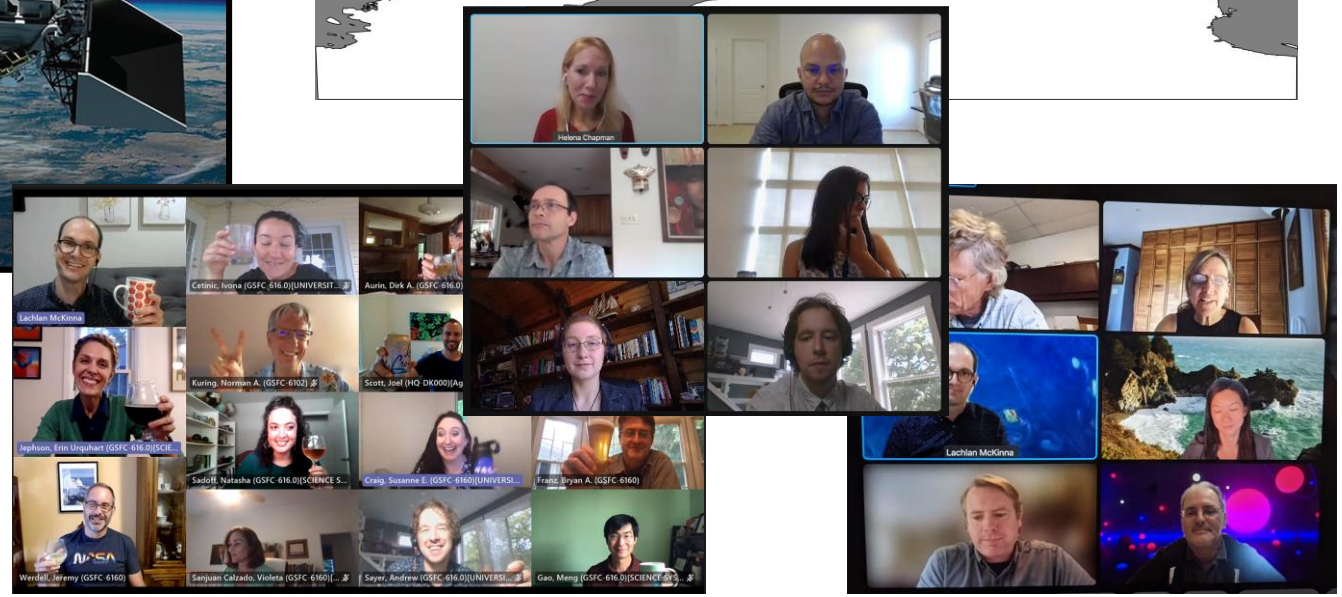
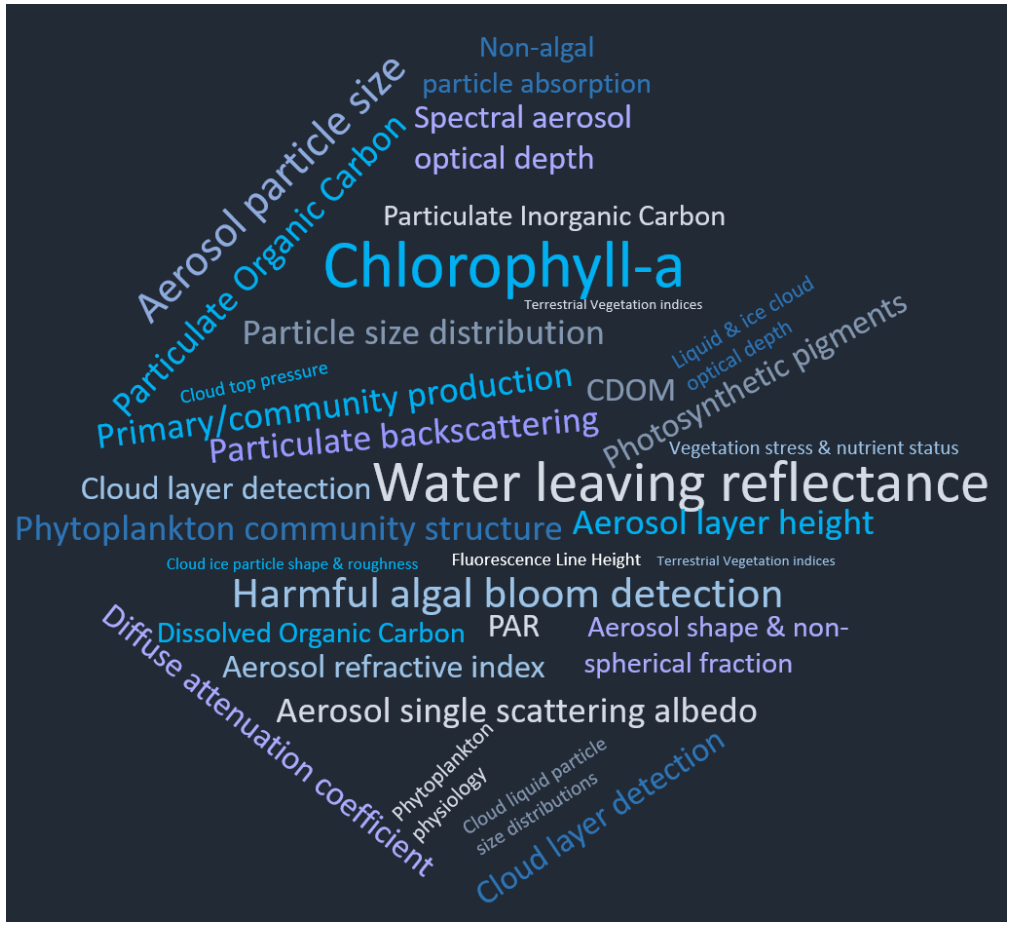


https://pace.oceansciences.org/app_workshops_02.htm

Plankton, Aerosol, Cloud, ocean Ecosystem

PACE Ocean and Atmosphere Community Survey

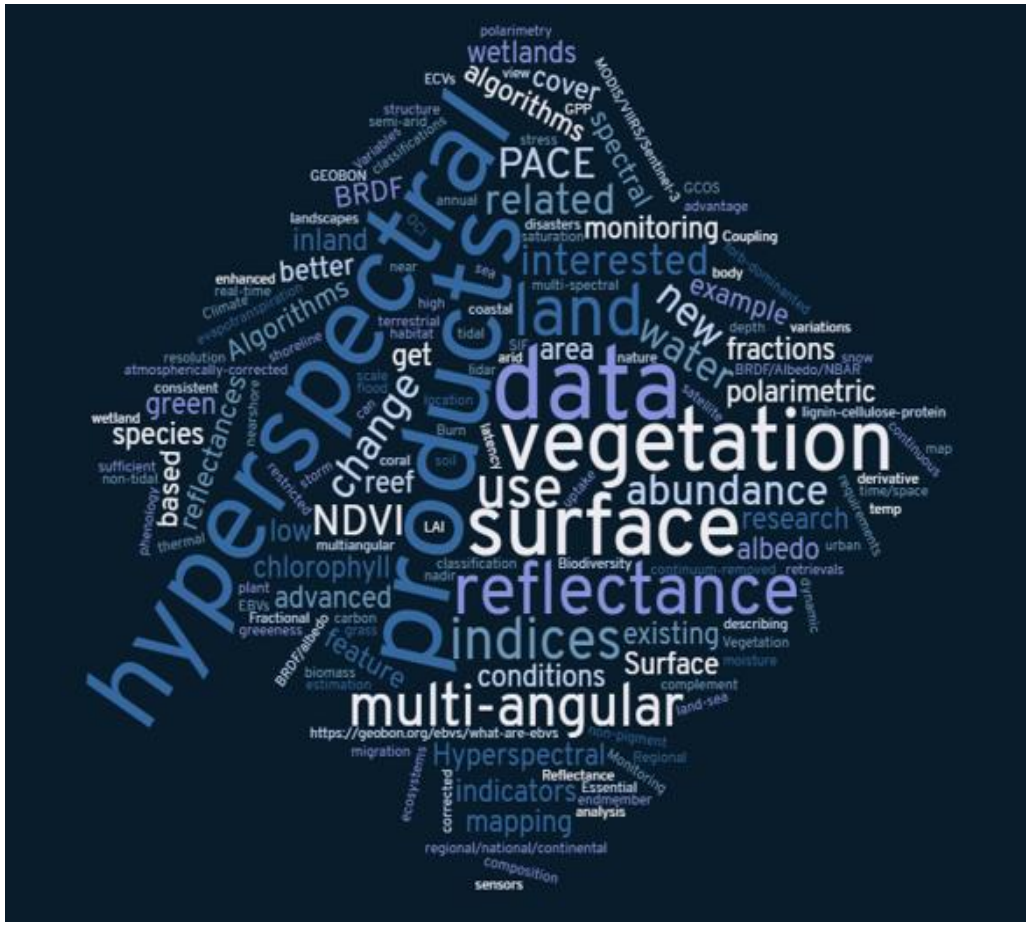
Q9: How valuable are the following PACE data products to your work? - PACE products characterized as "vital" *(Ocean & Atm. Community Survey, 2019; Tzortziou, Omar, et al.)*



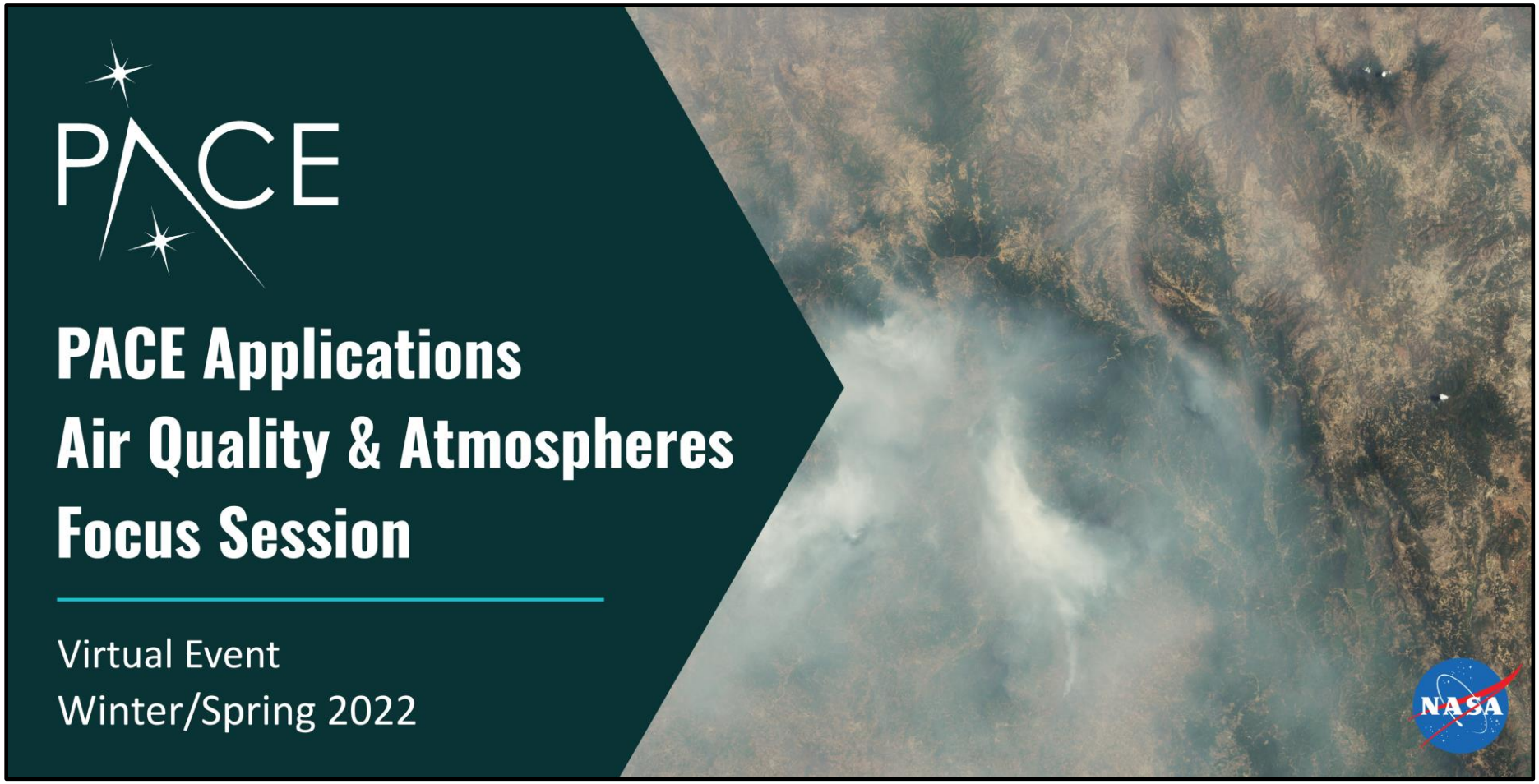
PACE Terrestrial-land Community Assessment

SurveyMonkey

Q13: What exploratory PACE products might you be interested in? *(Terrestrial Community Survey, 2021; Urquhart, Sadoff et al.)*



Looking forward…

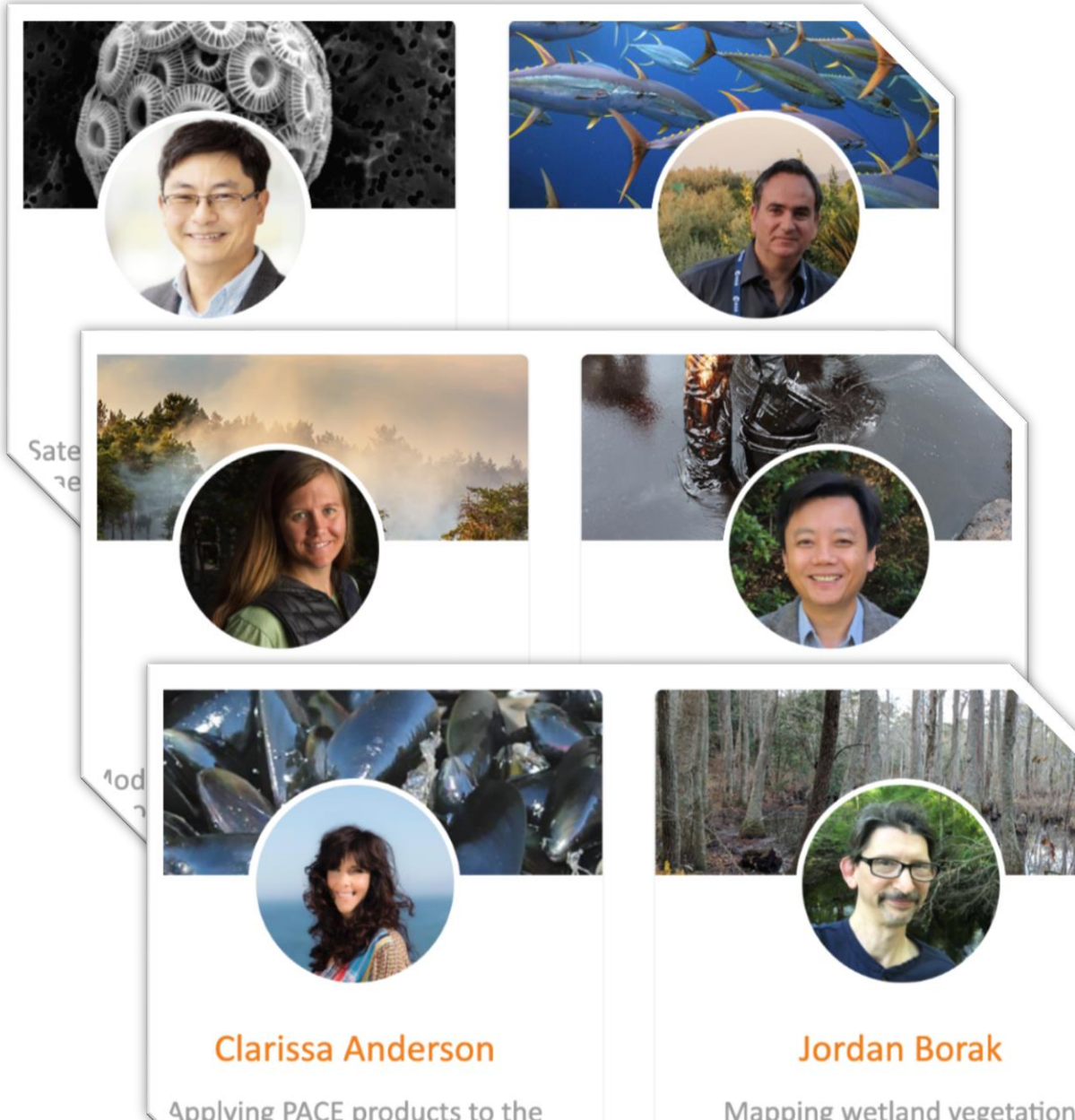


PACE Early Adopter Program

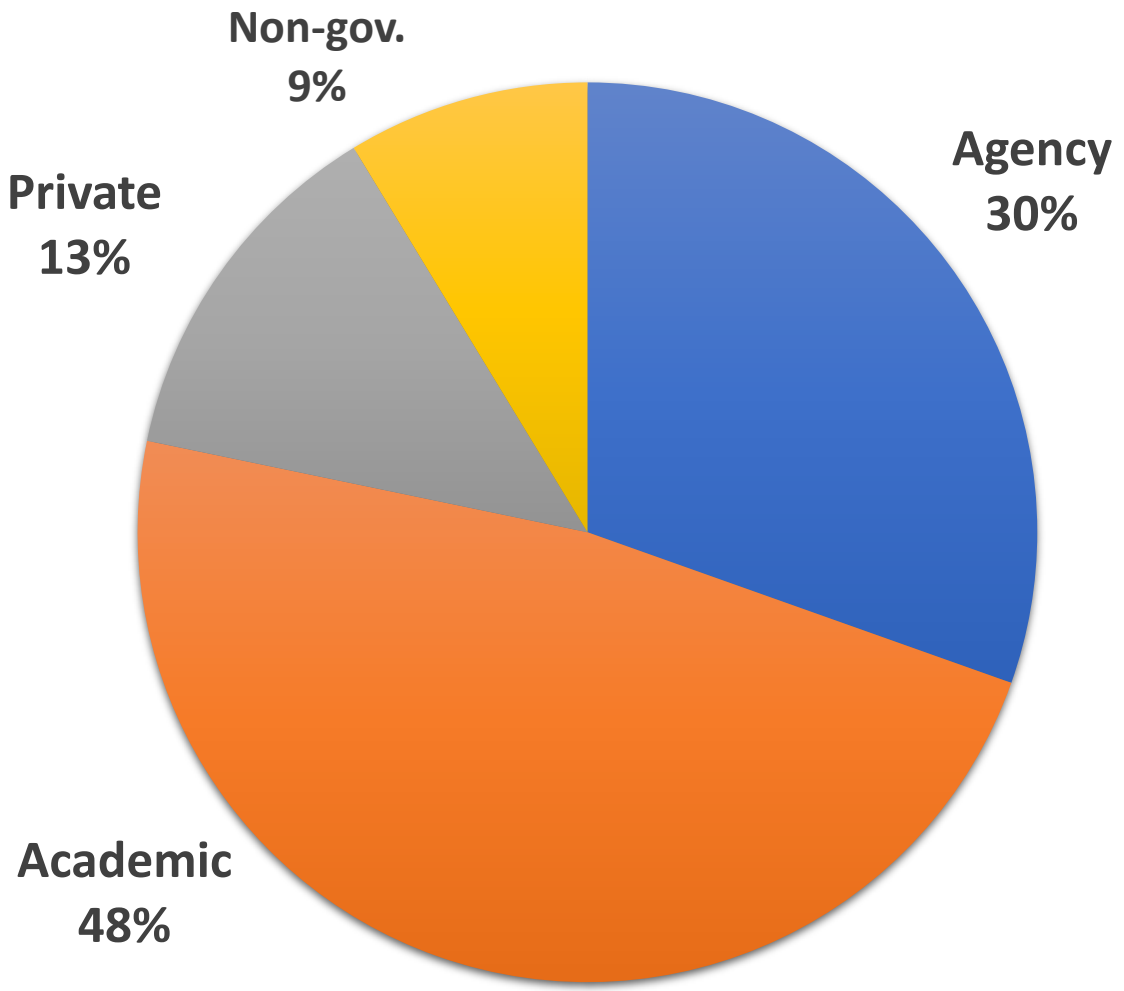
The PACE Early Adopter program promotes applied science and applications research designed to scale and integrate PACE data into policy, business, and management activities that benefit society and inform decision making.

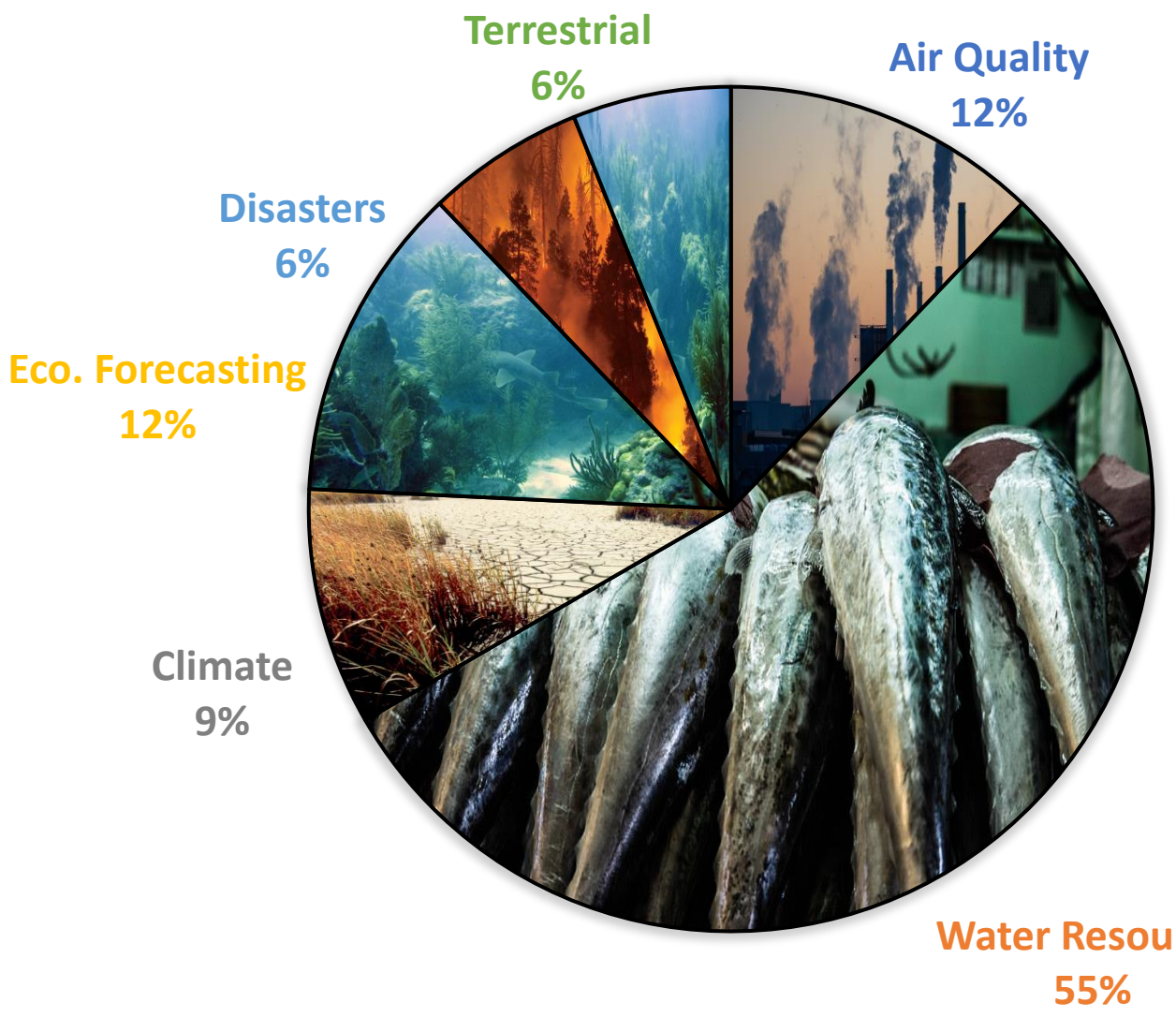
Goals:

- Expand the user communities with tangible and potential applications that would benefit from the use of PACE data
- Facilitate feedback on PACE data products pre-launch
- Accelerate the use and integration of PACE products into applications post-launch by providing specific support to Early Adopters who commit to engage in pre-launch applied research



PACE Early Adopter Program





PACE Early Adopter Program

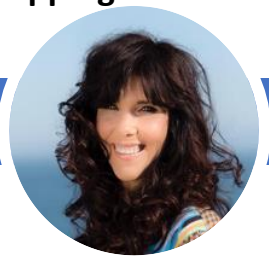
Aquaculture/Fisheries

Air-sea exchange

Marine mammals & Climate

Oil Spills

Mapping HABs Risk



Aquaculture/Fisheries

Waterborne Pathogens

Aerosols& Human Health

HABs Detection

Wetland Ecosystems

Data Integration

Food Security

Water Clarity-Waters Resources

Mobile Apps & Decision Making

Water Clarity-Water Resources

Data management

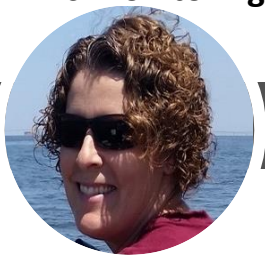
Air Quality & Human Health

Global Carbon Budget

HABs Monitoring

Air Quality & Climate

HABs Monitoring



HABs Monitoring

Water Clarity & Ecosystem Health

Data Integration

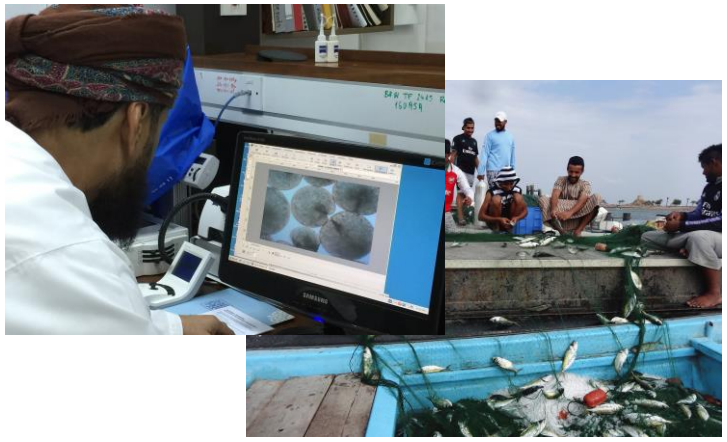
Plankton, Aerosol, Cloud, ocean Ecosystem

Joaquim Goes

Decision and Information System for Coastal waters of Oman (DISCO) - an integrative tool for managing coastal resources experiencing climate change »

Application: Harmful Algal Bloom (HAB), hypoxia, and fish kill forecasting decision support tool (DST) for the coastal waters of Oman

Significance: Over the past decade and half, the Sultanate of Oman has been experiencing massive outbreaks of HABs attributable to the warming trend and the onshore influx of hypoxic waters. DISCO, including PACE data inputs, will allow extended applications in analyses of industrial effluent discharge and seawater intake, environmental assessment, biodiversity, aquaculture, optimum water properties for fisheries, contaminant tracking, and other areas with implications for livelihoods and local, national, and regional economies.



How PACE can help: The availability of hyperspectral PACE OCI data will help accelerate the process of developing green Noctiluca specific ocean color algorithms for coastal waters of Oman. We have also seen a connection between aerosol plumes and green Noctiluca bloom outbreaks.

Stakeholders: Government ministries and the private sector (desalination plants, aquaculture, oil refineries, shipbuilding, tourism) in Oman and others around the Arabian Sea.

https://pace.oceansciences.org/people_ea.htm?id=83

Plankton, Aerosol, Cloud, ocean Ecosystem

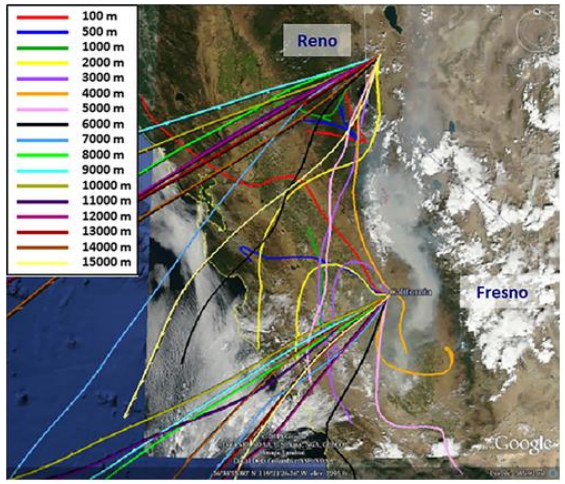
S. Marcela Loría-Salazar

Toward understanding the effect of aerosols on regional weather and human health in the southern Great Plains »

Application: Improved smoke forecasts; Informed health alert forecasts related to pollen, dust, and smoke in the Southern Great Plains

Significance: Aerosol pollution is a growing global public health problem due to wildfires in the US, which especially affects vulnerable human populations. PACE aerosol data will help us advance air quality models to better inform public health alerts in the SGP region of the United States and additional understanding the role of aerosols in regional weather.

How PACE can help: The use and evaluation of aerosol data from NASA PACE mission will advance smoke air quality models by (1) improving the spatial resolution with respect to MODIS aerosol products, especially for combined AOD-height retrieval, and (2) potentially advancing aerosol characterization from the two-multiangle polarimeters.



HYSPLIT 24-h back-trajectories (100–15,000 m) from the North American Model (NAM) at 12-km resolution at Fresno, CA, and Reno, NV, on August 31, 2013, superimposed onto a MODIS Aqua true-color image from NASA World View. MODIS, MODerate Resolution Imaging Spectroradiometer.

Stakeholders: Oklahoma MESONET Fire Network; Oklahoma Air Quality Division

https://pace.oceansciences.org/people_ea.htm?id=80

Plankton, Aerosol, Cloud, ocean Ecosystem

Vardis Tsontos

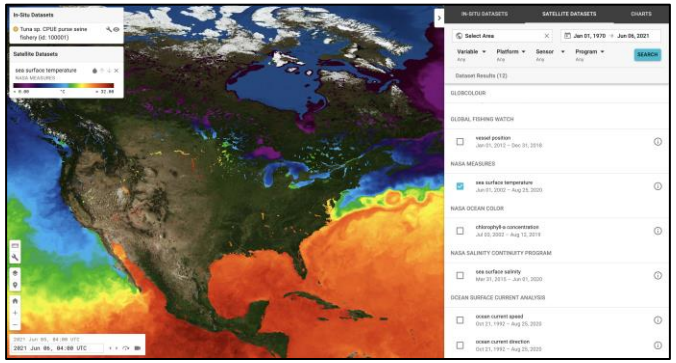
Applying PACE products to Earth Observation (EO) Applications and Oceanographic Data Management- CEOS COVERAGE »

Application: Oceanographic data management and visualization toolkit

Significance: COVERAGE seeks to expand the accessibility of EO data for the oceans to a broader community of users with a particular emphasis on less expert remote sensing users and biological applications communities. COVERAGE will facilitate improved understanding and decision in key areas including population and biodiversity responses to environmental variability and climate, species habitat characterization and utilization, etc.

How PACE can help: COVERAGE is anticipating the needs and necessary data infrastructures for improved end-user access to the increasing data volumes coming from the next generation NASA ocean satellite missions. The increased quantity of PACE hyperspectral data will serve as a test bed of value-added data services that will seamlessly integrate with other oceanographic data streams to support ocean applications.

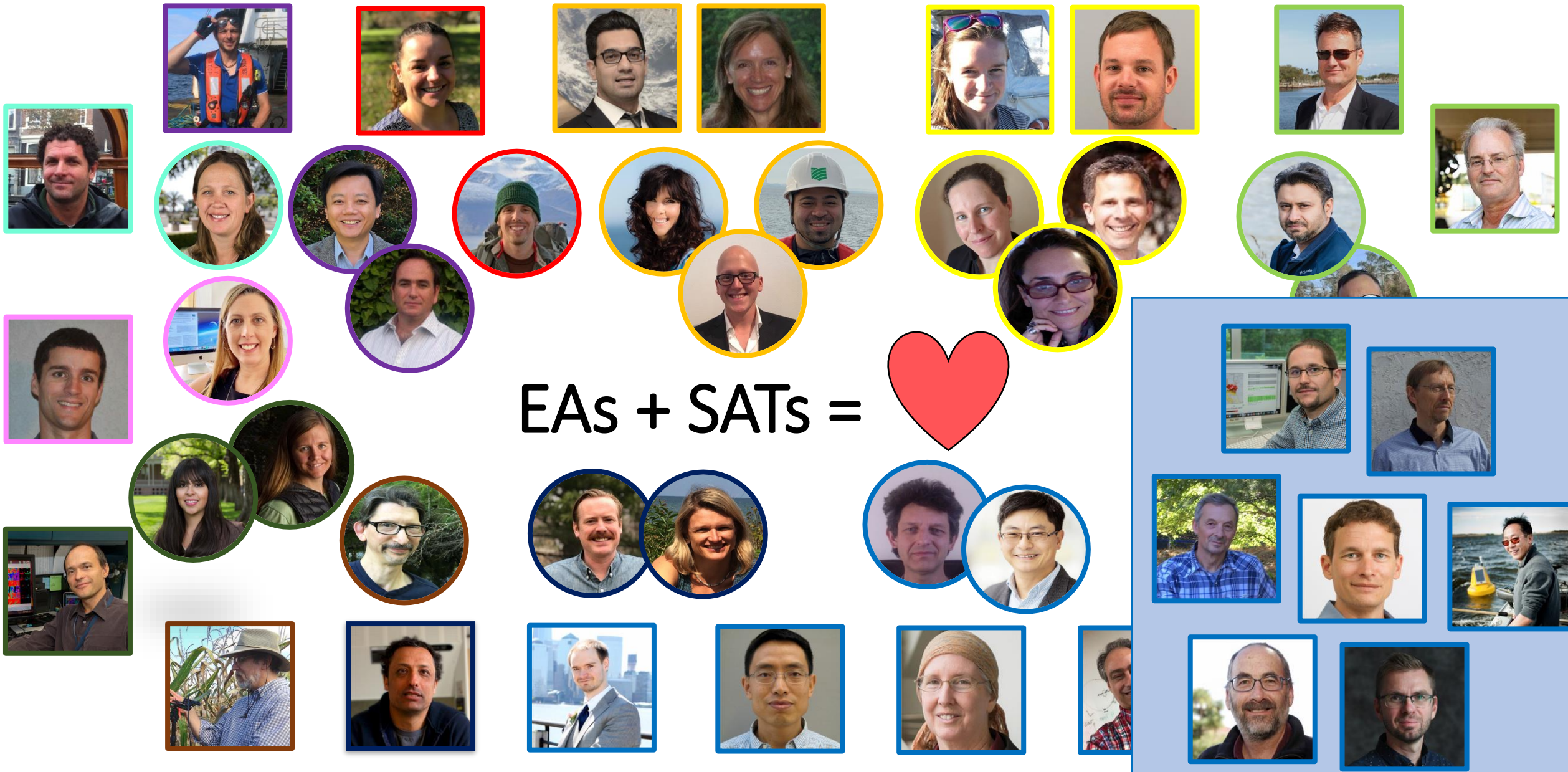
Stakeholders: GEO-Marine Biodiversity Observation Network; GEO-Blue Planet; GOOS-AniBOS; Sargasso Sea Commission; Inter-American Tropical Tuna Commission

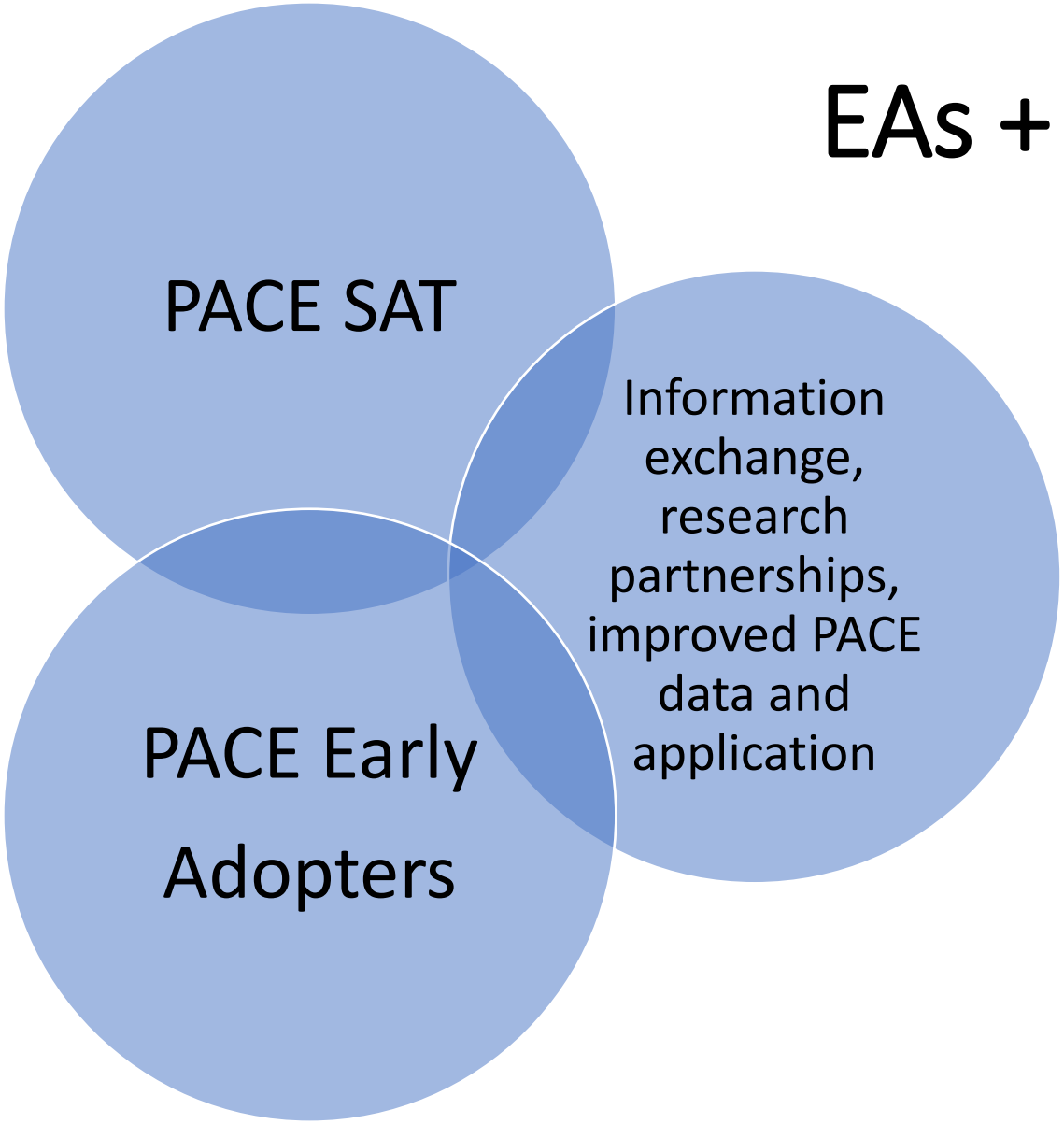


The CEOS COVERAGE visualization toolkit

https://pace.oceansciences.org/people_ea.htm?id=81

Plankton, Aerosol, Cloud, ocean Ecosystem





EAs + SATs = ❤

Interest Collaborating w/ Applications Program & EAs?	YES: 16	NO/NA: 6
Interest working w/ end-users to develop products?	YES: 15	NO/NA: 7
Interest in attending workshops?	YES: 14	NO/NA: 8

How have you interacted with your PACE SAT partner(s)?

How have your interactions benefited your applied PACE Early Adopter work & user community?

How do you envision this partnership evolving between now and launch date?

How have the interactions benefited your PACE SAT work?

Benefits for you:

- *Leverage your research outputs* for societal benefit & real-world solutions
- Build *cooperative partnerships* with user communities
- Learn about user concerns & gain a greater *appreciation of community knowledge & experiences*
- *Receive feedback* on how your algorithms and data products are being used
- *Co-authorship* on manuscripts & post-launch PACE economic valuation studies
- *Notoriety* to NASA program managers including featured profiles with EAs on the PACE Applications website
- Gain the *relationships and applied experience* to be more responsive to NASA *funding opportunities* that require stakeholder/user engagement & societal Impact statements

… Most of you indicated that you haven't?

How have you interacted with your PACE EA partner(s)?

Why?

What would make this partnership valuable to your SAT project and worth your limited time?