Leveraging Science to Advance Society

The PACE Mission Applications Program

Erin Urquhart, PACE Applications Coordinator
Joel Scott, PACE Applications Deputy Coordinator
Antonio Mannino, PACE Deputy Project Scientist
Maria Tzortziou, PACE Deputy Program Applications Lead
Ali Omar, PACE Deputy Program Applications Lead

Joel P Scott

Joel P Scott | Edit your CV

✉ joel.scott@nasa.gov
☎ 301.286.3147

Building: 028 | Room: W149
Org Code: 616

NASA/GSFC
Mail Code: 616.2
Greenbelt , MD 20771

Employer: Science Application International Corp.

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Curriculum Vitae Biography Selected Publications

Brief Bio

Joel is an Earth system scientist investigating the global oceans via satellite remote sensing from both biogeochemistry and physical oceanography perspectives. He has contributed extensively to peer-reviewed scientific literature, has experience mentoring students, and has participated in many conferences, science teams, and scientific workshops. Joel advocates for Open Science principles and is passionate about making Earth science accessible to all.

Positions/Employment

12/2019 - Present — **PACE Project Applications Deputy Coordinator**
Science Applications International Corporation (SAIC), NASA Goddard Space Flight Center, Greenbelt, Maryland
- Coordinates the Applied Science program for the NASA Plankton, Aerosol, Cloud, & ocean Ecosystem (PACE) satellite mission
- Hosts applied science workshops
- Leads the PACE early adopter data use program

4/2016 - 12/2019 — **Data Manager**
Science Applications International Corporation (SAIC), NASA Goddard Space Flight Center, Greenbelt, Maryland
- Data manager for the NASA SeaBASS bio-optical data archive
- Satellite oceanographer remotely studying oceanic biogeochemistry

6/2011 - 3/2016 — **Research Scientist**
Remote Sensing Systems, Santa Rosa, California
- Satellite oceanographer remotely studying ocean vector winds, salinity, and heat content
- Algorithm designer detecting and mitigating radio frequency interference (RFI)

PACE Applications Program

PACE
Advancing Earth Science at NASA

- *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 Applications Plan
PACE
Ver. 1.2
July 2018

What is an Application?

- **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

Ecological Forecasting

Air Quality

Disasters

PACE

Water Resources

Climate
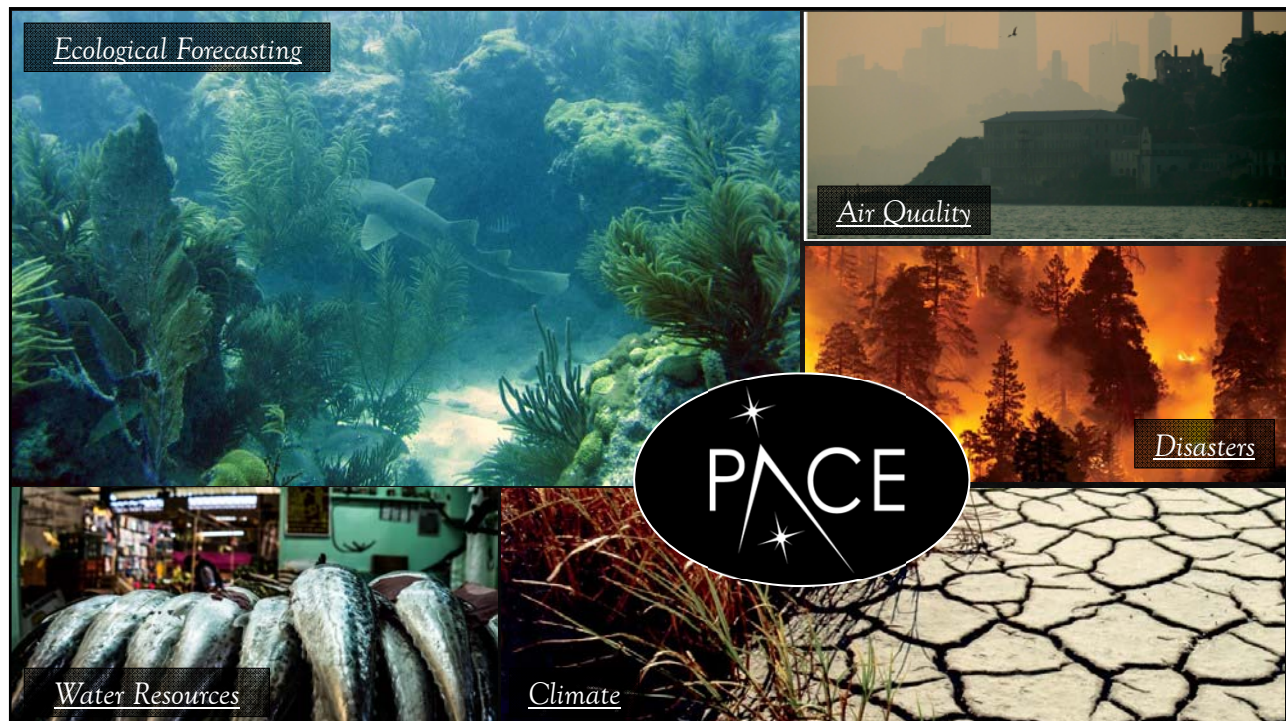
PACE Early Adopter Program
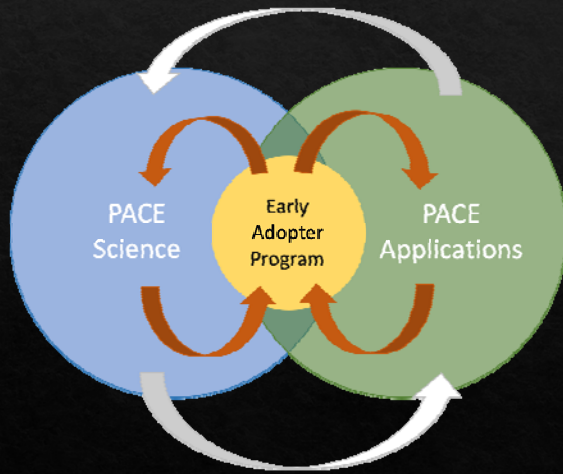
The goal of the Early Adopter program is to:
- o Expand the user communities with practical applications that would benefit from the use of PACE data sets
- o Facilitate feedback on PACE data products pre-launch
- o Accelerate the use of PACE products in applications post-launch by conducting pre-launch applied research

Early Adopters are individuals/groups who:
- o Have a direct, clearly defined need for PACE data products
- o Have an existing application or a new idea for PACE-related applications
- o Have an existing user for their application
- o Have existing resources to demonstrate the utility of PACE data in their application

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PACE Early Adopter Program

**Early Adopter Benefits:**
- o Engage with the PACE Project
- o Interact with other members of the Early Adopter team and *PACE Science & Application Team*
- o Participate in PACE Applications workshops, focus sessions, & tutorials
- o Access pre-launch simulated & proxy PACE data
- o Updates on the PACE mission, science data products, & field campaigns

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

EA Project Profile: Coastal & Offshore Oregon Marine Mammal Ecological Monitoring
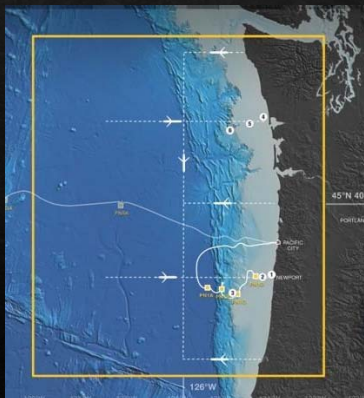

Liz Ferguson
Ocean Science Analytics; https://www.oceanscienceanalytics.com

Application: A monitoring program combining observational & remotely sensed data to assess ecological characteristics associated with marine mammal occurrence & the impacts of a changing California Current Ecosystem on marine mammal indicator species. Online trainings will be offered on marine mammal tracking & GIS software.

Significance: Shifts in the region, due to a changing climate, play a crucial role in the composition of fish communities & populations, affecting commercial and recreational fishing industries.

Why PACE: PACE will provide insights on phytoplankton & algal communities, beyond indirect chlorophyll observations, and will advance the existing observational network with improved spatial monitoring capabilities.

Stakeholders: PNW state resource managers, NOAA, grad & undergrad students

EA Project Profile: Modeling spatial and temporal exposure to air pollution in the western U.S.
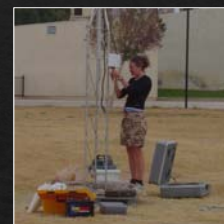
Heather Holmes
University of Nevada, Reno; https://haholmes.wordpress.com

Application: Improve air quality & exposure models of elevated PM2.5 concentrations due to temperature inversions & wildfire smoke in the western U.S. Provide smoke forecasts online to aid in air quality alerts.

Significance: The western U.S. is home to 70+ mil. people with many counties in violation of at least one criteria pollutant according to the EPA. Local meteorological & geographical conditions compound air quality monitoring.

Why PACE: PACE will provide continuity of aerosol retrievals currently in use from MODIS, MAIAC, & MISR. Multi-angle polarimetry from PACE can reduce the uncertainty of smoke plume injection height & aerosol retrievals.

Stakeholders: Washoe County Air Quality District, UNR Living With Fire outreach ambassadors, Early career researchers: PhD and Post-Doc

EA Project Profile: PezCA - Near real time satellite data distribution platform for Central America fisheries

Marina Marrari
FECOP; https://fishcostarica.org
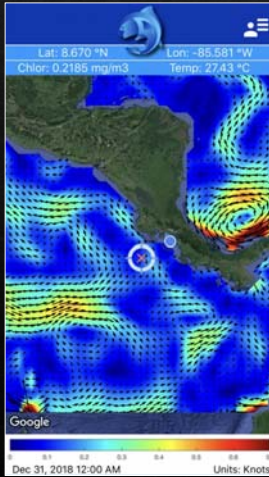
Application: A free mobile app serving NRT satellite data (e.g. - sea surface temperature, chlorophyll, currents, altimetry, bathymetry, and thermocline depth, as well as tide forecasts, moon phase, & fishing information.

Significance: Support of recreational fishing sector, government organizations, and decision-making processes in Costa Rica (monitoring of oceanographic conditions, climate change, effects of El Niño).

Why PACE: PACE will represent a valuable source of operational ocean color data to eventually replace MODIS in our current workflow and will expand the products we serve (e.g. – PFTs, red tide detection, etc).

Stakeholders: Recreational anglers, commercial fishermen, eco-tourism planners & agents

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

Slide 1

$$EAs + SATs = \heartsuit$$

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Benefits to YOU as SAT members:

- _Leverage your research outputs_ for societal benefit and real-world solutions
- Build _cooperative partnerships_ with end-user communities
- Learn about end-user concerns and gain a greater _appreciation of community knowledge & experiences_
- _Receive feedback_ on how your algorithms and data products are being used
- _Co-authorship_ on post-launch PACE economic valuation studies
- _Notoriety_ to NASA program managers including featured profiles with EAs on the PACE Applications website
- More responsive to NASA _funding opportunities_ that require stakeholder/ end-user engagement & Societal Impact statements

Slide 2

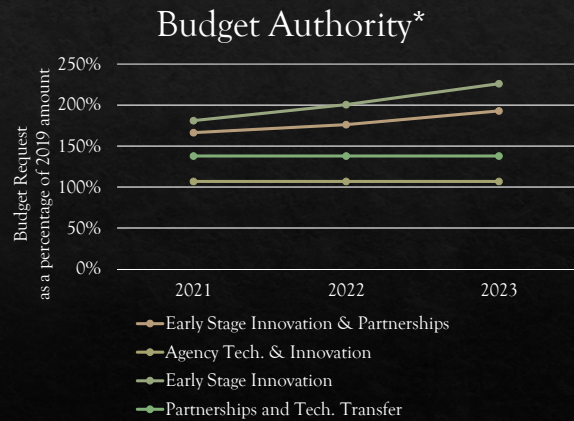# _Upcoming Applications Events_

1st PACE Applications Workshop

September 23-24th, 2020
Washington, DC

The Plankton, Aerosol, Cloud, ocean Ecosystem Mission (PACE) will host its first Applications Workshop on the 23rd and 24th of September 2020 at The Westin D.C. in Washington DC. This two-day workshop will provide an opportunity for early engagement with PACE end-users exploring topics of air quality, public health, water quality and resources, disasters, climate modeling, and ecological forecasting. The workshop will build a transdisciplinary dialogue centered on how PACE data products may be integrated into applications that advance society and inform decision-making processes. This workshop will encourage open collaboration from individuals and organizations across diverse backgrounds including universities, government agencies, and commercial, non-profit, and private sectors.

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

Take Away Message

- Early engagement between data producers & data users builds partnerships to *advance applications for decision-making*

- Pre-launch applied research from PACE Early Adopters provides feedback & guidance to the mission, *saving time & resources post-launch*

- PACE Applications are a *measure of mission success* to NASA, used to advocate and justify continued support for the mission

Budget Authority*

Legend:
- Early Stage Innovation & Partnerships
- Agency Tech. & Innovation
- Early Stage Innovation
- Partnerships and Tech. Transfer

* FY 2021 President's Budget Request Summary

How can
PACE Applications
help you??

Erin Urquhart & Joel P. Scott
PACE-applications@oceancolor.gsfc.nasa.gov
https://pace.gsfc.nasa.gov