NASA Earth Science Division
Applied Science Program
Plankton, Aerosol, Cloud, ocean Ecosystem Mission

PACE Early Adopter Guide

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DEFINITIONS:

Applications are innovative uses of NASA satellite data to help improve decision-making and provide practical solutions to meet the needs of society. Data products produced by PACE will help monitor water resources, terrestrial ecosystems, and air quality, as well as respond to natural disasters, including flood, volcanic, and wildfire events. The PACE Applications Program will foster the expansion of observatory's science data to inform policy and management decisions.

Applied research will provide fundamental knowledge of how PACE data products would be scaled and integrated into users' policy, business, and management activities to improve decision-making efforts.

PACE Community of Practice (CoP) is a group comprised of individuals who are familiar with NASA products, have a well-defined need for proposed PACE data products, will optimize their use of PACE products, possibly even before launch as part of the PACE test-bed activities and PACE calibration/validation, and who can apply their own resources to demonstrate the utility of PACE data for their research, application, or model. The Community of Practice includes PACE Early Adopters who have committed to engage in pre-launch applied research to accelerate the integration of PACE products after launch in their specific application that aids decision-making and directly benefits society.

PACE Early Adopters (EAs) are a subset of PACE CoP members who have a practical application/use of PACE data, and who are planning to apply their own resources (funding, personnel, facilities, etc.) to demonstrate the direct utility of PACE data for their decision support tool (DST), system, model, or application for decision-making or management, and societal benefit.

End-users and stakeholders include individuals or groups in the public or private sectors who may have specific input or uses for future PACE data for applications at local to global scales.

For relevant information on the proposed PACE mission objectives, applications areas, the PACE Applications Working Group (AWG) members, and more, potential Early Adopters may review the PACE Applications Plan (https://pace.oceansciences.org/docs/pace_applications_plan_v1-2.pdf).

Additional information about the mission and science objectives may be found at the following links:

- PACE web site; https://pace.gsfc.nasa.gov/
- PACE Science web page; https://pace.oceansciences.org/science.htm

PACE Applications Areas:

- Health and Air Quality
- Ecological Forecasting
- Water Quality and Resources
- Climate
- Disasters

Additional information about the Application Areas can be found at the NASA Applied Sciences website (https://appliedsciences.nasa.gov/).

PROGRAM DESCRIPTION:

The goal of the Early Adopter program is to:

1. expand the user communities with tangible and potential applications that would benefit from the use of PACE data sets,
2. facilitate feedback on PACE data products pre-launch,
3. 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.

Early Adopter Benefits:

- Support from PACE Science and Application Team (SAT) member and/or Project Science
- Participation in PACE Applications events, including workshops, focus sessions, and tutorials
- Learn about access to pre-launch simulated, proxy, calibration, and validation PACE data
- Priority updates on PACE activities from the project office, including anticipated science data products and field campaigns
- PACE web presence, project promotion, and advocacy at internal NASA and external scientific events

The PACE Early Adopter Program is a non-funded activity.

Early Adopters agree to:

1. Engage in pre-launch research that will enable integration of PACE data after launch in their application and project description form (provided after initial Early Adopter interview);
2. Complete the project with quantitative metrics prior to launch;
3. Actively participate in PACE Applications Team discussions and activities regarding utility of PACE mission data products related to their application needs; and by taking lead roles in PACE applications research, meetings, workshops, and related activities.

The PACE Applications Coordinators and PACE Project Science agree to:

1. Provide information to the PACE Project to facilitate incorporation of Early Adopters contributions into mission reporting and information dissemination;
2. Provide Early Adopters with images or visual representations of PACE simulated or proxy data via the OB.DAAC or other appropriate channels;
3. Provide Early Adopters with planned pre-launch calibration and validation (cal/val) data from PACE field campaigns, modeling, and synergistic studies, and access to data simulators as available and appropriate;
4. Support the EAs in getting access to and resolving issues with PACE pre-launch data sets;
5. Facilitate EAs research and receive and report feedback to the PACE project on research metrics;
6. Report on EAs successes, challenges and progress during PACE meetings (in person when possible, or by proxy);
7. Attend regular conference calls with all EAs. This will be a chance for EAs to provide feedback and progress updates.

APPLICATION:

Participant Eligibility Criteria:

- Have a direct, clearly defined need for PACE data products;
- Have an existing application or new ideas for novel PACE-related applications that directly benefit society;
- Currently work with application stakeholder, decision-maker, manager, or other type of end-user(s) and can describe their decision-making or management process;
- Have existing resources (personnel, tools, funding, facilities, etc.) to demonstrate the utility of PACE data in your application/model.

PACE Early Adopter applications and nominations will be accepted on a rolling basis.

Application Process:

1. Prospective Early Adopters may apply using the short webform, found at https://pace.oceansciences.org/app_form.htm, which includes the following:
    a. Principal Investigator and Co-PI contact information
    b. Title of Early Adopter project
    c. Description of system or application, including brief background, study region, objective, methodologies, and expected maturation of application (Application Readiness Level, ARL; see Table 1)
    d. Environmental and societal relevance of application
    e. List of application end-user(s) and point of contact (if available)
    f. Milestones and quantitative metrics that will assess impacts of PACE products on the application during the pre-launch phase
    g. Post-launch implementation strategy (if any)
    h. Select references relevant to applied research

REVIEW & SELECTION:

The PACE Applications coordinators and PACE Project representatives will review the application submissions to determine participant eligibility. Applicants who meet the Early Adopter eligibility criteria will be contacted to schedule a brief "interview" that will take place via telecon, video conference, or in person. The purpose of the interview is to better understand how the Early Adopter program and PACE data products can support the applicant's applied research, application, and/or decision-making efforts. If an applicant is not selected for the interview, they will be informed and will be added to the PACE Community of Practice (CoP) mailing list.

The selection criteria are based on the:

- Strength of end-user connection
- Potential for reaching an ARL-7 or higher post-launch (see Table 1)
- Scope of project
- Likelihood of success
- Justifiable reporting metrics
- Direct impact/benefit of application to society

The process is confidential until the EA selections are announced. After selections of EA projects are made, the PACE Applications Coordinators will notify all EA invitation respondents. At that time, an overview of Early Adopter Projects with investigators, affiliations, titles, and project descriptions, will be posted to the PACE Applications Early Adopter website.

APPLICATIONS ACTIVITIES:

EAs will be invited to PACE applied science and application events that are designed to connect the PACE Project and the Science and Applications Team members with EAs. These events will establish channels of communication, focusing on how PACE data may help to serve the needs of EAs' stakeholders and end-users. The PACE Early Adopter program is integrated with AWG activities and is carried out mainly through emails, telecons, workshops, tutorials and focus sessions organized by the AWG. The AWG also takes advantage of member attendance at conferences such as AGU, Ocean Optics, ASLO, etc. to meet in person when possible.

- **Workshops** are widely announced meetings that cover a broad diversity of topics to facilitate collaboration among audiences with diverse interests. Workshops will be held every year and will provide feedback to NASA and the PACE Mission about PACE product applications. Workshops are designed to give an update of the mission to the community and to provide information about PACE data products on a broad scale. PACE EAs will be included in the program to provide examples of PACE Applications.
- **Focus Sessions** are small events tailored to specific communities, providing detailed information about a connected group of products or applications.
- **Tutorials** are information transfer events that provide introduction on specific tools and utilities for working with PACE data (e.g. – data access and analysis, integration with other

observation or model datasets, etc). These events will also provide opportunities to address potential synergies designed to leverage innovation on how to best combine datasets from other missions (NASA and others) with those of PACE.

- **Town Halls** provide an interface for questions to be answered by the PACE Science and Application Teams.

Table 1. NASA Application Readiness Level descriptions (adapted from https://www.nasa.gov/sites/default/files/files/ExpandedARLDefinitions4813.pdf)

Application Readiness Level	Description
ARL-1	Basic research (Baseline idea)
ARL-2	Application concept (Invention)
ARL-3	Proof of application concept (Viability established)
ARL-4	Initial integration and verification in a laboratory or test environment (Protoype/plan established)
ARL-5	Validation in relevant environment (Potential etablished)
ARL-6	Demonstration in a relevant environment (Potential demonstrated)
ARL-7	Application of prototype in a End-User or partner's operational decision making (Functionality demonstrated)
ARL-8	Application complete, fully developed, and societal value demonstrated (Functionality proven)
ARL-9	Application operationally deployed, supporting decision-making for an external partner (Sustained use)