PACE Application Questions & Concepts

What is the air quality forecast of particulate matter (PM) predicted from PACE measurements of the aerosol optical depth (AOD) in regions where there are no direct measurements of PM?

The EPA produces a daily air quality index which comprises both the ozone and PM concentrations. In regions where there are no direct measurements of particulate matter, satellite measurements of AOD can be used to estimate PM.

Application Readiness Level: *3*
Applied Sciences Category: *Public Health and Air Quality*
Potential Host Agency: *EPA (James Szykman)*

Mission Data Product:
Aerosol Optical Depth

Spatial resolution: <1 km

Latencies: <1 hour

Projected Mission Performance:
AOD within +/- 0.02 at a horizontal resolution of 250 m

Ancillary Measurements:
Aerosol vertical distributions, Surface PM concentrations (at a few locations)

What is the volcanic ash concentration during and after a volcanic eruption? Is there an impact on air quality as a result of a volcanic material deposited in coastal/populated regions?

Measurements collected to support PACE atmospheric corrections in coastal regions may be used to quantify the concentration of material associated with volcanic eruptions. These data may be useful in enabling prudent ash-related aviation hazard mitigation policies and advisories.

Application Readiness Level: *3*
Applied Sciences Category: *Disaster Mitigation, Public Health and Air Quality*
Potential Host Agency*: FAA, EPA, NOAA, International Civil Aviation Organization, Volcanic Ash Advisory Centers (Shobha Kondragunta, NOAA)*

Mission Data Product:
Aerosol Optical Depth

Spatial resolution: <1 km

Latencies: <1 hour

Projected Mission Performance:
AOD within +/- 0.02 at a horizontal resolution of 250 m

Ancillary Measurements:
Aerosol vertical distributions, Sulfur dioxide concentrations

How do exchanges across the land-ocean interface influence carbon and nutrient loadings, water quality, and ecosystem dynamics in coastal waters?

The EPA Safe and Sustainable Water Resources Research Program aims at developing core indicators of water resource integrity and sustainability as well as indicators of key drivers and pressures across a range of spatial and temporal scales for use in integrated assessments. Integration of satellite observations with field measurements and modeling tools is needed to demonstrate assessment of sustainability and integrity of water resources.

Application Readiness Level: *3*
Applied Sciences Category: *Water Resources, Oceans, Coasts, Great Lakes, Ecosystems and Human Health*
Potential Host Agency: *EPA (Blake Schaeffer)*

Mission Data Products:
Chl-*a*, K_D (water quality)

Spatial resolution:
Estuaries: ≤250 m
Coastal Waters: ≤500 m

Coverage:
Minimum distance: 5.5 km
Maximum distance: 22 km

Latencies: 0.5-12 hours

Projected Mission Performance:
0.5 hour data latency, direct broadcast of 5 nanometer resolution data, spatial resolution of 1 km²(+/-10%) at all angles across track. Along track spatial resolution of 250 m² to <1 km² for inland, estuarine, coastal and shelf area retrievals for all bands or a subset of bands.

Ancillary Measurements:
Aerosols (spectral shape, vertical distribution), NO_2, O_3 concentrations for atmospheric correction

How are the productivity and biodiversity of coastal ecosystems changing, and how do these changes relate to natural and anthropogenic forcing, including local to regional impacts of climate variability?

PACE satellite-derived optics and biogeochemical variables may be assimilated into operational seasonal-to-interannual computer models. As a result, PACE data may improve model skills and forecasting capabilities of the Global Ocean Data Assimilation System / Coupled Forecast System (GODAS/CFS) and Real-Time Ocean Forecast System (RTOFS).

Application Readiness Level: *3*
Applied Sciences Category: *Ecological Forecasting*
Potential Host Agency: *NOAA (Paul DiGiacomo, Cara Wilson)*

Mission Data Products:
Chl-*a*, K_{PAR}, K_{490}

Spatial resolution: 1 km

Temporal resolution: Daily

Coverage: Global

Latencies: 12 hours

Projected Mission Performance:
0.5 hour data latency, direct broadcast of 5 nanometer resolution data, spatial resolution of 1 km²(+/-10%) at all angles across track. Along track spatial resolution of 250 m² to <1 km² for inland, estuarine, coastal and shelf area retrievals for all bands or a subset of bands.

Ancillary Measurements:
Aerosols (spectral shape, vertical distribution), NO_2, O_3 concentrations for atmospheric correction

How can PACE help with oil spill monitoring and response?

NOAA's subsurface oil monitoring program uses various modeling and observational approaches (airborne, shipborne, ground-based, space-based measurements) to track oil spills: where the oil is going on the surface and under the sea, and what the consequences are to local communities, wildlife and the marine environment (e.g., Deepwater Horizon/BP Oil Spill).

Application Readiness Level: *3*
Applied Sciences Category: *Disasters, Water Resources*
Potential Host Agency: *NOAA (Paul DiGiacomo, Cara Wilson)*

Mission Data Product:
Visible/true color imagery

Spatial resolution: <300 m

Temporal resolution: 1 hr

Coverage:
Coastal waters: <185 km
50N - 10N
106 W- 60W

Latencies: 0.5-1 hours

Projected Mission Performance:
0.5 hour data latency, direct broadcast of 5 nanometer resolution data, spatial resolution of 1 km²(+/-10%) at all angles across track. Along track spatial resolution of 250 m² to <1 km² for inland, estuarine, coastal and shelf area retrievals for all bands or a subset of bands.

Ancillary Measurements:
Aerosols (spectral shape, vertical distribution), NO_2, O_3 concentrations for atmospheric correction

ARL 3: **Proof of Application Concept (Viability Established) -** Feasibility studies to assess the potential viability of and provide a proof-of-concept for the application have been conducted