PACE Application Questions & Concepts

Application Question	Application Concept	Application Measurement Requirements	Applied Sciences Category	Potential Host Agency	Mission Data Product	Projected Mission Performance	Application Readiness Level*	Ancillary Measurements
What is the air quality forecast of particular 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 particulate matter concentrations. In regions where there are no direct measurements of PM, satellite measurements of AOD can be used to estimate PM.	**Spatial resolution**: <1 km **Latencies:** <1 hour	*Public Health and Air Quality*	EPA (James Szykman)	**Aerosol Optical Depth**	AOD within +/- 0.02 at the horizontal resolution of 250 m	3	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 migration policies and advisories.	**Spatial resolution:** <1 km **Latencies**: <1 hour	*Disaster Mitigation, Public Health and Air Quality*	FAA, EPA, NOAA, International Civil Aviation Organization, Volcanic Ash Advisory Centers (Shobha Kondragunta, NOAA)	**Aerosol Optical Depth**	AOD within +/- 0.02 at the horizontal resolution of 250 m	3	Aerosols (spectral shape, vertical distribution) 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.	**Spatial Resolution**: Estuaries: ≤250 m, Coastal Waters: ≤500m **Coverage:** Minimum distance: 5.5km, Maximum distance: 22km **Latencies:** 0.5-12 hours	*Water Resources, Oceans, Coasts, Great Lakes, Ecosystems and Human Health*	EPA (Blake Schaeffer)	**Chl-*a*, K_D *(water quality indicators)***	0.5 hour data latency, direct broadcast of 5 nanometer resolution data, spatial resolution of 1 km^2 (+/-10%) at all angles across track. Along track spatial resolution of 250 m^2 to <1km^2 for inland, estuarine, coastal and shelf area retrievals for all bands or a subset of bands.	3	Aerosols (spectral shape, vertical distribution) NO_2, O_3 concentrations for atmospheric corrections
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).	**Spatial resolution**: 1 km **Temporal resolution**: Daily **Coverage**: Global **Latencies**: 12 hours	*Ecological Forecasting*	NOAA (Paul DiGiacomo, Cara Wilson)	**Chl-*a*, K_{PAR}, K_{490}**	0.5 hour data latency, direct broadcast of 5 nanometer resolution data, spatial resolution of 1 km^2 (+/-10%) at all angles across track. Along track spatial resolution of 250 m^2 to <1km^2 for inland, estuarine, coastal and shelf area retrievals for all bands or a subset of bands.	3	Aerosols (spectral shape, vertical distribution) NO_2, O_3 concentrations for atmospheric corrections
How can PACE help with oil spill monitoring and response?	NOAA's subsurface oil monitoring program uses various modeling and observational approaches (airborne and 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 coastal communities, wildlife and the marine environment (e.g., Deepwater Horizon/BP Oil Spill)	**Spatial resolution:** <300 m **Temporal resolution:** 1 hour **Coverage**: Coastal waters: <185 km, 50N - 10N, 106W - 60W **Latencies**: 0.5-1 hours	*Disaster Mitigation, Water Resources*	NOAA (Paul DiGiacomo, Cara Wilson)	**Visible/true color imagery**	0.5 hour data latency, direct broadcast of 5 nanometer resolution data, spatial resolution of 1 km^2 (+/-10%) at all angles across track. Along track spatial resolution of 250 m^2 to <1km^2 for inland, estuarine, coastal and shelf area retrievals for all bands or a subset of bands.	3	Aerosols (spectral shape, vertical distribution) NO_2, O_3 concentrations for atmospheric corrections

*Feasibility studies to asses the potential viability of and provide a proof-of-concept for the application have been conducted, meeting the requirements for NASA's **ARL-3 - Proof of Application Concept (Viability Established)**