

PACE Project Science monthly update for the PACE Science Team

August & September 2016

Executive summary

The Project focused on preparing for and presenting at the Acquisition Strategy Meeting (ASM) on Aug 18, preparing for a polarimeter procurement, collaborating with CSA/NRL on their contributed high spatial resolution imager, and documenting requirements flow-down in preparation for the mission Systems Requirements Review in Nov. Per conclusions from the ASM, the Project will pursue a procured polarimeter and build the spacecraft bus at GSFC. Otherwise, the Project continued their intense technical, cost, and science evaluation of the OCI concept as it impacts SNRs and other performance metrics (e.g., crosstalk). Details are presented below, with the purpose of providing new information since the past monthly update. Given its late release, this will serve as both the Aug and Sep updates.

Details

Project milestones

- The Acquisition Strategy Meeting (ASM) was conducted on Aug 18 in the audience of the Associate Administrator of NASA, Mr. Robert Lightfoot. Two decisions were made at ASM: (1) the Project will proceed with a competitive procurement of a polarimeter, and, (2) GSFC will build the PACE spacecraft bus.
- The mission System Requirements Review (mSRR) is scheduled for mid-Nov. This is a major review, required to be completed before entering Phase B, that evaluates whether the proposed mission and systems architecture is credible and responsive to mission requirements, constraints, and resources.

Instruments

- The OCI System Engineering team focused on requirements for and testing of OCI CCDs, analog-to-digital converters, and other components in the detector/electronics chain. Broadly speaking, this involves finding cumulative performance sweet spot(s) for: CCD read rates, analog-to-digital converters, their effective numbers of bits, and their space readiness, numbers of CCD read taps, Lmax values assigned to each tap (which defines the dynamic ranges required for the CCD), and CCD electron well capacities.
- A Request for Proposals (RFP) and/or Announcement of Opportunity (AO) for the PACE polarimeter will be released in Dec, with an expected award in May if an option can be accommodated under design-to-cost. Requirements for the RFP/AO are currently being defined in collaboration with HQ. Thank you again to the science team for the developing their white paper on recommended polarimetric capabilities.
- The Project is completing their analysis package and cost ROM for integration and support of the CSA/NRL contributed coastal imager, COCI. This material will be refined in collaboration with HQ and delivered to (and, hopefully, presented to) HQ management.

The Project requires additional financial support to include COCI as part of the payload. The budget overguide request made earlier this year to support this instrument was not approved. Project Science requested that COCI include a 2-axis gimbal to support Sun glint mitigation and targeted pointing / data collection.

Science analyses

- OCI performance: Project Science continued to evaluate the impact of SNRs (provided by Engineering) for the evolving OCI concepts. Recall that the OBPG developed a Monte Carlo approach to evaluate the impact of noise on derived remote-sensing reflectances, the uncertainties from which will be used to infer if the OCI SNRs can meet mission threshold requirements on these reflectances.
- Altitude reduction from 675 km to ~420 km: Per the request of HQ, the Project explored the technical and scientific impacts of lowering the PACE observatory altitude to ~415 km to potentially support constellation flying with active instruments that benefit from lower altitudes. The Project identified mission elements that require further investigation if this altitude reduction were to be requested and presented this material to HQ on Jul 11. A subsequent analyses revealed that OCI flown for 675 km and a LIDAR flown at 415 km with a common Equatorial crossing time (e.g., 13:00) would result in an average difference in observation time of only ~23 min (max of ~47 min).
- The spectral range of OCI will be tentatively extended down to ~315 nm. One major benefit of this could be characterization of ozone to support ocean color atmospheric correction with relying on ancillary data sources. A case study using heritage OMI/OMPS ozone algorithms with a PACE spectral configuration is still underway.
- SWIR bands: ST input on SWIR band positions and widths has been and still is welcome. Thank you for the conversation on the utility of the 940 and 1380 nm bands during the Aug atmospheric correction science team telecon. Also, Project Science is working to understand the impacts of adding a 7th (980 nm) and/or 8th (1040 nm) SWIR band to OCI to better understand why this may or may not be possible.
- Others in the queue (advance input welcome from the ST): science impacts of spatial aggregation to smaller pixels at the end-of-scan (something the current OCI concept can do for UV-NIR, but not SWIR).

Communications

The Ocean Ecology Lab and OBPG have been increasingly supporting the ocean color communications and outreach material coming out of GSFC. Please let the Project know about related ocean color, clouds, and aerosols communications and outreach activities!

The PACE Web site (<http://pace.gsfc.nasa.gov>) continues to evolve. Please check it out. Thank you to those of you who provided their PACE-related publications to Annette. This information should now be included in your online profiles, so please take a moment to visit the Web site. If you have not contacted Annette (there are three of you), please do so.

Applied Sciences

The budget overguide request to develop an Applied Sciences program in accordance with an upcoming HQ/ESD directive was not approved. Details to follow if/when we learn more about this decision. In the meantime, the HQ Applied Sciences team and Project have continued development of a formal PACE Mission Applied Sciences Plan – crafted acknowledging and in accordance with unknown budget constraints – the deadline for which is KDP-B (entry into Phase B, roughly early Spring 2017).