HARPOONS System: Calibration – Validation of Legacy and Future Satellite Ocean Color Data

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In order for a satellite ocean color mission to meet its key science objectives, the ocean color sensor must have stringent calibration and validation data requirements needed to produce a time series of spectral data of science quality. This requires a robust vicarious calibration program that enables verification of the ocean color instrument calibration while in orbit. Highly accurate *in situ* measurements of Rrs(λ) provides the principal source of surface truth for the operational vicarious calibration activity. An example of a state-of-the-art vicarious calibration system is the Hybridspectral Alternative for Remote Profiling of Optical Observations for NASA Satellites (HARPOONS), which was designed for the PACE (Plankton, Aerosol, Cloud, ocean Ecosystem) Mission. HARPOONS consist of an advanced optical profiler tethered to a Wave Glider (WG) autonomous vehicle and has four components: an above-water global solar irradiance instrument mounted on a WG autonomous vehicle; an in-water profiling optical package integrated to and towed by the WG and continuously profiling slowly between the surface and ~5m; a Compact Optical Sensor for Planetary Radiant Energy (C-OSPREy) mounted on a fixed stationary coastal platform near the vicarious calibration site; and a Wave Glider autonomous vehicle. Initial testing and Integration of the optical profiler and the Wave Glider was conducted in Hawaii. Final testing of the whole system under full operational condition took place in Puerto Rico in 2017. The HARPOONS calibration site, located about 20 miles south of La Parguera, southwestern Puerto Rico complies with the environmental conditions required for a vicarious calibration station: cloud-free conditions; clear water site; and a clear maritime atmosphere. HARPOONS exceed all the requirements set forth by the PACE Science Definition Team by combining various mature technologies developed by NASA and industry.