Tuesday, October 9
Oral Session 4
14:40–15:40

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AUTONOMOUS SHIPBORNE IN SITU REFLECTANCE DATA IN OPTICALLY COMPLEX COASTAL WATERS FOR VALIDATION OF SENTINEL-3 IMAGERY: A CASE STUDY OF THE SALISH SEA, CANADA

Present limitations on the use of satellite imagery to derive accurate chlorophyll concentrations arise from the lack of sufficient in situ measurements for validation of satellite reflectance. We installed a set of hyperspectral radiometers on a commercial ferry to measure radiances and irradiance with solar tracking capability that permits autonomous operation (SAS Solar Tracker, ST). We present ST in situ water leaving reflectance data (RrsST) and accompany ferry box and CODAR data, and Sentinel-3 imagery acquired in the spring and summer of 2016 in Salish Sea, for a total of 560 in situ matchup measurements. Measured ST data were processed to RrsST with an optimization to account for the regional bio-optical properties defined as SCDOM=0.0155, aCDOM = 0.007-3.0, and bb* = 0.0013. Level 1 Sentinel-3 images were processed with Polymer 4.7, C2RCC 0.15, and the standard ESA Level 2 water leaving reflectance products. Rrs from POLYMER and C2RCC compared to RrsST shows R^2 above 0.9 and mean relative percentage difference (MRD) for the visible wavelengths of 17% and 14% for ocean and 15% and -7% for plume waters, respectively. A novelty dataset, composed of ferrybox biogeochemical (chla, CDOM, and turbidity) and CODAR data, allowed for a robust spatiotemporal traceability of the uncertainties associated with the quality of matchups in the interface of the Fraser River plume and ocean waters. This analysis revealed that the uncertainties are proportional to the local current speed and direction and heterogeneity of water masses, adding to errors >50% between RrsST and Rrs from Sentinel-3.

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