Towards Closure of *In Situ* Upwelled Radiance in Coastal Waters

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Dynamic coastal processes alter in-water optical properties and have a significant impact on the measurements and interpretation of upwelled radiance and thus, remote sensing data. Upwelled radiance, $L_u(\lambda,z)$ is an important quantity for the determination of the appearance of a water body, water column visibility, and for remote sensing. Traditionally, $L_u(\lambda)$ is measured about 1 m below the sea surface. This paper provides a method for estimating water-leaving radiance, $L_w(\lambda,0^+)$, which is the quantity estimated by remote sensors, given measurements of either inherent optical properties (IOPs) or the radiance attenuation coefficient, $K_L(\lambda)$. *In situ* observations of upwelled radiance were made during the HyCODE project in coastal New Jersey (< 25 m water depth) using two different methods: 1) HyperTSRB and 2) profiled spectroradiometers. These measurements were compared with radiative transfer model estimates that used complementary measurements of IOPs for Hydrolight 4.1 model inputs. $K_L(\lambda)$ was computed using data from the profiling spectroradiometers to determine upwelled radiance at 0.66 m below the sea surface ($L_u(\lambda,0.66)$), just below ($L_u(\lambda,0^-)$),and just above the sea surface ($L_w(\lambda,0^+)$), also using the *n*-squared law for radiance). Additionally, a tuning factor, determined using Hydrolight, is introduced to estimate $L_w(\lambda,0^+)$ from HyperTSRB-measured $L_u(\lambda,0.66)$. Average agreement between HyperTSRB and spectroradiometers with Hydrolight was within 10% at the blue wavelengths, within 25% at the green, and within 40% at the red wavelength; r^2 was greater than 0.92 in all cases. Water column optical properties changed drastically from nearshore (turbid) to offshore (clearer) due to the presence of an upwelling front. This front resulted in decreasing magnitudes and flattening of upwelled radiance spectra from nearshore to offshore.