An Approach to Developing Numeric Nutrient Criteria for the Coastal Waters of the Northeast Using the Hyperspectral Imager for the Coastal Ocean (HICO)

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EPA is responsible for the development of nutrient criteria for all of the nation's surface waters as a key policy priority. The Clean Water Act requires states to identify designated uses of their waters and when necessary develop science-based water quality criteria to ensure protection of the designated uses. Designated uses include recreation, fish consumption, shellfish harvesting and drinking water sources. Thresholds for water quality criteria are set to provide an expectation that classes of designated uses will be supported. EPA has established a national strategy for development of numeric criteria which identifies ~~calling~~ total nitrogen (TN) and total phosphorus (TP) as causal variables and dissolved oxygen and chlorophyll *a* as nutrient-related response variables. This research is part of a larger Agency effort to expand nutrient-related response variables to include other indicators such as ~~by developing numeric criteria based~~ water column incident light penetration (i.e., water clarity) in ~~of New England~~ coastal and estuarine waters. Thi~~se~~ response variable~~s~~ would support healthy seagrass habitats, fish consumption, shellfish harvesting, and recreational activities.

The Hyperspectral Imager for the Coastal Ocean (HICO) ~~-~~imaging instrument, onboard the International Space Station, offers EPA the opportunity to model the quality and quantity light in the water column in Northeastern waters with initial emphasis on the Narragansett Bay (Rhode Island) estuarine system~~s~~. Using atmospherically corrected images, apparent (e.g., remote sensing reflectance (R_{rs})) optical properties were retrieved and used to derive bio-optical models which estimated chlorophyll *a* (chl *a*) concentrations, colored dissolved organic matter (CDOM) absorption and total suspended solids (TSS) concentrations. The chl *a*, CDOM absorption, and TSS estimates were then input into a regionally calibrated seagrass bio-optical model to successfully predict and map spatial and temporal patterns in water clarity based on light attenuation and secchi depth for Narragansett ~~and Buzzards~~ Bay~~s~~.

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