Predicting Harmful Algal Blooms to Mitigate Neurotoxin Exposure Using 20 Years of Shellfish and MODIS Satellite Data

Schweinfurth, Lila (School: Oregon Episcopal School)

Marine biotoxins such as domoic acid (DA), a neurotoxin produced by the diatom Pseudo-nitzschia spp., and paralytic shellfish poison (PSP), a neurotoxic byproduct of the saxitoxin-producing dinoflagellate Alexandrium spp., can expose humans to life-threatening illness, harm marine wildlife, and negatively impact coastal fisheries and ecosystems. As harmful algal blooms (HABs) that manufacture such biotoxins become more frequent and expansive globally, detecting and mitigating marine neurotoxin exposure takes on greater importance. By examining 20 years of archived shellfish biotoxin data from the Oregon Coast in conjunction with data from NASA's Moderate Resolution Imaging Spectroradiometer (MODIS) Aqua satellite, the present study aims to develop predictive models for detecting DA and PSP. While regular monitoring of shellfish does alert the public to the presence of hazardous toxins, predictive models could facilitate the development of an advance warning system to minimize neurotoxin exposure. In the present study, models of DA and PSP classification achieved accuracies ranging from 0.96 to 0.98. Because HABs continue to proliferate into new areas, highly accurate predictive models could save lives through early notification. Moreover, such models could enhance the public's awareness of risks associated with ingesting contaminated shellfish.

Awards Won: