FORECASTING BREVETOXIN RESPIRATORY IRRITATION

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Brevetoxins produced by *Karenia brevis* can be aerosolized and lead to severe respiratory irritation. In people with asthma, brevetoxins pose a substantial and sustained health impact, even after one-hour exposure. Local emergency room visits also increase during blooms. Economic impacts occur as even healthy people avoid beach businesses when a "red tide" is reported to be in the region. The distribution of brevetoxin aerosol impact varies greatly, depending on patchiness of blooms and changes in wind direction. We have developed forecasts of location and timing of irritation in order to reduce all of these impacts. The forecast uses cell counts, a respiratory model, and a Web page delivery system. It requires timely knowledge of bloom concentration and location, which we obtain using rapid response microscopy cell counts, and a new system called HABscope. The HABscope—designed for use by volunteer citizen scientists—uses a student-grade microscope, a pocket tablet computer to capture and upload video, and open-source feature recognition software to count *Karenia* cells within minutes of sample collection.

The HABscope was demonstrated in Sarasota County in 2018, with good accuracy and consistent data collection. The forecasts and Web distribution components were demonstrated in Pinellas County during the intense bloom of fall, 2018. The county sampled water 3-7 days each week at 12-15 public beaches and determined concentration daily with microscopy. We combined that data with 3-hourly forecasts of wind speed and direction to determine risk of respiratory irritation at each beach for the next 36 hours, updated every three hours. Results were posted on a web-page. Both sampling and forecasts will continue during the next red tide event. We plan on expanding the forecast to other areas that have samples at least two days per week, and look to begin including monitoring by volunteers with the HABscope.

PRESENTER BIO: Bob Currier is a Research Specialist, Department of Oceanography, Texas A&M University. His primary area of expertise is ocean observation data management and visualization using a variety of developmental tools including Python, Flask, Keras and TensorFlow. His current research involves automated classification of phytoplankton using deep learning.