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Satellite-Assisted Forecasting Environment for Improving Oyster Safety (SAFE Oyster)

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The purpose of this project is to develop and demonstrate innovative technologies to automatically transfer, sustainably use, and interactively visualize NASA satellite remote sensing products for intelligently forecasting oyster safety risks, protecting public health, and promoting economic (particularly oyster industry) development in Louisiana and beyond.

Remote sensing is the only technology that can be used today to monitor large remote areas like oyster harvesting waters. A key barrier to the adoption and sustained use of remote sensing products in oyster safety monitoring and decision-making is the lack of experienced users and/or integrated systems that could work automatically. To overcome this barrier, the overall goal of this project is to investigate and develop products, which will advance the utility of NASA satellite remote sensing assets in improving oyster safety and protecting public health to achieve a paradigm shift in oyster safety management from the current post-outbreak response to a satellite-assisted forecasting model. This effort is directly related to the NASA Science Mission Directorate Earth System Division to understand the response of the Earth system to disasters as well as to further the use of Earth system science research to inform decisions and provide benefits to society. Further, this project will make a significant contribution to the economic development of Louisiana by reducing costly oyster ground closures and oyster recalls and thereby increasing oyster production.

To achieve the project goal, the following research objectives will be addressed: (1) Convert NASA satellite remote sensing images to parameters indicating the environmental health of oyster harvesting waters; (2) Create models incorporating the remote sensing parameters to forecast the oyster safety risk level; and (3) Develop tools for automating the conversion, transfer, and sustained use of NASA satellite remote sensing data for assessing oyster safety and public health risk. These objectives motivate the development of a Satellite-Assisted Forecasting Environment, called SAFE Oyster (an automated decision support system), for monitoring environmental indicators of potential oyster safety threats, informing decisions on oyster safety and public health, and enabling the automated transfer and sustained use of NASAs archive of Earth observations.

Development and validation of individual components of the SAFE Oyster system constitutes the specific tasks of this project: Task 1: Satellite-Assisted Monitoring of Environmental Predictors for Oyster Safety; Task 2: Forecasting of Oyster Norovirus Outbreak Risk; Task 3: Forecasting of Vibrio Prevalence Risk; Task 4: Field Sampling and Laboratory Analysis for Validation of Model Forecasts; Task 5: Quantitative Risk Assessment of Norovirus and Vibrio Threshold Infectivity Limits; Task 6: Development of Web-Enabled GIS Interface for SAFE Oyster System; Task 7: Development of Cyberinfrastructure and Mobile App for SAFE Oyster System.



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This project will be undertaken by an interdisciplinary team of researchers from Louisiana State University, Louisiana Tech University, Louisiana State University Health Science Center, and Southern University. The project will focus on Louisiana oyster harvesting areas along the U.S. Gulf of Mexico coast and synergistically combine AI-based modeling tools, geospatial mapping technologies, epidemiological investigations, field sampling and laboratory analyses, and NASA satellite remote sensing products within a cyberinfrastructure framework.