

IRA RFA Topic Area 2 Potential Project of Interest

1.e: Improved ability to monitor and predict changes in essential ocean features and processes that impact tropical cyclone intensification, marine heat waves, ecosystem dynamics, etc.

Goal

This topic area aims to improve NOAA's ability to monitor and predict extreme events that are characterized or influenced by subsurface ocean dynamics. This includes an improved ability to monitor trends, detect changes, provide forecasts, and deliver tailored information products to users for decision making purposes. These improvements will arm coastal communities with higher quality information and services needed to prepare for and/or mitigate the impacts of extreme events affecting health, livelihoods, and property.

Project Description

Climate change has been linked to increasingly severe events, such as rapidly intensifying tropical cyclones and frequent and prolonged marine heat waves (MHW). Sea surface temperature is often used for assessments and prediction of these types of extreme events, thanks to the widespread availability from remote sensing instruments. Yet, subsurface observations and forecasts, beyond even just temperature, are necessary for providing a full understanding of ocean conditions and impacts. For example, Atlantic tropical cyclone intensity changes have been linked to subsurface/upper ocean features that affect mixing or heat content, as characterized by water temperature and salinity profiles. Furthermore, the ecological impacts from MHWs occur below the surface, such as coral bleaching, species displacement, harmful algal blooms and disruptions to the ocean food web, leading to losses for fisheries and aquaculture. Upper ocean observations and predictions are increasingly vital for properly characterizing subsurface influences on, and impacts as a result of, extreme events.

A dearth of subsurface ocean observations (especially profiles) limits NOAA's ability to detect, monitor and predict coastal hazards, and to validate and evaluate model output used for various applications (hurricane intensity forecasting, ecosystem monitoring/forecasting, etc). Subsurface observations support data assimilative models that are used to create hindcasts and forecasts of ocean conditions. An increase in subsurface monitoring will directly benefit research entities and modeling centers that conduct model development and evaluation. In addition, reanalyses are important for improving next generation models and for providing physical, historical context to projects, including those under the [Climate Ecosystems and Fisheries Initiative](#). For example, a reanalysis could help explain changes in fish productivity by revealing perhaps an ocean feature that influenced behavior and migration patterns.

Projects proposed under this Topic Area should involve improvements to NOAA's ability to detect, monitor and predict extreme events that are influenced by subsurface dynamics and processes. Elements proposed can involve a combination of subsurface observing and model improvements and techniques, and may include an observing system design or data reanalysis. Activities should involve partnerships and coordination with relevant NOAA groups such as the Southwest Fisheries Science Center and the Physical Sciences Laboratory, which focuses efforts on MHW monitoring.

For More Information or to Ask Questions

Please contact Kathleen Bailey at kathleen.bailey@noaa.gov with questions on this project theme or to be connected to subject matter experts in NOAA for technical assistance with this project. Please send general questions about the RFA to ioos.regions@noaa.gov.