Understanding dynamics of coastal pelagic species using imaging systems and deep learning

Hongsheng Bi
University of Maryland Center for Environmental Science

Imaging technologies and deep learning are emerging new tools to study marine ecosystems and provide unprecedented new information to improve our understanding ecosystems dynamics. However, imaging pelagic species in coastal waters and processing these images are challenging due to large amounts of particulates and complex water movements. To address these issues, we developed a shadowgraph plankton imaging system, PlanktonScope and a deep learning based automated image recognition procedure, which can monitor plankton in coastal waters effectively. The high spatial and temporal resolution data allows a much-improved understanding of the dynamics of coastal pelagic species. PlanktonScope and the automated imaging have been deployed for regular plankton monitoring as well as providing early warning of swarms of mysids and jellyfish which have the potential to clog cooling water intakes for nuclear power plants.