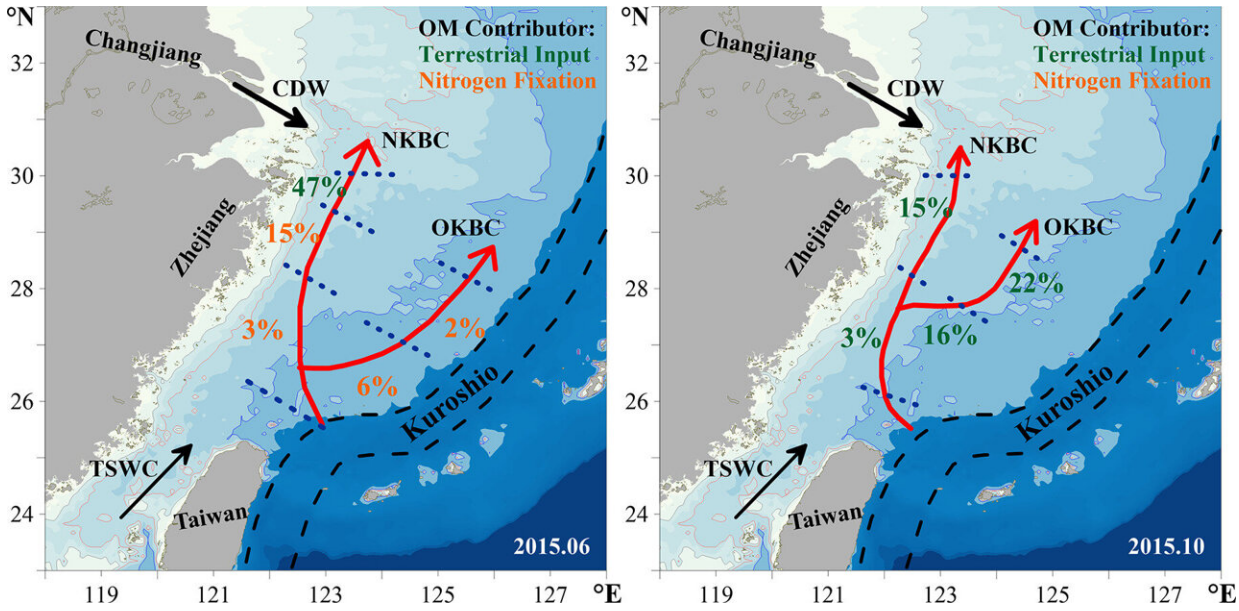
Game between Kuroshio intrusion and terrestrial input leads to hypoxia formation in East China Sea

March 21 2022, by Li Yuan



Graphical abstract. Credit: *Marine Pollution Bulletin* (2022). DOI: 10.1016/j.marpolbul.2022.113486

The East China Sea (ECS) is affected by severe hypoxia, which exerts significant influences on living resources, alterations of biogeochemical cycles and ecosystem degradation.

Previous studies have proved that organic matters (OM) decomposition,

as a series of oxidations, in the Kuroshio Subsurface Water (KSSW) played a significant role in forming the coastal hypoxia.

Recently, a research team led by Prof. Yu Zhiming from the Institute of Oceanology of the Chinese Academy of Sciences (IOCAS) has provided new information on the sources of decomposed organic matters in Kuroshio Subsurface Water on hypoxia formation in ECS by applying the nitrate isotopes technique.

The study was published in *Marine Pollution Bulletin* on March 10.

The researchers found stronger oxidations in the Kuroshio Subsurface Water than ambient waters in either June or October on the ECS shelf, which reduced the dissolved oxygen in the bottom. The reaction was stronger in June than that in October.

The nitrogen from N_2 fixation was introduced into the bottom nitrate in Kuroshio Subsurface Water in the southern ECS during June. However, those signals were hardly observed during October. Instead, the decomposition of terrestrial organic matters enhanced in the northern ECS during June and most of the ECS during October.

Based on the isotopic balance equation, the contributions from both atmosphere and land were demonstrated. The terrestrial and marine sources contributed almost equally to the development of ECS hypoxia, which judged the impact of human activities and natural process on coastal hypoxia quantitatively.

"These results provide vital information for understanding the mechanism of hypoxia formation driven by eutrophication and oceanic circulation," said Prof. Yu, the corresponding author. "It is crucial for nutrient management and policy making in mitigating hypoxic conditions."

"The nitrate isotope is significant in studying the marine nitrogen cycles. It is expected to provide more insights into the typical environmental disasters in the near future," said Dr. Wang Wentao, first author of the study.

More information: Wentao Wang et al, Hypoxia formation in the East China Sea by decomposed organic matter in the Kuroshio Subsurface Water, *Marine Pollution Bulletin* (2022). DOI: 10.1016/j.marpolbul.2022.113486

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