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Breakthrough findings by CMLRE and NIO on the positive impact of methane loss on Climate Change

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The Centre for Marine Living Resources and Ecology (CMLRE) and the National Institute of Oceanography (NIO) found massive loss of methane (CH_4) through anaerobic oxidation during bottom water anoxic events (Oxygen-depleted conditions) in summer monsoon of the west coast of India. This is a breakthrough in understanding of the methane cycling process and pathways behind the anaerobic oxidation.

Anaerobic oxidation of methane (AOM) is generally considered as a microbial process occurring in anoxic marine and freshwater sediments.

Reduction in methane concentration under acute oxygen deficiency is a major relief to the environment because it helps reducing the net greenhouse effect from west coast region. The decrease in potential greenhouse gas (GHG) CH_4 can help avoid potential climate tipping points and reduce environmental impacts such as global warming, ocean acidification, sea-level rise etc., and may reduce the formation of tropospheric ozone, which harms the health of humans and plants.

CMLRE-NIO conducted studies to understand the CH_4 distribution and its emissions from the water column to evaluate the influence of upwelling and estuarine contribution over the South Eastern Arabian Sea (SEAS) shelf. Upwelling is an oceanographic phenomenon involving wind-driven motion of dense and cooler nutrient-rich water to the ocean surface replacing nutrient-depleted warmer surface water. The studies revealed that during the summer monsoon, Oxygen-depleted conditions occur naturally from the convection of low oxygen waters onshore of the Arabian Sea, which occur on the continental shelf through a physiological process. Such low oxygen conditions induce biochemical changes of GHGs.

“Although anthropogenic effects on coastal oxygen depletion and cascading GHGs production are prominent, such effects are highly limited to nearshore regions only as <10% of anthropogenic nutrients are only exported from the Indian estuaries and rest are recycling fast within estuaries and acting as sink zones. In a way, our coastal seas are being protected heavily by estuaries. Such low oxygen conditions induce biogeochemical changes of GHGs, so primarily is a natural phenomenon,” Dr. G.V.M. Gupta, a senior scientist at CMLRE, who led the research, said. The research team comprised of V. Sudheesh of CMLRE, Ministry of Earth Sciences, Kochi, and S.W.A. Naqvi of the Institute of Oceanography, Panaji. The research paper is published in the Journal of *Frontiers in Marine Science* (available online from 15 May 2020).