3.060 How do warm-core eddies affect methane emission into the atmosphere in the southwestern Canada Basin? .

Early Career Scientist

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Abstract:

Methane (CH_4) is a potent greenhouse gas and plays major roles in both tropospheric and stratospheric chemistry. During the last two centuries, atmospheric CH_4 has increased by 1000 ppb and reached to 1834ppb in 2015 as a result of anthropogenic activities. Amount of CH_4 emission into the atmosphere is attractive to the scientists, due to remarkable changing in global warming. The ocean acts as one of the sources of atmospheric CH_4, and the CH_4 flux can vary depending on the oceanic region owing to the difference in biological activities and physical condition. In the Arctic Ocean, a massive CH_4 hydrates from marine sediments release and/or methanogenic CH_4 producing in anaerobic environment with the presence of high organic matter on the seafloor and then diffusion into water column was examined. However, the vertical CH_4 distribution is still scarce, so it needs to be examined for comprehension of CH_4 dynamics.
A noted point is vertical CH-$_4$ distribution inside/outside of the warm-core eddy (WCE), which had been observed. We consider that WCEs are generated as a result of instability of Alaskan Coastal Current through Barrow Canyon. A coherent mesoscale eddy is one of the possible mechanisms for transporting the shelf-water from Chukchi Sea into the Canada Basin (CB) interior. The existence of WCE implies that it would transport nutrients as well as CH_4 from the Chukchi Sea shelf-water to the CB. Seawater samples were collected to capture vertical CH_4 distribution in the CB during R/V Mirai (MR15-03) in summer 2015. We found that a broad spreading of sub-surface CH_4 peaks in depth inside the radius of eddy's velocity maximum has been compared to outside of WCE. A sinking mechanism inside of WCE is explained by vertical mixing associated with the velocity shear. Discussion of contribution of CH_4 emission between WCE and cold-core eddy will be shown.