Methane exchange between atmosphere and ocean

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Methane (CH_4) is one of the major greenhouse gases with approximate 30 times as much greenhouse effect as carbon dioxide. Sources of CH_4 would be biogenic, thermogenic, and combustion. Agricultural lands are a major contributor to CH_4 emission. Although the ocean is thought to be a sink for methane, little research has been conducted to directly measure CH_4 flux on the ocean. Our objective was to gain our knowledge on the CH_4 exchange between the atmosphere and the ocean by direct measurement of CH_4 flux on a ship. Row, pitch, and yaw were detected in real time with three-axils inclinometer and accelerometer on board, and wind speed and wind direction were corrected to compensate ship's motion to separate upward and downward eddies of air. The methane concentration of upward and downward air was measured every 30 min to estimate CH_4 flux with the relaxed eddy accumulation method. Methane concentration in the atmosphere varied along the course of the ship: (1) high in Tokyo and decreased to the equator; and (2) abruptly increased in the Berling Sea after the northern Pacific Ocean. Methane flux was tended to increase where CH_4 concentration was high. As reported by the previous workers, we found the direct measurement of flux was larger than the conventional bulk method.

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