

## Methane exchange between atmosphere and ocean

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Methane (CH<sub>4</sub>) is one of the major greenhouse gases with approximate 30 times as much greenhouse effect as carbon dioxide. Sources of CH<sub>4</sub> would be biogenic, thermogenic, and combustion. Agricultural lands are a major contributor to CH<sub>4</sub> emission. Although the ocean is thought to be a sink for methane, little research has been conducted to directly measure CH<sub>4</sub> flux on the ocean. Our objective was to gain our knowledge on the CH<sub>4</sub> exchange between the atmosphere and the ocean by direct measurement of CH<sub>4</sub> flux on a ship. Roll, pitch, and yaw were detected in real time with three-axis 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<sub>4</sub> 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 Kuroshio Sea after the northern Pacific Ocean. Methane flux was tended to increase where CH<sub>4</sub> 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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