Other (the greenhouse effect gases)

Estimation Of The Air-sea Dinitrogen Monoxide Flux Based On The Measur

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1. Objective Dinitrogen monoxide (N2O) is one of the greenhouse effect gases. It is stabile in the troposphere, and depletes the ozone layer to decompose in the stratosphere. According to IPCC report, nature sources occupy 65 % of the amount of N2O emission in the world. Ocean is the second nature source, and estuaries and coastal seas occupy 57 %. On the other hand, absorption into the seas is not estimated. And because it is difficult to measure N2O concentration in the water, the measured data are a few. Therefore N2O concentrations in the air and in the water were measured in the Seto Inland Sea and Pacific Ocean, and the N2O flux between the air and the sea was estimated based on the measured data. 2. Methods We had 5 cruises in March and September 2009 and March, June and August 2010. We think of March as winter because of the lower water temperature, and think of June, August and September as summer. N2O was detected by the non-dispersive infrared analyzer (MODEL46C, Thermo Electron products) and the concentrations were decided every 1 hour and every about 2 km, because cruising speed is about 12 knots. Water temperature, salinity and wind speed were also measured every 1 minute and every about 370 m. All data were averaged in each basin, Osaka bay, Harima -nada, Bisan-seto, Hiuchi-nada, Aki-nada, Bingo-nada, Iyo-nada, Kii Channel, Bungo Channel and Pacific Ocean. N2O flux is function of the gas transfer coefficient, N2O concentrations in the air and in the water, water temperature and salinity. The gas transfer coefficient is the function of water temperature and wind speed. The positive N2O flux means emission to the air. 3. Results N2O concentrations in the air in winter are high in comparison with it in summer. But the range of variation is less than 60 ppbV. On the other hand, the range of variation of N2O concentration in the water is about 400 ppbV. The concentrations in the inland seas are higher than that in the open sea. Especially, the concentrations in the water in Osaka bay are high in comparison with it in the air at 50-200 ppbV. N2O was saturated in almost area in summer. But N2O was not saturated in winter except Osaka Bay. Therefore Osaka Bay is the source of N2O throughout year, and other regions are the sink in winter, and are the source in summer.

4. Discussion Flux in Osaka Bay correlate with N2O concentration in the water, because lots of N2O is produced in the seawater and the bottom sediment in Osaka Bay. But flux of other region depended on water temperature. Because solubility is larger when water temperature is lower, so the ocean can absorb more N2O. Wind speed related to the volume of flux in all cases.