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Evaluation of seasonal changes in methane flux in a wetland ecosystem using the Closed Geosphere Experiment Facility

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To estimate CH_4 emission from a wetland ecosystem to the atmosphere, seasonal change in CH_4 flux was measured continuously in the Closed Geosphere Experiment Facility (CGEF). Plant-mediated transport is one of the important pathways for CH_4 emission from *Phragmites australis*-dominated vegetation because most CH_4 emission occurs through *P. australis* plant. The CGEF is equipped with a Geosphere Module (GM) and a Geosphere Material Circulation (GMC) system. The size of the GM is 5.8 m $\times$ 8.7 m in ground area with an average height of 11.9 m, including the soil depth of 3.1 m. A wetland ecosystem dominated by *P. australis* was introduced into the GM. The CGEF can control air temperature and CO_2 concentration in the GM automatically. Hourly CH_4 flux from the wetland ecosystem can be calculated easily by measuring continuously the changes in CH_4 concentration in air, air temperature and pressure in the GM. The method showed that monthly CH_4 flux varied from 0.39 to 1.11 g C m^{-2} $month^{-1}$ from April to November and the CH_4 emission for the plant growing season (eight months) was 5.64 g C m^{-2}. The CGEF has an advantage in studying total CH_4 emission from soil to the atmosphere through plant-mediated transport, diffusion and ebullition because of the large size of the GM.