

Variation in Methane and Nitrous Oxide Emission from Practical Paddy Fields with Intermittent Irrigation

IIDA Toshiaki, KAKUDA Ken-ichi, ISHIKAWA Masaya and OKUBO Hiroshi

農業土木学会論文集 No.247, pp.45-52 (2007)

Abstract

The emissions of methane and nitrous oxide from paddy fields to the atmosphere were observed at two practically used rice paddy fields in the northern part of Honshu Island in Japan. The observation was conducted by the closed chamber method basically once a week for about 6 months from June to December 2005. Intermittent irrigation was introduced from the beginning of July to mid-August to analyze the effect of the water management on variation in the gas emissions. The methane emission and the nitrous oxide emission showed opposite tendency to each other, in agreement with the previous studies. During the intermittent irrigation, the gas emissions cyclically fluctuated, responding to soil redox conditions which are governed by the water regime. However, the peaks of the gas emission did not precisely coincide with the irrigation and drainage actions. The gas emission often lagged several days behind the water management. Spatial variation in the gas emissions was greater during the intermittent irrigation than in other periods. The spatial variation was greater in the nitrous oxide emission than in the methane emission. After harvest, the considerably high methane emission was observed, while such high emission of nitrous oxide was not detected after the harvest.

Key words: Greenhouse gas, Paddy field, Intermittent irrigation, Methane, Nitrous oxide, Spatial variation