

## Analysis of methane concentration observed by SCIAMACHY: Correspondence with rice paddies

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Methane( $\text{CH}_4$ ) is the second most important anthropogenic greenhouse gas after carbon dioxide( $\text{CO}_2$ ). The concentration has been doubled since the industrial revolution, because of the human activities. However, sources and sinks of methane still leave big uncertainty. It is an urgent issue to make the global methane budget clearer. Recently, SCIAMACHY(Scanning Imaging Absorption spectrometer for Atmospheric CHartography) onboard ENVISAT(Environmental Satellite) enabled us to know global  $\text{CH}_4$  distribution from space. In this study, we analyzed the relation between  $\text{CH}_4$  concentration and the area of the rice paddy that is one of the most important sources of methane in Asia.

We analyzed SCIAMACHY data including vertical column densities (VCD) of  $\text{CH}_4$ , which are retrieved by IMAP-DOAS algorithm at the Heidelberg university[1]. In order to convert the vertical column density into the mixing ratio, we used  $\text{CO}_2$  data that was simultaneously observed with  $\text{CH}_4$ . It is assumed that vertical profile of  $\text{CH}_4$  mixing ratio is constant.

We used the distribution data of rice paddies that Takeuchi et al.[2] had derived from the spectrum of MODIS(MODerate resolution Imaging Spectroradiometer). The  $\text{CH}_4$  emission from rice paddies depends greatly on the season because rice paddies emit  $\text{CH}_4$  in the rainy season when they are filled with water.

Then, we selected "The typical region of rice paddies" and "Desert" in Asia, and analyzed seasonal variation of  $\text{CH}_4$  concentrations over the each region. As the result, seasonal variation of  $\text{CH}_4$  mixing ratio over the desert was similar to the background one. On the other hand,  $\text{CH}_4$  concentration over the rice paddies increased rapidly in rainy season, and decreased during the post-rainy season. The contrast of the two regions indicates that rice paddies really emit significant amount of  $\text{CH}_4$  in the rainy season.

[1] Frankenberg, C et al., J. Geophys. Res, 2006, Vol.111, D07303

[2] Takeuchi, W et al., Yasuoka, Y(2005) Photogrammetry and Remote Sensing, 43(6), 20-33.