

## ***Interactive comment on “How methane emission from rice paddy is affected by management practices and region?” by Jinyang Wang et al.***

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Answers to Referee 1:

General comments Rice agriculture is an important source of atmospheric methane (CH<sub>4</sub>). The estimations of CH<sub>4</sub> emission from rice fields on a national or global scale have been relatively well documented by using the inventory-based methods or model-based approaches. Due to more and more field measurements of CH<sub>4</sub> emission were available from the monsoon Asian countries and the rest of the world in last ten years, the effect of various factors (management practices like water management, nitrogen (N) fertilizer use, organic input and rice varieties, etc.) on CH<sub>4</sub> emission from rice fields would be different in statistics from previous reports. However, no information is

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available on this issue in global scale. The authors updated the dataset from monsoon Asian countries as described previously (Yan et al., 2005) to over the world (1089 measurements from 122 rice fields across the world) in this study. They reassessed the impacts of major variables controlling CH<sub>4</sub> emission from rice fields and found that water management and organic fertilizer application were the top two controlling variables. They developed the region- and country-specific emission factors and also estimated the default EFs at regional and country levels. Overall, the topic of this work was very important and timely to gain an insight into CH<sub>4</sub> emission inventory, which would help to assess regional and national agricultural CH<sub>4</sub> budget with low uncertainties. Good job! The manuscript was well written too. I recommend this work to be acceptable after minor revisions for publication in Atmospheric Chemistry and Physics.

Answer: We would like to thank referee 1 for his/her positive and critical comments on our work. We are glad that referee 1 recognized the importance of our work and we would like to take the opportunity to address concerns of referee 1.

Minor comments 1. Abstract Please give more information (e.g., EFs or SFs) about the CH<sub>4</sub> emission as affected by the region. In other words, the authors should pay much more attention to the regional CH<sub>4</sub> emission or emission factors (EFs) besides the management practices.

Answer: We followed this suggestion. Results of organic amendment and global or regional emission factors of CH<sub>4</sub> were added in the abstract.

2. Materials and Methods - Please show the units for all dependent and independent variables in Eqns (1) and (2). - How to quantify the pre-season water status (PW) and water regime (WR) in Eqns (1) and (2)? - What's the difference between OM and AOM in Eqn (1)? - It's hard to figure out what the climate variables are. Do the agroecological zones (AEZ) represent climates? If no climate variables were involved in these two equations, I would suggest deleting the CL but showing AEZ.

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Answer: We appreciate these thoughtful suggestions. -The units for all dependent and independent variables in Eqns (1) and (2) were added. -We added the brief description in section 2.2 to explain how we quantified the pre-season water status and water regime during the rice-growing season when we were collecting data. The detailed description can be found in Table 1. -As stated in the revised manuscript, OM and AOM represent the type and amount of organic amendments added, respectively. -We followed this suggestion and changed 'CL' to 'AEZ' throughout the manuscript.

3. Results and Discussion - Suggest changing '3.3 Development of region- or country-specific emission factors' to '3.3 Region- and country-specific emission factors' - Please make further discussion to compare the emission factors in this study with IPCC default emission factors.

Answer: We appreciate this thoughtful suggestion. Regarding the region- or country-specific emission factor, we did our best to make comparisons between our estimates and these values which are being often used in their national inventory reports. However, there were not many studies to add in the discussion for the comparison between regional emission factors with other studies. Because most countries do not have country-specific emission factors till present, we evaluated our results by the following ways: one is to use the scaling factors as shown in Table 3 to derive seasonal CH<sub>4</sub> emission as it is often presented in their national communication reports to UNFCCC, and the other one is to make indirect comparison between the national CH<sub>4</sub> inventory estimated using the 2006 IPCC guideline (Yan et al., 2009) and their national inventory reports.

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