

Interactive comment on “Simulation of observed climate changes in 1850–2014 with climate model INM-CM5” by Evgeny Volodin and Andrey Gritsun

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We thank the referee for the careful reading and important comments and we will change the paper accordingly.

1. Referee comment: The authors use the term “Solar Constant”, which is the amount of total solar energy received by unit time and unit area at the mean sun-earth distance. This term is somewhat misleading, because the irradiance is varying in time and hence the majority of contemporary papers (see Kopp and Lean (2011), Kopp (2016), etc.) use “Total Solar Irradiance” or TSI. I would recommend the authors to do the same.

Author’s response: We agree with the reviewer

C1

Author’s changes in the manuscript: “Solar constant” will be replaced by “Total Solar Irradiance”, or “TSI”.

2. Referee comment: One of the important results of the study is a good ensemble mean reproduction of the observed slowdown in global warming in 2000-2014. The authors attribute this result to more accurate description of the TSI variability in the CMIP6 protocol. It should be noted that this conclusion should be treated with caution. The slowdown in warming begins in 2000, when the discrepancy in the TSI values between the CMIP5 and CMIP6 protocols is still very small (Fig. 2). It is difficult to expect that such a small value can have a significant effect on the change in GMST. Moreover, there is a general agreement in the literature (see Yan et al. (2016) and references in it) that the slowdown of GMST increase in 1998-2013 was a result of the increased uptake of heat energy by the global ocean during these years. Although the slowdown in warming in the model simulations, are obtained when the AMO and PDO indices are incorrectly reproduced in the experiments, it does not indicate that the redistribution of heat in the global ocean could not be the main cause of the slowdown in global warming.

Author’s response: Authors agree with the reviewer on this (very important) statement. Yes, the ocean heat uptake can play significant role in global warming decrease in 2000-2014 obtained in the model, and, yes, it could happen even if the AMO and PDO have incorrect phases. We will further investigate this question.

Author’s changes in the manuscript: Last paragraph at page 4 where the role of TSI is discussed will be rewritten in such a way that TSI decrease after year 2000 is one of possible mechanisms responsible for global warming slowdown. Ocean heat uptake in model experiments will be calculated, and conclusion about its role in global warming slowdown obtained in the model will be added to the paper.

3. Referee comment: The article clearly lacks punctuation marks, for example in the expression “et al.” in references to literature.

C2

Author's response: Authors agree with the comment.

Author's changes in the manuscript: Punctuation marks will be checked and corrected.

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