

Reply to Reviewer #2

We would like to thank Reviewer #2 for the additional useful comments. Below follows our response point by point. The reviewer's comments are given in *italic* and our response is given in **bold** font.

1) The Reviewer notes: "I appreciate that the authors have re-written their abstract to better reflect novel aspects of their study. However, the newly added paragraph in Section 3.6 compares standard deviations between different regions. But this does not help to understand which region contributes most to uncertainty in total ERF_{aci}. Quantifying which region contributes most to uncertainty in the global mean requires area weighting."

The standard deviations of different regions presented in Section 3.6 are area-weighted since they are calculated from the area-weighted mean regional ERFs of the individual models. In order to investigate which regions contribute most to the uncertainty of ERF (and its components), we first calculated the area-weighted standard deviation for a number of regions defined in Gutiérrez et al. (2021) from Fig. S17 and then estimated the percent contribution to uncertainty using the following formula:

$$\frac{\sigma_R}{\sigma_G} \times \frac{A_R}{A_G} \times 100 \quad (1),$$

where σ_R and σ_G are the area-weighted standard deviations of the region and the globe, respectively, and A_R and A_G are the surface areas of the region and the globe (after regridding – see Section 2.3), respectively. In Table I below, we show the percent contribution of all ERF components for several ATLAS regions of interest, along with their surface areas in Km². East Asia has the land region with the largest contribution to ERF_{ARI} and ERF_{ACI} uncertainty (9.15% and 6.53%, respectively) by far. There are also oceanic regions that largely contribute to ERF_{ACI} uncertainty (such as the Central and East North Pacific Ocean), but this is due to their large surface areas affecting the result (Eq. 1). Areas not included in Table I have small contributions (< 4%) to the uncertainty of ERF_{ARI}, ERF_{ACI}, and ERF_{ALB}. This information was added to Section 3.6.

Table I. Contribution (in %) of the regional total ERFs to the global total ERF uncertainty for a number of ATLAS regions. The surface areas of each region are presented in Km².

Region	Surface Area	ERF	ARI	ACI	ALB
East North America	5,761,900.38	1.64	2.02	1.77	1.05
West and Central Europe	3,717,508.80	0.89	0.82	1.02	1.18
Mediterranean	6,921,701.15	1.37	2.27	1.73	2.05
Sahara	11,005,305.48	2.21	4.47	1.21	3.54
East Asia	9,383,381.53	5.79	9.15	6.53	2.39
Arabian Peninsula	3,513,646.80	0.96	2.66	0.45	1.49
South Asia	5,677,956.74	1.85	4.89	1.98	3.18
Southeast Asia	17,171,955.47	4.31	5.13	4.06	3.50
East Antarctica	14,352,549.81	1.26	0.42	0.84	2.99
West Antarctica	5,395,830.36	0.38	0.15	0.43	1.09
Arctic Ocean	6,231,731.98	1.19	0.89	0.84	4.29
West North Pacific Ocean	18,639,975.87	5.73	3.61	5.88	2.07
Central and East North Pacific Ocean	31,138,651.29	8.55	5.03	8.76	3.75
West South Pacific Ocean	5,721,202.30	0.54	0.40	0.66	1.14
Central and East South Pacific Ocean	46,160,223.14	5.97	2.77	5.99	4.37
North Atlantic Ocean	23,927,204.38	5.87	5.77	6.43	2.95
Southern Ocean	51,367,264.97	6.83	2.54	6.61	3.16
Global	510,064,471.91	100.00	100.00	100.00	100.00

References

1) Gutiérrez, J. M., Jones, R. G., Narisma, G. T., Muniz Alves, L., Amjad, M., Gorodetskaya, I. V., Grose, M., Klutse, N. A. B., Krakovska, S., Li, J., Martínez-Castro, D., Mearns, L. O., Mernild, S. H., Ngo-Duc, T., van den Hurk, B., and Yoon, J.-H.: Atlas, in: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by: Masson-Delmotte, V., Zhai, P., Pirani, A., Connors, S. L., Péan, C., Berger, S., Caud, N., Chen, Y., Goldfarb, L., Gomis, M. I., Huang, M., Leitzell, K., Lonnoy, E., Matthews, J. B. R., Maycock, T. K., Waterfield, T., Yelekçi, Ö., Yu, R., and Zhou, B., Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1927–2058, <https://doi.org/10.1017/9781009157896.001>, 2021.