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Can a model weighting scheme be used to obtain skillful, reliable and seamless climate information for the next 1-40 years?

Antje Weisheimer[1], Daniel J. Befort[1], Lukas Brunner[2], **Leonard F. Borchert**[3], Andrew P. Ballinger[4], Christopher H. O'Reilly[1,5], Gabi Hegerl[4], and Juliette Mignot[3]

[1]University of Oxford, AOPP, Clarendon Laboratory, Physics, Oxford, United Kingdom (antje.weisheimer@physics.ox.ac.uk)
[2]Institute for Atmospheric and Climate Science, ETH Zurich, Zurich, Switzerland
[3]Sorbonne Universités (SU/CNRS/IRD/MNHN), LOCEAN Laboratory, Institut Pierre Simon Laplace (IPSL), Paris, France
[4]School of GeoSciences, University of Edinburgh, Edinburgh, United Kingdom
[5]Department of Meteorology, University of Reading, Reading, UK

Skillful, reliable and seamless climate information for the next 1-40 years is crucial for policy- and other decision makers to develop suitable planning strategies. This poses a challenge for the scientific community, which is split up into the prediction community (developing initialized predictions up to multi-annual time scales, e.g. 10 years), and the climate projection community (providing long-term projections). As predictions are initialized with the observed climate state at the start of the integration, they are often more skillful for lead times of a few years (depending on variable and region) compared to uninitialized climate projections, which can provide information beyond 10 years. Thus, most useful climate information for the next 1-40 years would likely need to draw upon information from both sources. However, temporal merging from different sources is challenging, e.g., it can lead to discontinuities in the central estimates at the respective transition points, which pose problems for interpretation and communication alike.

The aim of this study is to explore if skillful and seamless climate information can be provided by applying a model weighting scheme to initialized decadal predictions and projections. The model specific weights are based on the respective past model performance compared to observations. Whereas for climate projections each model is assigned a single weight, for initialized decadal predictions these weights are calculated for each forecast year separately. Here, we apply the weighting technique to CMIP6 decadal predictions and climate projections from 8 different models.