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On the reliability of decadal climate prediction

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Decadal climate predictions and forced climate projections both provide potentially useful information to users for the next ten years. They only differ in the former being initialised with observations, while the latter is not. Bringing together initialised decadal climate predictions and non-initialised climate projections in order to provide seamless climate information for users over the next decades is a new challenging area of research. This can be achieved by comparing the forecast quality of global initialised and non-initialised simulations in their common prediction time horizons (up to 10 years ahead), and quantify in how far initialisation improves the forecast quality. Forecast quality has been usually explored through skill assessment. However, the impact of initialisation on the reliability, which quantifies the agreement between the predicted probabilities and observed relative frequencies of a given event, of decadal predictions has not yet been investigated sufficiently. Hence, users of probabilistic predictions are particularly sensitive to the potential lack of reliability which would imply that the probabilities are not trustworthy and this can have negative consequences for decision-making. In this communication, initialised decadal hindcasts (or retrospective forecasts) from 12 forecasting systems of the Coupled Model Intercomparison Project Phase 5 are compared to the corresponding non-initialised historical simulations in terms of reliability over their common period 1961-2005. We show that reliability varies greatly depending on the region or model ensemble analysed and on the correction applied. In particular, the North Atlantic and Europe stand out as regions where there is some added-value of initialised decadal hindcasts over non-initialised historical simulations in terms of reliability, mainly because of smaller biases and/or a better representation of the trend. Furthermore, we show that post-processed data display more reliable results, indicating that bias correction and calibration are fundamental to obtain reliable climate information.