



A prototype for showing the merits and limitations of multi-model climate ensembles

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Climate encompasses both opportunities as well as weather-related risks. Modern civilisation has adapted to local climates with suitable forms for agriculture, energy, economy, and towns and cities have been located out of harm's way. Earth's climate has been stable since the last ice age, but is currently changing rapidly as a result of increased concentrations of greenhouse gases. Now there is a need for climate change adaptation which requires actionable information about likely future outlooks. Global climate models are our main tool for making climate projections, but policy and decision-makers have little experience with such models. Furthermore, there are already vast volumes of data available, and the volume size is an obstacle for people unfamiliar with climate models. We present a web-based prototype (<https://climatedatasite.net/>) that shows the merits and limitations of future projections. It was developed in a Copernicus Climate Change Services (C3S) project DECM (Data Evaluation for Climate Models). The prototype extracts and presents relevant and salient information embedded in this body of big data. It aims to present the essence of this data in an intuitive and easily understood way at high speed. User-friendliness and helpfulness for non-experts with a low threshold have been central. The prototype's emphasis is on evaluation and quality control for multi-model climate model ensembles (e.g. CMIP5 and CORDEX), and we propose two ways of illustrating limitations and uncertainties: by showing an evaluation of the models' ability to reproduce the mean annual cycle and by showing the spread in outlooks among different models. It also brings together information from different sources to maximise its utility and helpfulness, but avoids overwhelming users with information. Most importantly, the prototype was designed with two user categories in mind: advanced "data user" and non-expert "product user". It can for instance assist product users with easy-to-use visualizations on questions about what is the current status of climate change over a certain area and how is this presented depending on the model-ensemble chosen. For a product user interested in some specific sector, like energy, the tool can demonstrate which of the sub-ensembles could be best-fit-for use and what is the level of uncertainty that needs to be understood and accepted. The prototype has built-in user-feedback, and with the use of google-analytics, it is self-learning about users preferences too.