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A review of uncertainty visualization within the IPCC reports

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Results derived from climate model simulations confront non-expert users with a variety of uncertainties. This gives rise to the challenge that the scientific information must be communicated such that it can be easily understood, however, the complexity of the science behind is still incorporated. With respect to the assessment reports of the IPCC, the situation is even more complicated, because heterogeneous sources and multiple types of uncertainties need to be compiled together.

Within this work, we systematically (1) analyzed the visual representation of uncertainties in the IPCC AR4 and AR5 reports, and (2) executed a questionnaire to evaluate how different user groups such as decision-makers and teachers understand these uncertainty visualizations.

Within the first step, we classified visual uncertainty metaphors for spatial, temporal and abstract representations. As a result, we clearly identified a high complexity of the IPCC visualizations compared to standard presentation graphics, sometimes even integrating two or more uncertainty classes / measures together with the "certain" (mean) information. Further we identified complex written uncertainty explanations within image captions even within the “summary reports for policy makers”.

In the second step, based on these observations, we designed a questionnaire to investigate how non-climate experts understand these visual representations of uncertainties, how visual uncertainty coding might hinder the perception of the “non-uncertain” data, and if alternatives for certain IPCC visualizations exist. Within the talk/poster, we will present first results from this questionnaire.

Summarizing, we identified a clear trend towards complex images within the latest IPCC reports, with a tendency to incorporate as much as possible information into the visual representations, resulting in proprietary, non-standard graphic representations that are not necessarily easy to comprehend on one glimpse. We conclude that further translation is required to (visually) present the IPCC results to non-experts, providing tailored static and interactive visualization solutions for different user groups.