



## **From attributing individual extreme events to reliable future risk assessment**

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At least in the short term, changes in magnitude and frequency of extreme weather events are how the impacts of climate change manifest. Decision makers are increasingly requesting quantitative information on such changing hazards and risk of past present and future extremes. With the emergence of extreme event attribution over the last few years this information can be provided for some events when combining the methods of event attribution with decadal scale projections, impact assessments and model evaluation. Different methods to attribute individual extreme weather events necessarily lead to differences in the explicit framing of the attribution question. Overall there is great strength in using different approaches to assess the role of anthropogenic climate change in extreme weather events as it allows assessing the uncertainty. However, differences in the framing and hence differing answers can lead to apparently contradictory answers to the attribution question and also future risk assessment which can be complementary as, e.g., the magnitude for an event can be mainly due to natural variability while the likelihood of the event occurring can have changed considerably. While methodologies to incorporate such seemingly contradictory approaches have been developed it is not trivial to move from the attribution of an extreme event where the event definition is based on the impacts of a past event to projections of possible events in the near future. There will always be a trade-off between what can be reliably simulated and what affects people locally and also what can be known in before an event happens. In other words, what are the hazards and how can we assess them reliably? Showing examples from the few studies that have been done on the attribution of weather events and their impacts I will illustrate how the methodologies can be applied in the context of assessing extreme events and their impacts under 1.5 and 2 degrees. But many open questions remain that will need to be addressed in order to provide systematic quantitative risk assessments; an assessment expected to be delivered, e.g., in the context of the IPCC AR6 assessment.