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Impact Attribution for Climate Law: The Case of Storm Irene

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People are increasingly turning to courts to combat climate crisis. In the early 2000s, fewer than 10 climate change litigation cases had been filed globally. By 2024, this number has grown to over 2,500, with more than half originating in the United States. Some of these cases rely on extreme weather attribution science to link damages to anthropogenic climate change. Developing rigorous, legally useful assessments of damage attributable to climate change is an increasingly pressing need.

We present a framework for forecast-based impact attribution which can link physically consistent hazards to impacts, providing evidence for legal cases and climate cost recovery laws. As a case study, we analyze the severe impacts of Storm Irene in August 2011 when it was undergoing extratropical transition in the north-eastern USA. In the state of Vermont, Irene caused rainfall of up to 180 mm within a few hours, leading to fluvial and pluvial flooding with catastrophic consequences that caused $850 million in economic damages. By integrating an operational weather forecast model (ECMWF's IFS) and hydrological models with economic impact assessments, we assess the extent to which these damages can be attributed to anthropogenic climate change.

This research underscores the potential of interdisciplinary attribution methodologies to enhance the scientific basis for judicial adjudication on climate change and climate law-making.