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Towards hurricane impact forecasting for the Dutch Caribbean

Nadia Bloemendaal[1,2], Rob Sluijter[2], Jos Diepeveen[2], and Elco Koks[1]
[1]Vrije Universiteit Amsterdam, Institute for Environmental Studies, Water and Climate Risk, Amsterdam, Netherlands (nadia.bloemendaal@vu.nl)
[2]Royal Netherlands Meteorological Institute (KNMI), De Bilt, Netherlands

The Royal Netherlands Meteorological Institute (KNMI) has been responsible for weather forecasting in the Dutch Caribbean (Bonaire, St. Eustatius and Saba – the BES islands) since 2016. And while weather patterns in the Caribbean often exhibit homogeneous characteristics, this region is also prone to some of the most violent storms on earth in the form of hurricanes. The most infamous example of this is Hurricane Irma (2017), which passed close to Saba and St. Eustatius but made a direct landfall on and severely impacted several other Caribbean islands, including Sint Maarten. Over 90% of the buildings on St. Maarten were damaged, including most of the infrastructure on the island. The estimated damage totaled to be around 2.7 billion USD (approximately 200% of the country's GDP).

With its extensive weather forecasting expertise as a solid foundation, KNMI is now moving towards impact-based forecasting through the development of the *Early Warning Centre* (EWC). For the BES islands, this means that we will design a hurricane impact model, combining KNMI's forecasting experience with impact modeling expertise nested within academia. With respect to the latter, we follow the traditional risk modeling approach and set up a hazard – exposure – vulnerability type of model chain. In such model chain, it is predominantly the choice of hazard data that determines the nature and applicability of the output data. For instance, (ensemble) forecast tracks provide insights into possible impacts of an imminent hurricane. Similarly, using synthetic hurricane tracks from a statistical model like STORM will result in a full spectrum of risk and associated probabilities. We will also incorporate local knowledge to develop and improve exposure and vulnerability input data.

In this presentation, we discuss the different input datasets needed to build an impact model, and how the different output products can assist weather forecasters in better understanding the impact of imminent hurricanes in the Dutch Caribbean.