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Investigation of superstorm Sandy 2012 in a multi-disciplinary approach

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Abstract. At the end of October 2012, Hurricane Sandy moved from the Caribbean Sea into the Atlantic Ocean and entered the United States not far from New York. Along its track, Sandy caused more than 200 fatalities and severe losses in Jamaica, The Bahamas, Haiti, Cuba, and the US. This paper demonstrates the capability and potential for near-real-time analysis of catastrophes.

It is shown that the impact of Sandy was driven by the superposition of different extremes (high wind speeds, storm surge, heavy precipitation) and by cascading effects. In particular the interaction between Sandy and an extra-tropical weather system created a huge storm that affected large areas in the US. It is examined how Sandy compares to historic hurricane events, both from a hydro-meteorological and impact perspective.

The distribution of losses to different sectors of the economy is calculated with simple input-output models as well as government estimates. Direct economic losses are estimated about USD 4.2 billion in the Caribbean and between USD 78 and 97 billion in the US. Indirect economic losses from power outages is estimated in the order of USD 16.3 billion. Modelling sector-specific dependencies quantifies total business interruption losses between USD 10.8 and 15.5 billion. Thus, seven years after the record impact of Hurricane Katrina in 2005, Hurricane Sandy is the second costliest hurricane in the history of the United States.

1 Introduction

Hurricane Sandy was the last tropical cyclone (TC) of the 2012 Northern Atlantic Hurricane season. From 24 to 30 October, Sandy moved on an unusual track from the Caribbean to the East Coast of the United States, where it made landfall in New Jersey in the early hours of 30 October. Along its path, the severe storm caused more than 200 fatalities and widespread damage to one the poorest (Haiti) and one of the richest countries (US) in the world with different patterns of impact and loss. Sandy was an extraordinary event due to its multihazard nature and the cascades of adverse events in the aftermath that aggravated the direct impacts significantly.

From a hydro-meteorological perspective, the most unusual aspect was the very large spatial extent of up to 1700 km, primarily a result of the interaction of the TC with an upper-tropospheric trough. This interaction led to a rapid extra-tropical transition (e.g., Jones et al., 2003)