ATS/CIRA Colloquium

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ATS 101 Hosted by Michael Bell

Drivers of Continental US Hurricane Damage

This presentation will examine the drivers of continental US (hereafter US) hurricane damage on a variety of timescales. For nearly 50 years, the Saffir-Simpson Scale has used maximum sustained wind to categorize hurricanes. Here I will show that minimum sea level pressure has a stronger correlation with US damage than maximum sustained wind. Minimum sea level pressure has the added benefit that it is also much easier to measure than maximum sustained wind, both with aircraft reconnaissance as well as with surface measurements on land. Both of these intensity metrics will also be compared against integrated kinetic energy – another metric that has recently been proposed to categorize hurricanes. The focus of the presentation will then shift to drivers of US hurricane damage on sub-seasonal to seasonal timescales. When the Madden-Julian oscillation (MJO) is enhancing convection over Africa and the Indian Ocean, vertical wind shear decreases across the tropical Atlantic and Caribbean, and US hurricane landfalls are favored. When the MJO is enhancing convection over the Pacific Ocean, vertical wind shear increases, and US hurricane landfalls are disfavored. On seasonal timescales, La Niña increases US hurricane landfall likelihood, especially along the East Coast, while El Niño suppresses US hurricane landfall likelihood. Positive phases of the Atlantic multi-decadal oscillation enhance US landfall frequency on longer-term timescales. While US hurricane damage has increased exponentially since the start of the 20th century, the primary driver of this increase to date has been increases in exposure along the coastline. When normalizing hurricane damage by population, inflation and wealth, there has been no long-term trend in hurricane damage - in line with the lack of trend in either US hurricane or major hurricane landfalls since 1900. Damage in the future from hurricanes will likely continue to grow as population continues to increase along the coastline, with climate change exacerbating these increases via sea level rise, precipitation increases, and potentially stronger storms.

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