RESPONS: Regional Seasonal Forecasts and Multi-Annual Predictions of Tropycal cyclons

Description

Tropical Cyclones (TCs) rate as the primary natural disaster in the context of causing death, destruction and economic loss. The impact of Hurricane Katrina on New Orleans and Sandy on New York testify to their destructive capacity: they have caused combined damage reaching close to $200 billions and consequences of these storms, particularly Katrina, can still be felt to this day. And while hurricanes can cause an incredible amount of damage to infrastructures of advanced countries, they can totally cripple the developing nations of Latin America. For example, it is estimated that hurricane Mitch, which hit Honduras in 1998, killed nearly 22,000 people whilst destroying 70- 80% of the country's transportation network and causing water shortage in 70% of the country. The primary energy source for a TC is the evaporation from the ocean surface. With the warming of oceans due to global warming, the threat posed by these storms is expected to grow not only in North and Latin America (Hoffman et al., 2010), but also in Europe (Haarsma et al., 2013). Already, an upward trend in the intensity of the strongest storms has been detected (Elsner et al, 2008) and the geographical regions supporting cyclogenesis have been measured to be migrating poleward, away from the tropics towards the extra-tropics (Kossin et al., 2014).

This project aims to develop forecasting products that will be useful to address the threat posed by these storms. First, we will develop a multi-annual Atlantic hurricane forecast product using a combination of statistical downscaling techniques and a series of initialized climate simulations (also referred to as decadal forecasts) produced in the context of the international CMIP5 and SPECS projects. Special attention will be given to the ability of these forecasts at predicting changes between prolonged periods of high and low cyclone activity. State-of-the-art hindcasts (forecasts of the past) produced by a catastrophe-modeling firm associated to this project will be used as a benchmark against which to evaluate the skill of our new cyclone forecast product. Using real-time forecasts, we will then produce a 5- year forecast of Atlantic hurricane activity. In the second part of the project, we plan to develop regional seasonal forecasts of tropical cyclone activity for both basins th

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