

A Global Investigation of the Impacts of Landfalling Tropical Cyclones on Societies

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Landfalling tropical cyclones (TCs) result in much devastation and numerous fatalities around the world each and every year. The impacts of TC landfall to specific communities and societal groups vary widely. These variations in impacts are due not only to the strength and intensity of the TC at landfall, but also to a given society's vulnerability and resiliency to these stresses at the time of the TC event. Societies have various levels of vulnerability to TC landfall based on many factors including education, preparedness, personal history with previous events, and governmental infrastructure, to name but a few. The frequency of landfalling events is an important factor for population and ecological vulnerability, not only due to the immediate impacts associated with landfall events, but also for the long-term socioeconomic development of the region.

This research seeks to gain insight into the many factors that determine how a society is impacted by a landfalling TC in order to aid in the development of metrics to determine vulnerability to these events. An analysis of the physical characteristics of the spatial and temporal patterns of landfalling events, the socioeconomic and demographic conditions of the location at the time of landfall, and the range of impacts resulting from the set of all landfalling TCs from 1998 to 2013 is presented on scales ranging from global to regional. A comparison of the levels of impacts, which result from TC landfall in developing versus developed countries, is performed. Using both socio-economic and geographic data from sources including, but not limited to EM-DAT (the Emergency Events Database), World Bank, the Socioeconomic Data and Applications Center (SEDAC), and the International Best track Archive for Climate Stewardship (IBTrACS) we will attempt to quantify the level of vulnerability and resiliency of each impacted region by assessing the spatial and temporal trends in TC impacts. The use of socio-economic data in concert with physical storm parameters will allow for a more robust understanding of the ramifications of landfalling TCs.