

RELATIONSHIP BETWEEN CLIMATE CHANGE AND WEATHER¹

Overview

Scientific evidence presented in the Intergovernmental Panel on Climate Change Third Assessment Report does not indicate any clear linkage between extreme weather events and the measured global temperature increases of the past century. The lack of demonstrable linkages results from both insufficient long-term observational records of specific extreme weather events, and the fact that some of these phenomena have not been affected measurably by the warming of the last century

Precipitation

Over the 20th century (1900 to 1995), there were relatively small increases in global land areas experiencing severe drought or severe wetness. (Page 33)

New analyses show that in regions where total precipitation has increased, it is very likely that there have been even more pronounced increases in heavy and extreme precipitation events. (Page 103)

Long-term global trends for 1900 to 1995 are relatively small for both severe drought and wet area statistics. However, during the last two or three decades there have been some increases in globally combined severe dry and severe wet area, resulting from increases in either the dry area (e.g. over the Sahel, eastern Asia, and southern Africa) or the wet areas (e.g. over the United States and Europe). Most of the increases occurred after 1970. Except for the Sahel, however, the magnitude of wet and dry areas is not unprecedented during this century, but it should be noted that rainfall in the Sahel since the height of the drought has substantially increased. (Page 162)

Tropical and Extra-Tropical Storms

There is no compelling evidence to indicate that the characteristics of tropical and extratropical storms have changed. Changes in tropical storm intensity and frequency are dominated by interdecadal to multidecadal variations, which may be substantial, e.g., in the tropical North Atlantic. Owing to incomplete data and limited and conflicting analyses, it is uncertain as to whether there have been any long-term and large-scale increases in the intensity and frequency of extra-tropical cyclones in the Northern Hemisphere. Regional increases have been identified in the North Pacific, parts of North America, and Europe over the past several decades. In the Southern Hemisphere, fewer analyses have been completed, but they suggest a decrease in extra-tropical cyclone activity since the 1970s. (Page 33)

¹ All page numbers from the following quotes refer to the following: Intergovernmental Panel on Climate Change, *Climate Change 2001: The Scientific Basis*. Third Assessment Report of the IPCC. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge, United Kingdom, and New York: Cambridge University Press).

Changes globally in tropical and extra-tropical storm intensity and frequency are dominated by inter-decadal to multi-decadal variations, with no significant trends evident over the 20th century. Conflicting analyses make it difficult to draw definitive conclusions about changes in storm activity, especially in the extra-tropics. (Page 5)

Based on limited data, the observed variations in the intensity and frequency of tropical and extra-tropical cyclones and severe local storms show no clear trends in the last half of the 20th century, although multi-decadal fluctuations are sometimes apparent. (Page 34)

Changes in tropical and extra-tropical storm intensity and frequency are dominated by inter-decadal to multi-decadal variations, with no significant trends over the 20th century evident. Conflicting analyses make it difficult to draw definitive conclusions about changes in storm activity, especially in the extra-tropics. (Page 104)

There is little sign of long-term changes in tropical storm intensity and frequency, but inter-decadal variations are pronounced. Owing to incomplete data and relatively few analyses, we are uncertain as to whether there has been any large-scale, long-term increase in the Northern Hemisphere extra-tropical cyclone intensity and frequency though some, sometimes strong, multi-decadal variations and recent increases were identified in several regions. Limited evidence exists for a decrease in cyclone frequency in the Southern Hemisphere since the early 1970s, but there has been a paucity of analyses and data. Recent analyses of changes in severe local weather (tornadoes, thunder days, lightning and hail) in a few selected regions provide no compelling evidence for widespread systematic long-term changes. (Page 163)

Severe Weather

Recent analyses of changes in severe local weather (e.g., tornadoes, thunderstorm days, and hail) in a few selected regions do not provide compelling evidence to suggest long-term changes. In general, trends in severe weather are notoriously difficult to detect because of their relatively rare occurrence and large spatial variability. (Page 33)

No systematic changes in the frequency of tornadoes, thunder days, or hail events are evident in the limited areas analysed. (Page 5)