# Understanding How Climate Change Could Affect Tornadoes

***First International Summit on Tornadoes and Climate Change; Crete, Greece, 25–30 May 2014***

PAGE 412

Current understanding of how tornadoes might change with global warming is limited. Incomplete data sets and the small-scale nature of tornadic events make it difficult to draw definitive conclusions. A consensus report on the climate of extreme storms found little evidence of trends in tornado frequency in the United States. However new research suggests a potential climate change footprint on tornadoes. Some of this research was presented at the First International Summit on Tornadoes and Climate Change, hosted by Aegean Conferences. The summit took place at the Minoa Palace in Chania, Greece, from 25 to 30 May 2014. Thirty delegates from eight countries—Greece, the United States, Germany, the United Kingdom, China, Japan, Israel, and Taiwan—participated.

Delegates emphasized caution when interpreting historical records. They noted that it can be misleading to draw conclusions about the effects of climate change on tornadoes from upward trends in the available reports. Sudden upswings in the number of tornado reports might have more to do with increased awareness of tornadoes' influence by the media, better communications, and popular culture. Some of the significant challenges with the data sets of tornado and other severe weather reports, like hail, include population bias, paucity of meteorological measurements, variability in the sources of reports, institutional data verification and archiving, inconsistent attribution of Enhanced Fujita Scale classification to events, and the fact that the scale is based on damage (compounding the population bias). Researchers need to seriously consider these issues when analyzing and interpreting the data.

Some delegates noted that frequency is but one component of tornado climate. It was shown that the number of tornado days and the spatial density of tornadoes are worthwhile analytics that are less affected by reporting bias. Because tornadoes often cluster in space and time, the need for data sets that collate information at the event and cluster levels was mentioned. A discussion by the sponsors ensued on the topic of extending the databases to include cluster and environmental information.

Despite the challenges in data quality, it was demonstrated that there is useful information in the available records that can be used to better understand tornado climatology. One study showed that after accounting for population density and county size, the region of central Kansas has the highest incidence of tornadoes in the state. Discussions on the physical mechanism for this finding focused on genesis locations. Another study showed statistical evidence that the oceans might contain a small amount of information about the character of the upcoming tornado season a month in advance.

There were presentations of work being conducted to assess socioeconomic factors that affect the vulnerability to tornado impacts and also novel methodologies to objectively assess damage that has been inflicted by tornadoes. It was gratifying to note that there is scientific interest in tornadoes impacting many jurisdictions worldwide, with research on four continents being represented at this meeting, including work in developing nations, small island states, and countries with greater experience with recording tornadoes.

The summit was sponsored by Climatek, Inc., and the Risk Prediction Initiative. Travel awards were given to student delegates. A few scientists received travel and accommodation subsidies. The summit was successful in fostering dialogue on this important topic. Planning for the second summit is under way.

—James Elsner, Florida State University, Tallahassee; email: jelsner@fsu.edu; and Mark Guishard, Bermuda Institute of Ocean Sciences, St. George's