



Trends in Severe Storms from Nine Years of AIRS Data

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There is wide agreement that global warming will affect the strength of convection and that the effects of climate change are likely to be seen first in extreme events. Long-term observations from space provide a globally unbiased view of such changes. The high radiometric stability achieved by modern infrared hyper-spectral sounders makes even small changes detectable. Extreme events may be extreme droughts, extreme rainfall, severe storms, and others. Here we focus on the frequency of severe storms. Starting in 1980 using thermal imager data from the GOES geostationary satellites, a certain class of very cold clouds has been associated with extremes in rain fall, tornadoes, aviation turbulence and lightening activity. With the Advanced Infrared Sounder (AIRS) these Deep Convective Clouds (DCC) are identified with spectra where the weak water lines are inverted. As the metric of change we use the daily count of DCC. Although most DCC are found in the tropical zone, they are detected during the summer months at latitudes as far as 45N and 45S. We find that between 2002 and 2012 the frequency of DCC has increased by 2% over tropical land, but decreased by 1%/yr for the tropical oceans. Since a large fraction of the annual regional precipitation is associated with severe storms, the observed opposite trends in DCC frequency may be interpreted as a shift in precipitation from ocean to land. This shift may be related to LaNino/ElNino events or to a Decadal Oscillation.