ID: W2167905626

TITLE: Tropical cyclones and climate change

AUTHOR: ['Thomas R. Knutson', 'John L. McBride', 'Johnny C. L. Chan', 'Kerry Emanuel', 'Greg J. Holland', 'Chris Landsea', 'Isaac M. Held', 'James P. Kossin', 'Arvind K. Srivastava', 'Masato Sugi']

ABSTRACT:

Whether the characteristics of tropical cyclones have altered, or will alter, in a changing climate has been subject of considerable debate. An overview of recent research indicates that greenhouse warming will cause stronger storms, on average, but a decrease in the frequency of tropical cyclones. Whether the characteristics of tropical cyclones have changed or will change in a warming climate ? and if so, how ? has been the subject of considerable investigation, often with conflicting results. Large amplitude fluctuations in the frequency and intensity of tropical cyclones greatly complicate both the detection of long-term trends and their attribution to rising levels of atmospheric greenhouse gases. Trend detection is further impeded by substantial limitations in the availability and quality of global historical records of tropical cyclones. Therefore, it remains uncertain whether past changes in tropical cyclone activity have exceeded the variability expected from natural causes. However, future projections based on theory and high-resolution dynamical models consistently indicate that greenhouse warming will cause the globally averaged intensity of tropical cyclones to shift towards stronger storms, with intensity increases of 2?11% by 2100. Existing modelling studies also consistently project decreases in the globally averaged frequency of tropical cyclones, by 6?34%. Balanced against this, higher resolution modelling studies typically project substantial increases in the frequency of the most intense cyclones, and increases of the order of 20% in the precipitation rate within 100 km of the storm centre. For all cyclone parameters, projected changes for individual basins show large variations between different modelling studies.

SOURCE: Nature geoscience

PDF URL: None

CITED BY COUNT: 2626

PUBLICATION YEAR: 2010

TYPE: article

CONCEPTS: ['Tropical cyclone', 'Climatology', 'Environmental science', 'Climate change', 'Storm', 'Precipitation', 'Global warming', 'Atlantic hurricane', 'Cyclone (programming language)', 'African easterly jet', 'Greenhouse gas', 'Tropical cyclone rainfall forecasting', 'Tropical cyclone scales', 'Atmospheric sciences', 'Tropical wave', 'Meteorology', 'Geography', 'Geology', 'Oceanography', 'Field-programmable gate array', 'Computer science', 'Computer hardware']