Geophysical Research Abstracts, Vol. 9, 01768, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01768

The use of synthetic hurricane tracks in risk analysis and climate change damage assessment

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Because of the lack of data on past hurricanes, empirical evaluations of the statistics needed for risk management are very uncertain. To overcome this problem, a hurricane model is used to produce large sets of synthetic hurricane tracks. After a validation of the model, these synthetic tracks are used to assess statistics, which are impossible to derive with enough confidence from historical series. This method provides, for 11 regions of the U.S. Atlantic coast, the annual landfall probabilities of hurricanes belonging to each category of the Saffir-Simpson scale. This model can be used to investigate the future of hurricane risks. As a first step, the model is run with a 10-percent increase in potential intensity. In such an environment, according to the model, annual landfall probabilities increase in all regions, especially for the strongest hurricanes. The vulnerability of each U.S. coastal county is then calibrated using data on past hurricanes and their normalized economic losses. The increase in annual hurricane damages due to a 10 percent increase in potential intensity can be evaluated at +54 percent, meaning that the average normalized losses caused by hurricanes would increase from approximately $8 billion to about $12 billion a year. These results suggest that hurricane losses are very sensitive to changes in potential intensity and may rise significantly in response to climate change. This paper calls, therefore, for taking into account hurricane damages in the analysis of climate policies, even though other factors like population evolution, economic growth and preparedness may be prevailing over climate change in the driving of hurricane damages.