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Asian Monsoon Years (2007-2012) Stochastic assessment of typhoon risk in the Asia-Pacific region

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Typhoons generally trigger disasters, such as floods, landslides, storm winds and storm surges, often causing severe economic as well as human damages. In the West North Pacific (WNP), about 27 typhoons are generated per year. More specifically in the Philippines alone, the annual average number of typhoons approaching the region, over the past 59 years, is 20, of which 9 make landfall. Thus, the Philippines is one of the countries where typhoons often cause significant damage. Recently, in September and October 2009, two destructive typhoons named Ketsana and Parma made landfall in the Philippines. There was a large number of human casualties, especially in the Luzon region. In addition, the typhoons also caused large economic loss. Typhoons are likely to become more intense in future due to global warming. As a result, there is a possibility that damage caused by typhoons will become larger due to increase in number of intense typhoons. Therefore, it is necessary to project the effect of future climate change on typhoon activity, and subsequently estimate the risk associated with typhoon such that the potential damage caused by typhoons can be reduced. Outputs of GCMs have been extensively used to assess future climate, but these models are computationally demanding. Therefore, stochastic typhoon models (STMs), which are computationally feasible, are often employed to estimate the risk associated with typhoons. This study aims to project future typhoon activity and assess typhoon risk stochastically under future climate change around the Philippines, and hopefully the entire Asian region at the time of presentation, with the usage of a simple STM. Typhoon risk is estimated based on total cost of damages, which includes human damage as well as damage to physical infrastructures. Results obtained so far are as follows. Firstly, this study successfully developed a simple STM based on previous literature. Outputs of the developed STM were validated against observed data and the typhoon tracks in southern WNP were comparatively well reproduced. Also, central pressure by the improved STM was in agreement with the observed data. Next, the STM was used to generate typhoons for 10,000 years under the current climate and a future climate change scenario. The number of typhoons passing through the Philippines was found to be decreasing whereas the number of typhoons with lower central pressure was found to be increasing in future. As a result, although typhoons become more intense, expected costs of damage caused by a single typhoon is unchanged, but expected annual cost of damages caused by typhoons was found to decrease in future in the Philippines. In this regard, Ketsana and Parma might not be due to the climate change.