



Changes of storm surge and typhoon intensities under the future global warming conditions

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Recent several climate models suggest that the frequency of intense storms could increase by the end of the 21st century, despite a decrease in the overall frequency of tropical cyclones. The study aims to investigate the change of storm surge and typhoon intensities under the future global warming conditions around the Korean peninsula (KP) with a downscaling and statistical approach that reproduces the past intense typhoons in the warming conditions. The cyclostationary empirical orthogonal function (CSEOF) is used to estimate the future warming condition from the 21st century prediction of MPI_echam5 IPCC climate model based on the A1B scenario. Here, the sea surface temperature (SST) is considered as a target variable for the CSEOF analysis and other atmospheric variables are regressed on the SST. This method allows us to construct a consistent global warming pattern for all variables.

Two major typhoons, Maemi (2003) and Rusa (2002), are reproduced under the future global warming conditions. Storm surges are estimated based on the typhoon prediction. The numerical experiments show that the typhoon's intensities in terms of the central pressure are increased about 19 hPa and 17 hPa, respectively, when the future SST conditions are only considered. The storm surges are also increased up to 60 cm along the coastal regions of the KP. However, when the additional conditions for other atmospheric variables are considered, the storm surge and typhoon intensities are not significantly increased. It is found that this is mainly because air temperature near the top of troposphere is also increased as much as the SST does and the resultant small change in the temperature difference between two levels in the KP areas does not provide a favorable condition in the typhoon's intensification.