

## Increasing the highest storm surge in Busan harbor

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One of the most pronounced effects of climate change in coastal regions is sea level rise and storm surges. Busan in particular, the fifth largest container handling port in the world, has suffered from serious storm surges and experienced a remarkable mean sea level (MSL) rise. This study investigates a long-term variation of annual maximum surge height (AMSH) using sea level data observed in Busan over 53 years (1962~2014). The decomposition of astronomical tides and surge components shows that the AMSH has increased 18 cm over 53 years (i.e. 3.5 mm/year), which is much larger than the MSL trend (2.5 mm/year) in Busan. This significant increase in AMSH is mostly explained by the increased intensity of landfall typhoons over the Korean peninsula (KP), which is associated with the increase of sea surface temperature and the decrease of vertical wind shear at mid-latitudes of the western North Pacific. In a projected future warming environment, the combination of an increasing MSL and AMSH will accelerate the occurrence of record-breaking extreme sea levels, which will be a potential threat in Busan harbor.