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High resolution mapping of flood hazard for South Korea

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Floods are one of primary natural hazards that affect South Korea. During the past 15 years, catastrophic flood events which mainly have occurred during the rainy and typhoon seasons - especially under condition where soils are already saturated, have triggered substantial property damage with an average annual loss of around US$1.2 billion (determined from WAter Management Information System's flood damage database for years 2002-2011) in South Korea. According to Seoul Metropolitan Government, over 16,000 households in the capital city Seoul were inundated during 2010 flood events. More than 10,000 households in Seoul were apparently flooded during one major flood event due to torrential rain in July 2011. Recently in August 2014, a serious flood event due to heavy rainfall hit the Busan region in the south east of South Korea.

Addressing the growing needs, RMS has recently released country-wide high resolution combined flood return period maps for post-drainage local "pluvial" inundation and undefended large-scale "fluvial" inundation to aid the government and the insurance industry in the evaluation of comprehensive flood risk. RMS has developed a flood hazard model for South Korea to generate inundation depths and extents for a range of flood return periods. The model is initiated with 30 years of historical meteorological forcing data and calibrated to daily observations at over 100 river gauges across the country. Simulations of hydrologic processes are subsequently performed based on a 2000 year set of stochastic forcing. Floodplain inundation processes are modelled by numerically solving the shallow water equations using finite volume method on GPUs. Taking into account the existing stormwater drainage standards, economic exposure densities, etc., reasonable flood maps are created from inundation model output. Final hazard maps at one arcsec grid resolution can be the basis for both evaluating and managing flood risk, its economic impacts, and insured flood losses in South Korea.