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Toward flood risk prediction: a statistical approach using a 29-year river discharge simulation over Japan

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Abstract:

A statistical approach that considers the bias and uncertainty of models is proposed for interpreting the simulated river discharge as a flood risk. A 29-year simulation was performed to estimate parameters of the Gumbel distribution for the probability of extreme discharge. The estimated discharge probability index (DPI) showed clear agreement with observed values. Even more strikingly, high DPI in the simulation corresponded to actual flood damage records. This indicates that the real-time simulation of the DPI could potentially provide flood warnings. This paper also suggests an application using the same statistical method for real-time flood risk prediction that overcomes the lack of sufficiently long simulation data through the use of a pre-existing long-term simulation to estimate statistical parameters. A preliminary flood risk prediction that used operational weather forecast data for 2003 and 2004 gave results similar to those of the 29-year simulation for the Typhoon Tokage (T0423) event on October 20th 2004, demonstrating the transferability of the technique to real-time prediction, which is differently biased.

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