Developing a Malaysia flood model

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Faced with growing exposures in Malaysia, insurers have a need for models to help them assess their exposure to flood losses. The need for an improved management of flood risks has been further highlighted by the 2011 floods in Thailand and recent events in Malaysia. The increasing demand for loss accumulation tools in Malaysia has lead to the development of the first nationwide probabilistic Malaysia flood model, which we present here.

The model is multi-peril, including river flooding for thousands of kilometres of river and rainfall-driven surface water flooding in major cities, which may cause losses equivalent to river flood in some high-density urban areas. The underlying hazard maps are based on a 30m digital surface model (DSM) and 1D/2D hydraulic modelling in JFlow and RFlow. Key mitigation schemes such as the SMART tunnel and drainage capacities are also considered in the model. The probabilistic element of the model is driven by a stochastic event set based on rainfall data, hence enabling per-event and annual figures to be calculated for a specific insurance portfolio and a range of return periods.

Losses are estimated via depth-damage vulnerability functions which link the insured damage to water depths for different property types in Malaysia. The model provides a unique insight into Malaysian flood risk profiles and provides insurers with return period estimates of flood damage and loss to property portfolios through loss exceedance curve outputs. It has been successfully validated against historic flood events in Malaysia and is now being successfully used by insurance companies in the Malaysian market to obtain reinsurance cover.