



Modelling Hail Impact, part 2: From hazard to loss

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Hail hazard is often expressed by maximum hailstone size or as hail kinetic energy. These variables are highly aggregated and cannot directly be translated into hail losses at individual building locations.

In part one of this contribution, we introduced a detailed hail hazard model providing a hailstone size distribution across the area of interest. This can be used as an input for an engineering fragility model. For a hail size distribution at a given hazard intensity, each stone's individual kinetic energy on a component can therefore be quantified and is then directly related to the material resistance. The material resistance data can be defined from laboratory studies of ice sphere impacts of given velocities. The expected resistance of materials and their uncertainty allows the performance of an overall building's exterior or envelope to be probabilistically assessed using the component-level damage. Different components can be considered for example: roof elements such as tiles, wall cladding/external insulation, windows, external shutters, and roof-mounted solar panels.

The fragility is derived using First Order Second Moment (FOSM) reliability or Monte Carlo methods. The fragility is subsequently converted to vulnerability to define financial consequences and loss by relating the performance state to a component replacement cost.