



On the use of insurance geodata to map flood-risk areas

Quentin Hénaff, Omar Jerrari, Hani Ali, Marco Brettschneider, and Simon Blaquièrè
AXA Global Re, Reinsurance Actuarial & Cat Modeling, Paris, France (quentin.henaff@axa.com)

For the last 30 years, almost all the French metropolitan municipalities have been hit by natural disasters and more than half of which were floods. The last two catastrophic flood events in France demonstrated both the severity and the variability of flood risk exposure: respectively 700 and 1300 million EUR of loss and damages for 2015 pluvial flood in the south and 2016 fluvial flood in the north.

The geo-referencing of insurance portfolio addresses and moreover of experienced claims allowed us to investigate the spatial relationships between policyholders and their hydrographic environment.

After the extraction of potential flood hazard areas computing TauDEM and HAND algorithms from Copernicus 25-m resolution digital elevation model (EU-DEM) and hydrographic database (EU-HYDRO), we have developed an insurance geodata-calibrated flood risk map at metropolitan France scale and then extended to other European Union countries.

The geographic segmentation of flood-risk areas, including surface runoff, is based on a two-step process:

- exploratory work on hydrographic variables (i.e. flood stages and Strahler stream order) using machine learning to maximise explained variance on historical claims experience;
- an insurance specific ratio which minimises the capture of global insured value in flood-risk areas while maximising the prediction of experienced claims cost.

Our results show that flood-risk areas mapping can benefit from alternative sensing techniques and more generally that geoscientific studies of natural hazard could take advantage of insurance geodata exploration.