Using open source data for flood risk mapping and management in Brazil

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Worldwide the frequency and severity of major natural disasters, particularly flooding, has increased. Concurrently, countries such as Brazil are experiencing rapid socio-economic development with growing and increasingly concentrated populations, particularly in urban areas. Hence, it is unsurprising that Brazil has experienced a number of major floods in the past 30 years such as the January 2011 floods which killed 900 people and resulted in significant economic losses of approximately 1 billion US dollars. Understanding, mitigating against and even preventing flood risk is high priority.

There is a demand for flood models in many developing economies worldwide for a range of uses including risk management, emergency planning and provision of insurance solutions. However, developing them can be expensive. With an increasing supply of freely-available, open source data, the costs can be significantly reduced, making the tools required for natural hazard risk assessment more accessible. By presenting a flood model developed for eight urban areas of Brazil as part of a collaboration between JBA Risk Management and Guy Carpenter, we explore the value of open source data and demonstrate its usability in a business context within the insurance industry.

We begin by detailing the open source data available and compare its suitability to commercially-available equivalents for datasets including digital terrain models and river gauge records. We present flood simulation outputs in order to demonstrate the impact of the choice of dataset on the results obtained and its use in a business context. Via use of the 2D hydraulic model JFlow+, our examples also show how advanced modelling techniques can be used on relatively crude datasets to obtain robust and good quality results. In combination with accessible, standard specification GPU technology and open source data, use of JFlow+ has enabled us to produce large-scale hazard maps suitable for business use and emergency planning such as those we show for Brazil.