



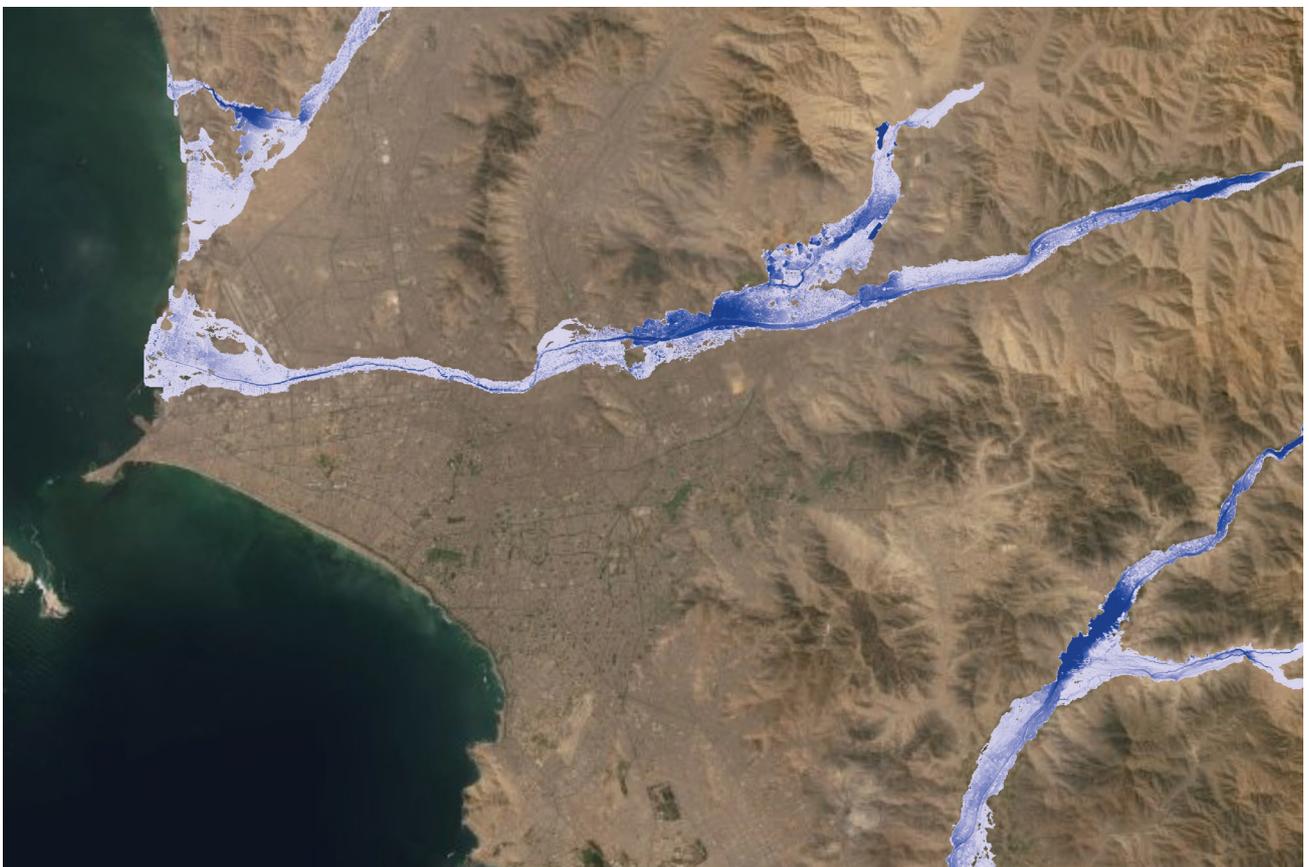
FLOOD SERVICES

Flood modeling applications

FLUVIAL FLOODING

River flooding is a standard application of hydraulic models. However, they require a variety of fundamentals. Firstly, high-quality terrain models are required, but also detailed information on the inflows. In areas with little or no long-term water level data, these data are often missing. Nonetheless, **based on good satellite data and a detailed topographic analysis**, the traces left by historical flood events can be used to establish relatively **reliable flood models**. For this purpose, the terrain models must first be well prepared, in particular the vegetation

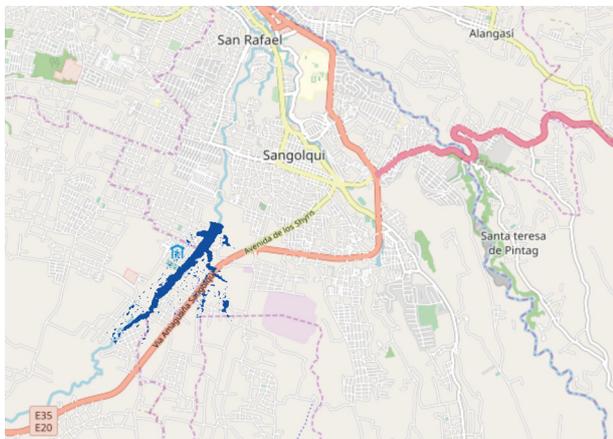
cover must be removed. The geomorphological signatures in the landscape are then used to detect the flood outline at individual points. These are then used as boundary conditions for the simulation model and a first model run is started. The results are checked with respect to their plausibility and subsequently optimized iteratively by correcting and further refinement of the boundary conditions. With this method, the discharge quantities can be estimated indirectly and then used to simulate areas also further downstream. This makes it possible to **produce flood hazard maps even for areas with extremely poor data**.



Flood modelling example for Peru, source: GEOMER, background ESRI.

LAKE OUTBURST

Lake outbursts as a result of mass movements are a problem occurring worldwide, especially in high mountain areas. Mass movements lead to the blockage of rivers and the subsequent formation of lakes, sometimes within a very short period of time. When filled, the lakes overtop the newly formed dams and can possibly erode them very quickly. The result is a hazardous flood wave, which must be estimated both in terms of wave height and speed. With **simulation models such as FloodArea**, these processes can be modeled quite well.

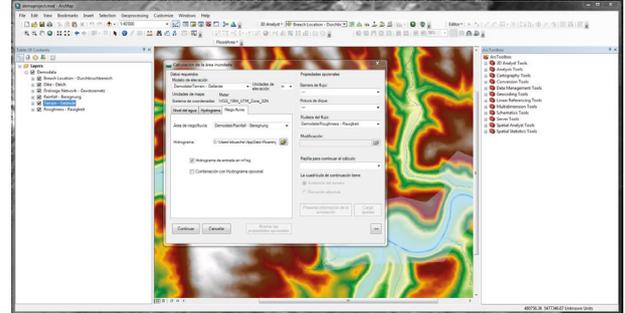


A lake possibly arising from mass movements north of Cotopaxi, Ecuador, source: GEOMER, background OSM 2019.

PLUVIAL FLOODING

Heavy rainfall events occur not only as a result of climatic effects, but also in the vicinity of volcanic eruptions. They are characterised by precipitation with extreme intensities and can occur in combination with mass movements. To prepare for such events, **pluvial flooding hazard maps** are used, which are generated from a combined calculation with hydrological and hydraulic

models. The results are **maximum inundation depth**, but also **flow velocity and direction**. The calculation is based on high-quality terrain models, but also on soil maps and land cover.



The FloodArea graphical user interface integrated in ArcGIS.

SIMULATION MODELS

The applied models **Hydro^{RAS}** and **FloodArea^{HPC}** are self-developed by geomer GmbH and have been used worldwide for about 20 years. In order to enable integration into multi-risk analyses, input and output data are coordinated with other models and the provision of results as well as the actual models are worked on to offer them in form of software as a service. This allows the user to modify individual simulation scenarios and integrate the simulation process into their own application chains.



Implementation of flood modelling as a service, integrated in the **RIESGOS** demonstrator.

SPONSORED BY THE



Federal Ministry
of Education
and Research

More information about the project:
www.riesgos.de

Dr. André Assmann, Kerstin Büche
geomer GmbH, Heidelberg
aasm@geomer.de kerstin.bueche@geomer.de