Geophysical Research Abstracts
Vol. 19, EGU2017-2226, 2017
EGU General Assembly 2017
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Geohazards and bridges in Calabria (South Italy): analysis of spatial-temporal damage distribution for critical points individuation

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In Calabria (southern Italy), during extreme weather periods, the road network is the most frequently and intensely damaged element. In fact, floods, landslides triggered by rainfall and even storm surges can cause both direct and indirect damage to roads. Direct damage consists in breakage of road sectors, with or without the involvement of people. Indirect damage involves the effects on society, from roads disruptions to utility services and local businesses, which result in a loss of revenue and tourism, and increased expenses from longer driving distances due to road blockages.
In Calabria, the regional roads belong to a main road system, running along the perimeter of the region, and a secondary system reaching the innermost cities and villages. Floods and storm surges mainly affect the main system, often acting simultaneously, while landslides and flash floods of small catchments affect the innermost system, often causing the complete isolation of rural villages.
This work is based on a large database named ASICal (Historically flooded areas in Calabria, http://160.97.12.71/oda/sito_oda_4_003.htm) of effects caused by phenomena triggered by rainy periods in the Calabrian territory, since the XIX Century. Going throughout this historical series of damage, we selected the cases with effects on bridges and then we classified: a) the bridges in three main groups according to the type of construction, b) the effects according to the type of phenomena that caused it, and c) the damage in three severity levels.
The aim is to obtain (a) a trend of damage affecting the Calabrian bridges during the analyzed period, classified in terms of both the type of triggering phenomenon and relative damage; (b) the location of the damaged structures, allowing the creation of a map of critical points that either must be monitored during rainfall periods or urgently need defensive work.