



Risk assessment of flash floods in central Pyrenees (Spain) through land use change analysis

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Nowadays, the main cause of the damages to human areas is the increased risk exposure. The urbanization in touristic areas in Pyrenees has increased enormously in last 25 years, and the most of urban development have been made on land occupied by the stream channel. We present two different case studies in central Pyrenees: one in Aragón river and one in Ésera river. We made a land use analysis from 1956 to 2013 in the headwaters of these two rivers delimiting the channel in different flash floods events, and analysing the amount and distribution of precipitation at the same time. The results show that the risk exposure is one of the main factors of the impact of flash floods. We found that most of the damage on urbanization and human activities was caused by the urban occupation of areas that were located on the floodplain of the river. For both Aragon and Esera headwaters precipitation events were considered extreme in their time series. However, the amount of precipitation of these extreme events does not support the consequences in geomorphological and human environments. The events of high intensity rainfall over the last years could be expected, yet, it had unexpected consequences that could be predictable by land managers through an appropriate regional planning.