

EGU2020-19767

<https://doi.org/10.5194/egusphere-egu2020-19767>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



## The October 1940 extreme flood in the Pyrenees revisited: validation of some hypotheses based on hydraulic simulations

Eric Gaume, **Maryse Charpentier-Noyer**, and Olivier Payrastre

GERS-LEE, Univ Gustave Eiffel, IFSTTAR, F-44344 Bouguenais, France (eric.gaume@univ-eiffel.fr)

One of the most impressive flash floods of the last century in France, as in Spain, occurred in the Eastern part of the Pyrenees on the 17<sup>th</sup> and 18<sup>th</sup> of October 1940. 47 people died in France during this extraordinary event and more than 100 in Catalonia. This flood caused considerable damages to buildings and, in particular, destroyed the center of the thermal town of Vernet-les-Bains on the slopes of the mount Canigou. The maximum observed 24-hour rainfall amount was close to one meter and remains until now one of the French record values. This flooding has already been widely documented both by the state technical services and by scientists of the time. Much of this documentation, which has been archived and is still available, makes it possible to propose new evaluations in the light of the recent advancements in flash floods studies. The conclusions of this work of flood reanalysis are presented, and are supplemented here by hydraulic simulations in order to test different hypotheses concerning the timing and magnitude (i.e. discharge values) of the flood. The Basilisk software (finite volume method for shallow water equations with adaptive mesh refinement) is used to conduct the 2D-hydraulic simulations. The initial reanalysis of the flood revealed that (1) the peak discharge values estimated in 1940, on which local risk assessment studies are based, had probably been largely over-estimated; (2) a sudden increase of local water levels, described by eye-witnesses in the town of Elne, was due to the breach of a railway embankment in the floodplain upstream the town. The hydraulic simulations, carried out both with the peak discharge estimated in 1940 and with the re-evaluated one, show that the former values are not compatible with the flood witnesses' accounts - which retrace the chronology of the episode - or with the surveyed water levels. The revised and reduced peak discharge appears to be more realistic according to the data retracing the event. Moreover, the presence of the breach in the railway line embankment appears to explain the maximum water levels observed in the town of Elne. This work illustrates that major past-flood events may be re-interpreted at the light of our increased scientific knowledge provided that they have been well documented at the time of their occurrence, which is often the case for major devastating floods.