The floods recorded in the North of Spain in October 2019. A paradigm of compound and multi-hazard event in the framework of climate and environmental change

M. C. Llasat (1,2), I. Caballero-Leiva (1,2), M. Llasat-Botija (1,2), L. Esbrí (1,2), T. Rigo (3), A. Díaz (4), J. P. Martín-Vide (5), A. Iglesias (6)

(1) Department of Applied Physics, University of Barcelona, Spain; (2) Water Research Institute, University of Barcelona, Spain; (3) Meteorological Service of Catalonia. Barcelona, Spain; (4) Department of Economics, University of Barcelona, Spain; (5) Technical University of Catalonia – BarcelonaTech, Barcelona, Spain; (6) Department of Agricultural Economics & CEIGRAM, Technical University of Madrid, Spain

A multivariate compounding event

(co-occurrence of hazards from multiple climate drivers in the same geographical region).

Heavy rainfalls, windstorms, flash-floods, strong sea surges N Catalonia (Sanuy et al., 2020)

A spatially compounding event

(co-occurring hazards from different climate drivers at distant locations within a limited time window)

Night 22-23/10: flash-floods **Francolí River**

Morning 23/10: tornado Gualba

24/10: snowfalls Pre-Pyrenean region

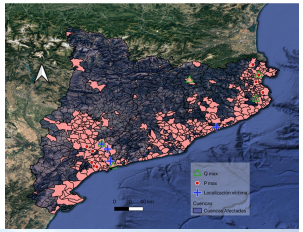
Cascading effects

Landslides and debris flows

Damages in critical infrastructures

Gloria event January 2020

Covid-19 pandemics



Hydrometeorological perspective

Mediterranean low, Mesoscale convective system

Socio-economic perspective

FLOODUP: Citizen science experiment in collaboration with the Museu de la Vida Rural de l'Espluga de Francolí. Low level of the citizens collaboration

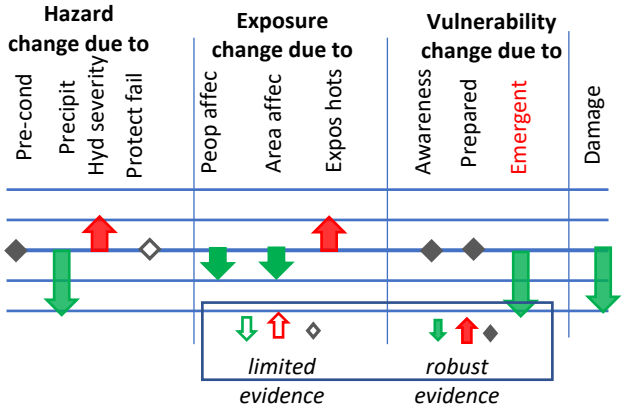
Early warning, emergency management and recovery

INUNCAT, VENTCAT, PROCICAT emergency procedures

Paired-flash floods comparison (Kreibich et al., 2017)

22-23 October 2019 (293 mm, Qmax=544 m^3/s Montblanc, 7 deaths, >44 € M)

9-11 October 1994 (410 mm, Qmax= 900 m^3/s Montblanc, 10 deaths >230 € M)



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