EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

# Map of the Major Flood Disasters in Europe: 1950-2005

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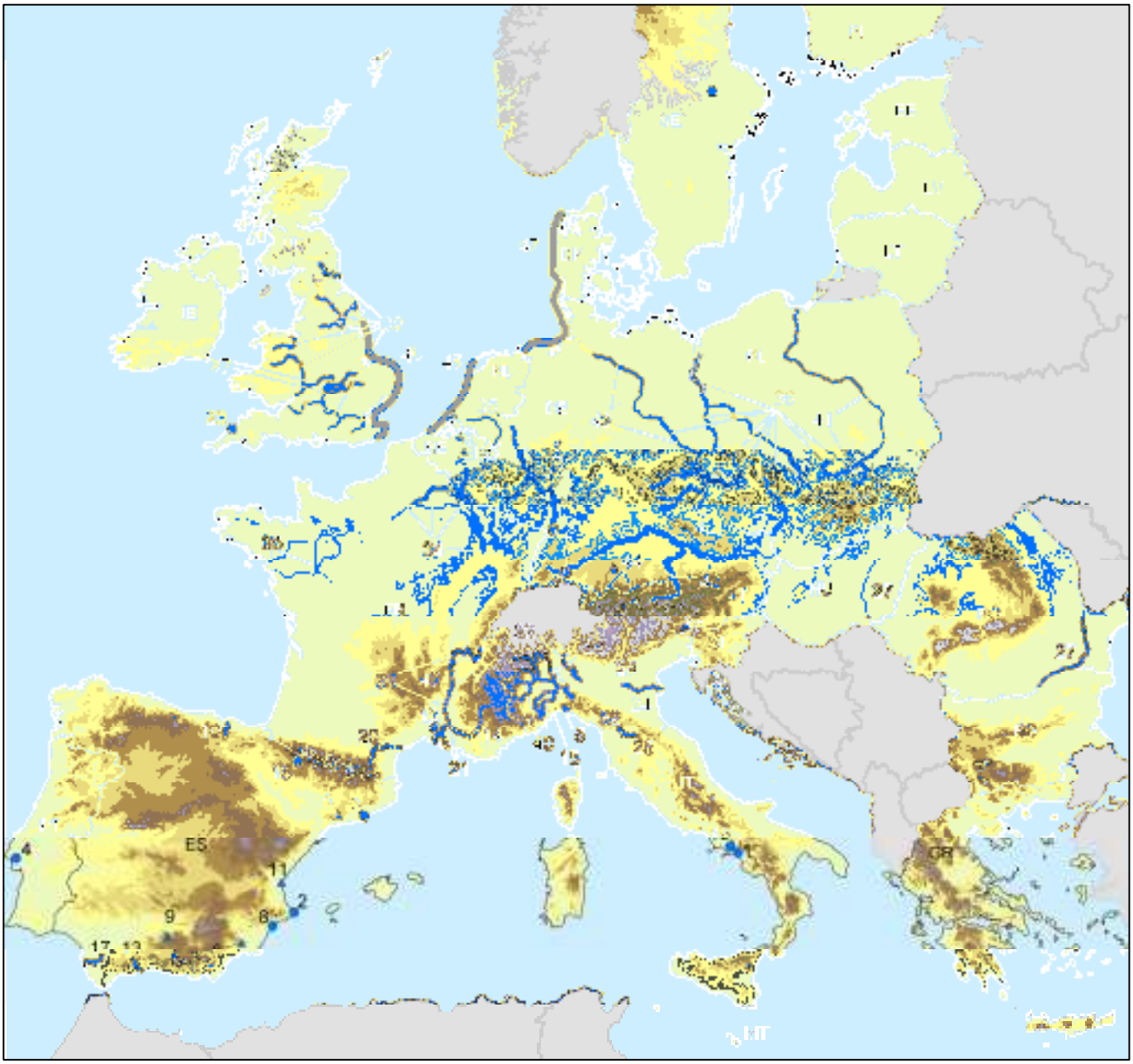


Major flood disasters in Europe: 1950-2005. Numbers from 1 to 23: flash floods, 24 to 44: river floods, 45 to 47 storm surge floods. A triangle feature represents very large regional events. No major flood events were reported during the study period in the EU's regions not included in the map.

Between 2000 and 2005 Europe suffered more than 100 floods, including 9 major flood disasters. These major flood events caused 155 casualties and economic losses of more than € 35 billion. Furthermore the material flood damage of 2002 is estimated to be higher than in any previous single year (Barredo, 2007). Indeed there is an increase in the frequency of years with very high damage produced by major flood disasters in Europe. Two years of the current decade, i.e. 2000 and 2002, are among the worst concerning losses in the last 36-year period (Barredo, 2007). Despite the relevance of the issue, there is a need for comprehensive, standardised and georeferenced information on floods. Relevant, accurate and up-to-date data is important for political and economic

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LB-X1-07-022-EN-N
February 2007

decision-making. In Europe, historical data on flood disasters are neither comprehensive nor standardised, thus making difficult long-term analyses at continental level. In this study we present the map of the major flood disasters of the last 56 years in the European Union. This work is a contribution towards a better understanding of the occurrence and distribution of major flood disasters in Europe.
Information from the Emergency Events Database (EM-DAT[1]) and NATHAN[2] of Munich Re has been assessed for the production of the map. See Barredo (2007) for an in-deep description of the methods and results of this study.

**Mapping historical flood disasters from global datasets**

A GIS database for flood disasters was implemented by using information from EM-DAT and NATHAN. Core information on floods was obtained from these two public data warehouses. Then a method for flood mapping was designed and carried out for the implementation of the GIS database. EM-DAT provides geographical information for flood disasters in two data fields i.e. location and river basin affected. The field location usually contains information identifying various geographical features and administrative units, for example counties, provinces, cities, villages, rivers and regions. In the case of NATHAN the geographical detail is even rough. This database still contains a small-scale map in which each flood event is represented with a point mark. Thus the problem arises as to how to map spatial events with only, at best, the administrative reference of their occurrence. Several approaches have been proposed to overcome the problem of flood mapping from global datasets e.g. FAO (2001), Verelst (1999) and Peduzzi et al. (2005).
The method proposed by FAO (2001) and Verelst (1999) consists in the definition of the name of the first administrative units reported in EM-DAT. After the definition of the administrative units hit by natural disasters, those datasets were used to produce disaster frequency or occurrence maps for various disaster types. These maps represent a first effort for mapping historical natural disasters for large regions. Nevertheless the results of this method are rather coarse. The approach of Peduzzi et al. (2005) is a more sophisticated method for flood mapping. Peduzzi and co-workers moved from an approach based purely on administrative units to the identification of flooded areas by using geo-physical models. Even if the method proposed by Peduzzi et al. (2005) does not address the precise location of the flood events for prevention and mitigation purposes, it represents an advance for mapping disastrous natural hazards using global datasets. The method consists in the definition of the watersheds affected by each flood disaster. In view of the recognised limitations of the method, Peduzzi et al. (2005) proposed using flood models based on elevation, slopes, land use/cover, type of soils and meteorological data for a more accurate mapping. Indeed this is the approach that we have used in this study.
We used the potential flood hazard map of Europe based on extreme water levels (De Roo et al. 2007) for mapping historical flood disasters using global datasets. The information on floods coming from EM-DAT and NATHAN were integrated into a GIS database. Following the approach from Peduzzi et al. (2005) the information from EM-DAT and NATHAN were mapped with the support of the potential flood hazard map of Europe (De Roo et al. 2007) and ancillary data from the Geographical Information System of the European Commission (GISCO). Thus, each geo-referenced record in the database has linked information from EM-DAT and NATHAN.

**References**


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[1] EM-DAT: The OFDA/CRED International Disaster Database - Université Catholique de Louvain, Brussels, Belgium. Available at: http://www.em-dat.net

[2] Available at: http://www.munichre.com