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HYDRATE

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Cereve — Centre d'Enseignement et de Recherche Eau Ville Environnement

The European research project HYDRATE on flash floods (2006-2008)

E. Gaume[1], M. Borga[2], G. Delrieu[3], P. Bernardara[1]

[1] ENPC-CEREVE (gaume@cereve.enpc.fr), [2] Univ de Padoue, [2] LTHE

Abstract :

HYDRATE is a specific targeted research project supported by the European community within the 6th framework program for the period (2006-2009). Its main objective is to improve the scientific basis of flash flood forecasting by extending the understanding of past flash flood events, advancing and harmonising a European-wide innovative flash flood observation strategy and developing a coherent set of technologies and tools for effective early warning systems.
To this end, the project includes actions on the organization of the existing flash flood data patrimony across Europe. The observation strategy proposed in HYDRATE has the objective to collect flash flood data by combining hydrometeorological monitoring and the acquisition of complementary information from post-event surveys. This will involve a network of existing Hydrometeorological Observatories; all placed in high flash flood potential regions. HYDRATE will develop a freely-accessible European Flash Flood Database to make available the collected hydrometeorological data to the international research community.
The Partners include nine universities and seven government research centres from eight Member States, one Associated Candidate State and three third-countries. Three French research centers, members of the French Cevennes-Vivarais Hydrmeteorological observatory, are taking part to this project: LTHE, ENPC-CEREVE and Cemagref. This project has just begun. The main tasks of this projects as well as preliminary results will be presented.

I. Structure of the project:

1) The work program

HYDRATE is the first European research program specifically focused on the hydrological aspects of flash-floods. It effectively started in December 2007. Its main objectives are twofold: (i) increase our knowledge on these specific floods in extending the understanding of past events and developing observation strategies , (ii) testing innovative early warning technologies. The 3-year work program is organized 11 work packages (see figure 1). The core of the project is devoted to the observation of new events (WP3, WP4) and the collation and analysis of data on past floods (WP1, WP2). The collected data will be compiled and analyzed (WP5 and 6) to reach the first objective of HYDRATE (increase the knowledge on flash-floods) and gathered into a European archive (WP7). Finally, the available data on flash-floods will be used to develop and test models and/or procedures for flash-flood early warning (WP8).

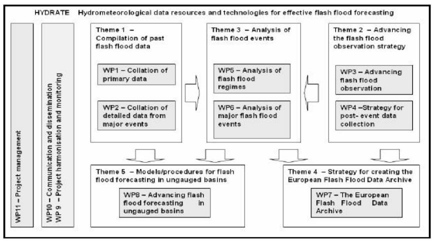

Figure 1: Structure of the HYDRATE project.

2) The partners

The HYDRATE project involves 14 partners from 9 different European countries and 3 non-European partners from China, South Africa and the USA. It relies on six existing or in project European hydro-meteorological observatories (figure 2).

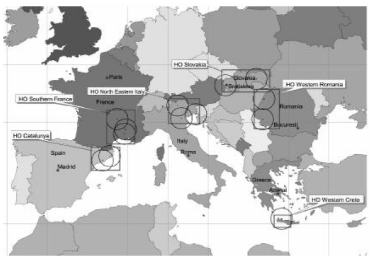

Figure 2: Locations of the six HYDRATE Hydrometeorological Observatories. Radar sites and radar coverage (at 120 km) are also shown.

3) The project schedule

HYDRATE will last 3 years (table 1). The collation of available data on past events (WP 1 and 2) on which some other WP rely (WP 5-8), will be the first conducted tasks.

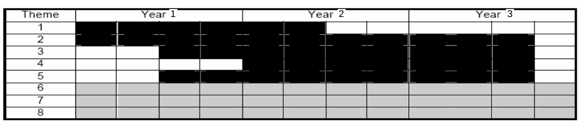

Table 1: Overall project time table

II. A focus on WP1:

1) The objectives

The magnitude and frequency of flash-floods (floods induced by thunderstorms of limited areal and temporal extent) may vary significantly from one region of Europe to another for various reasons: the climate and corresponding rainfall hazard are spatially variable and, according to previous studies on flash floods, the response of the watersheds to a rainfall event depends on their characteristics (especially their geology) and on their antecedent moisture conditions. This first work package aims at collating and compiling primary data (see the template example) about, at least, the 30 major past events occurred in each of the regions covered by the partners during the last 5-6 decades. The collected data will feed an inventory of European flash flood events which will be compared to existing world largest flood inventories (see figure 3). It will be used to build flood envelop curves for the various considered regions and to produce maps indicating the location and the magnitude (magnitude index based on the envelop curves) of the reported floods to assess the spatial heterogeneity of the flash-flood risk over Europe.

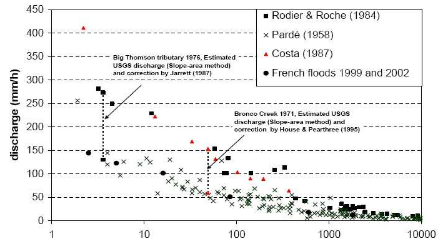

Figure 3: Inventories of the most extreme reported flood peak specific discharges as a function of the upstream watershed area .

2) The WP1 data collation template

The mandatory data appear in yellow and the optional data in blue in the template.

Section Identification	1
Event code	code
Date of the event	date
Cross-section name	texte
Cross-section Longitude (World Geodetic System 84)	num
Cross-section Latitude (World Geodetic System 84)	num
Cross section altitude [m]	num
Basin data	
Minimum information	
Watershed area [km2]	num
Estimated time of concentration [h]	num
Additional Data- Optional fields	
Minimum elevation [m]	num
Maximal elevation [m]	num
Average elevation [m]	num
Average basin slope	num
Glacial Areas [%]	num
Land use	text
Soils	text
Average soils deepness [m]	num
Geology	text
Location map	link
other geographical document	link
other geographical document	link
Discharge data	
Minimum information	
Peak discharge [m3/s] Probable	num
Estimation method	
Discharge estimation quality rate	
Regulated stream	
Additional Data- Optional fields	
Peak discharge [m3/s] Max	num
Peak discharge [m3/s] Min	num
10 year return period peak discharge [m3/s]	num
Sediment transport	
Flood duration [h]	num
Flood hydrograph	link
Past- historical floods	link
Attached file 1 (report on the estimation)	link
Attached file 2 (pictures of the cross-section)	link
Attached file 3 (cross-section survey)	link
Other attached file	link

Rainfall data	
Minimum information	
Maximum total accumulated point rainfall [mm]	num
Total Rainfall duration [h]	num
Number of raingauges	num
Number of raingauges within the basin	num
Quality of data	
Size of rainfall event	
Hydro-Meteorological type of event	
Additional Data- Optional fields	
Maximum intensity over time of Conc. [mm/h]	num
Initial wetness status	
Rainfall spatial distribution map	link
Radar data	link
Other attached files	link
Climatic data	
Minimum information	
Average annual precipitation [mm]	num
Observation period [years]	num
Additional Data- Optional fields	
1 years return period hourly rainfall [mm]	num
10 years return period hourly rainfall [mm]	num
100 years return period hourly rainfall [mm]	num
1 years return period daily rainfall [mm]	num
10 years return period daily rainfall [mm]	num
100 years return period daily rainfall [mm]	num
Intensity Duration Frequency curve	link
Monthly distribution of precipitation	link
Temperature Data	link
Damages	
Minimum information	
Number of casualties	num
Additional Data- Optional fields	
Circumstances of fatalities	txt
Economical Damages [€]	num
Report on the damages	link
Related documents	
Photos	link
Attached Reports	link
References list	link

Lists Used in the sheet

Estimation method	Quality of data	Regulated during flood	Sediment transport	Initial wetness status	Size of rainfall event	Type of event
Direct current- meter measurement	1 - Very good	Yes	water flow	very dry	Localised storm	Storm
Calibrated stage-discharge relation	2 - Good	No	mud	in recharge	Generalised storm	Storm with snow-melt
Reconstruction from reservoir operation	3 - Fair		concentrated flow	very wet		Strom with hail fall
Manning Strickler formula estimation	4 - Poor					
Slope conveyance method						
Hydraulic 1D simulation						
Hydraulic 2D simulation						
Orifice laws						
Critical flow assumption						
Surface velocity estimation						
Erosion- sediment clues						
Other						
Unknow						