TECHNISCHE UNIVERSITÄT DRESDEN
Fakultät für Forst-, Geo- und Hydrowissenschaften

01. Juli 18 - 1 Uhr
LANGE NACHT DER WISSENSCHAFTEN
Ein Projekt des Netzwerks Dresden - Stadt der Wissenschaften

FLOODmaster
1st Focus Workshop 2005

Risk Management of Extreme Flash Floods

Sources: Meteorological and Hydrological Aspects - an Event Perspective of the Müglitz Flood 2002 -

Weather Situation

In July and August four exceptional low pressure systems developed. Long-lasting precipitation led to at least saturated soils before the heavy rainfalls occurred mid of August. A new – fifth - low pressure system named "Ilse" originated on 08 August 2002. The cause of the flood disaster was the so called Genua cyclon, an air mass system which loads up to saturated status with heat and moisture over the Mediterranean Sea.

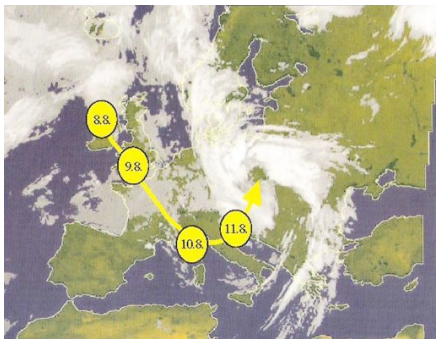

Fig. 1: Infrared Satellite Picture 10 to 12 August 2002 including Ground Low Pressure Area „Ilse" (Ref.: DWD, Offenbach/M.)

"Ilse" went straight up northeast from the Alps Region to Northern Europe, typical for the Vb weather pattern. It reached Saxony in the night of 11 to 12 August and caused long-lasting and highly intensive precipitation - reinforced by the orographical effect of the Eastern Ore Mountains. The low pressure system got stationary and the rainfall focused in one area for more than 30 hours.

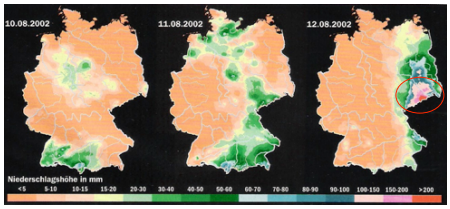

Fig. 2: Daily Precipitation and Rainfall Distribution for Germany 10 to 12 August 2002

Weather Prognosis

A warning forecast from the German Weather Service (DWD) on Sunday, 11 August 2002, announced rainfall of 40 up to 80 mm in Saxony for Monday. Sunday night a weather warning was declared, but the rainfall prognosis never was revised.

Private weather services had similar prognosis.

Meteorology

The total of 312 mm as 24-hour precipitation observed at DWD weather station Zinnwald–Georgenfeld was the highest rainfall amount ever measured in Germany before. This is close to the physical possible maximum precipitation.

Rainfall intensity and distribution are shown in fig 3 and fig. 4.

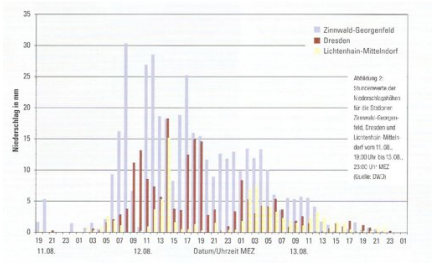

Fig. 3: Hourly Rainfall Amount for Zinnwald-Georgenfeld, Dresden, and Lichtenhain-Mittelndorf 11 to 13 August 2002 (DWD)

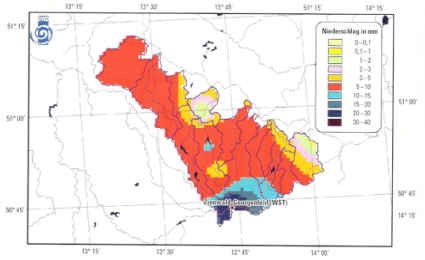

Fig. 4: Distribution of Rainfall on 12 August 2002 6 to 7 MET for Part of the Eastern Ore Mountains (DWD)

Hydrology

A few hours after the peak in precipitation intensity the water level of the rivers rose. The dam of the Glashütte flood control reservoir broke. The total water amount led to a flash flood with huge bed load and material transfer and at least tremendous damages first in the upper Müglitz basin due to the missing natural or technical retention potentials.

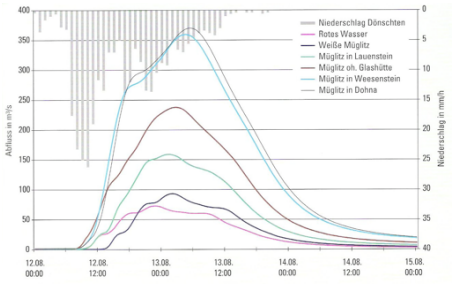

Fig. 5: Rainfall at Dönschten and Discharge Hydrographs for two Tributaries and the Müglitz River as well at Different Gauges (LTV)

The fast increase of runoff at the beginning of the flood is caused by the tributaries of the sub-catchments "Weiße Müglitz" and "Rotes Wasser". The intensity of the flood event was increased by overlap of the two runoff peaks.

Within six hours the water level increased about 1 meter.

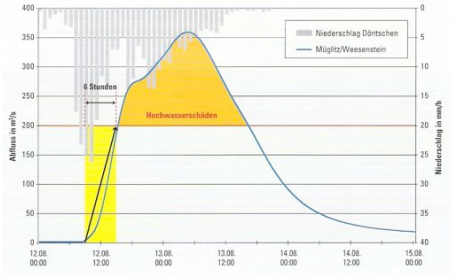

Fig. 6: Hydrograph of the Müglitz River near Weesenstein; Response Time starting from when Damage arose

International Teaching Module
FLOODmaster
Integrated Flood Risk Management of Extreme Events

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