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Geneve 22.-23. Mai 2009

Flood Warning and Mitigation in Internationally Shared River Systems

– Experiences in the Elbe River Basin –

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The Elbe-Labe
1 094 km
148 268 km²

Germany 62,5%
Czech 33,7%
Austria 0,6%
Poland 0,2%

Flood categories

Winter and spring floods

1845, 1981, 2000, 2006

Summer floods

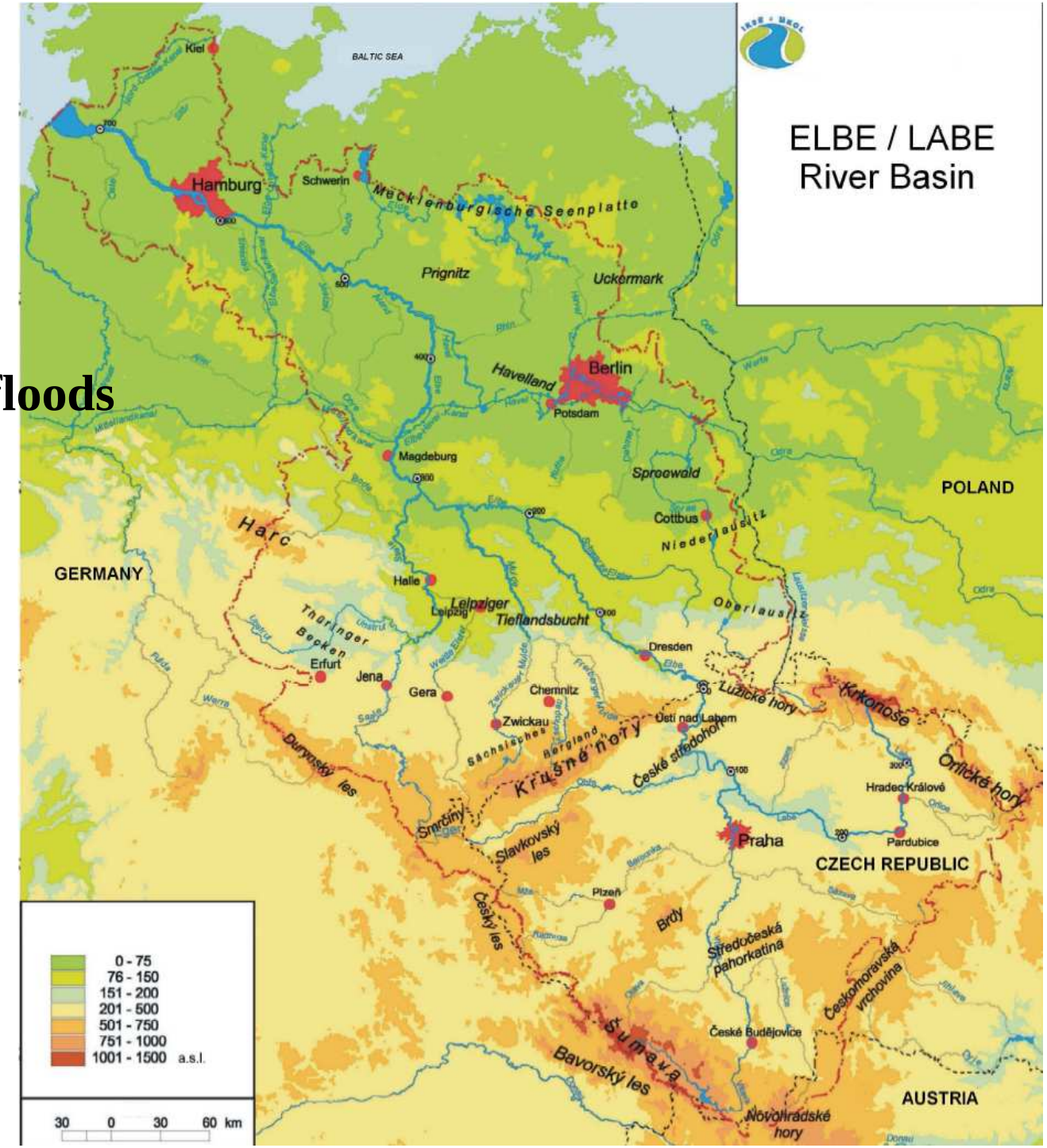
1890, 1981, 1997, 2002

Flash floods

1979, 1987, 1996, 1998

Ice floods

1982, 1985



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Cooperation in the Elbe River Basin

The International Commission for Protection of the River Elbe (ICPE-IKSE-MKOL)

established in 1990 – Czech Republic, Germany, Eropean Union, (Austria, Poland)

Main tasks

- to enable water usage, first of all from river bank infiltration for drinking water supply

- to enable usage of water and sediments for agriculture purposes

- to achieve a natural ecosystem with appropriate amount flora and fauna kinds

- to decrease a pollution load of the North Sea from the Elbe river basin

- to improve flood protection in the Elbe river basin (added in 1997)

- to coordinate implementation of the Framework directive on water policy(added in 2000)

- to coordinate implementation of the Flood directive (added in 2007)

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Flood Action Plan of the Elbe River Basin (FAP)

prepared by WG Flood and accepted in 2003

-Analyses of hydrological aspects of floods and their forecasting

-Principles for increasing of retention capacity of catchment by measures in agriculture, forestry and infrastructure

-Study of former inundation area and possibility of their renewal

-Study of technical flood protection measures (polders, levees)

-Study of the influence of big reservoirs on flood regime on the Elbe

-Modernization of gauging network and data transfer system

-Conception of the common international flood forecasting system in the Elbe basin (CZ – DE federal and land authorities)

FAP realizad by national competent authorities (CZ, DE land authorities)

FAP is every two years checked and updated – ICEP

FAP is followed and supported by other project (eg. ELLA harmonization of spatial planning and land use principles)

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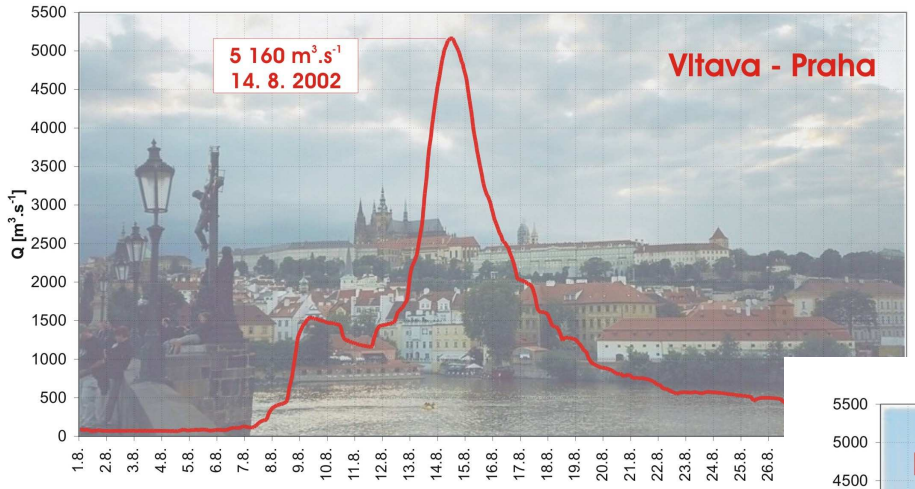
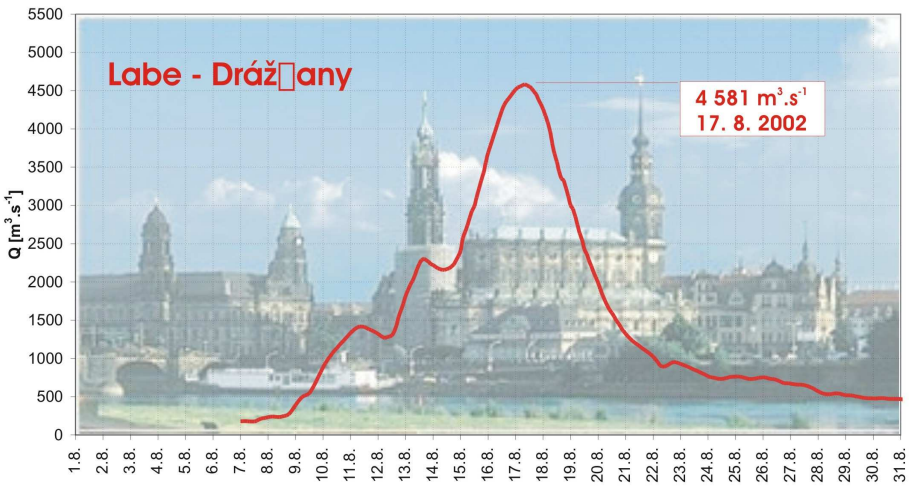
Flood in August 2002



Common Czech and German assessment of the 2002 flood in the Elbe basin was done and incorporated into the Flood Action Plan (2003)

Extremity of flood (return period)
1000 y in small rivers in South Bohemia and East Germany
500 y in the Vltava (Prague)
200 y in the Elbe



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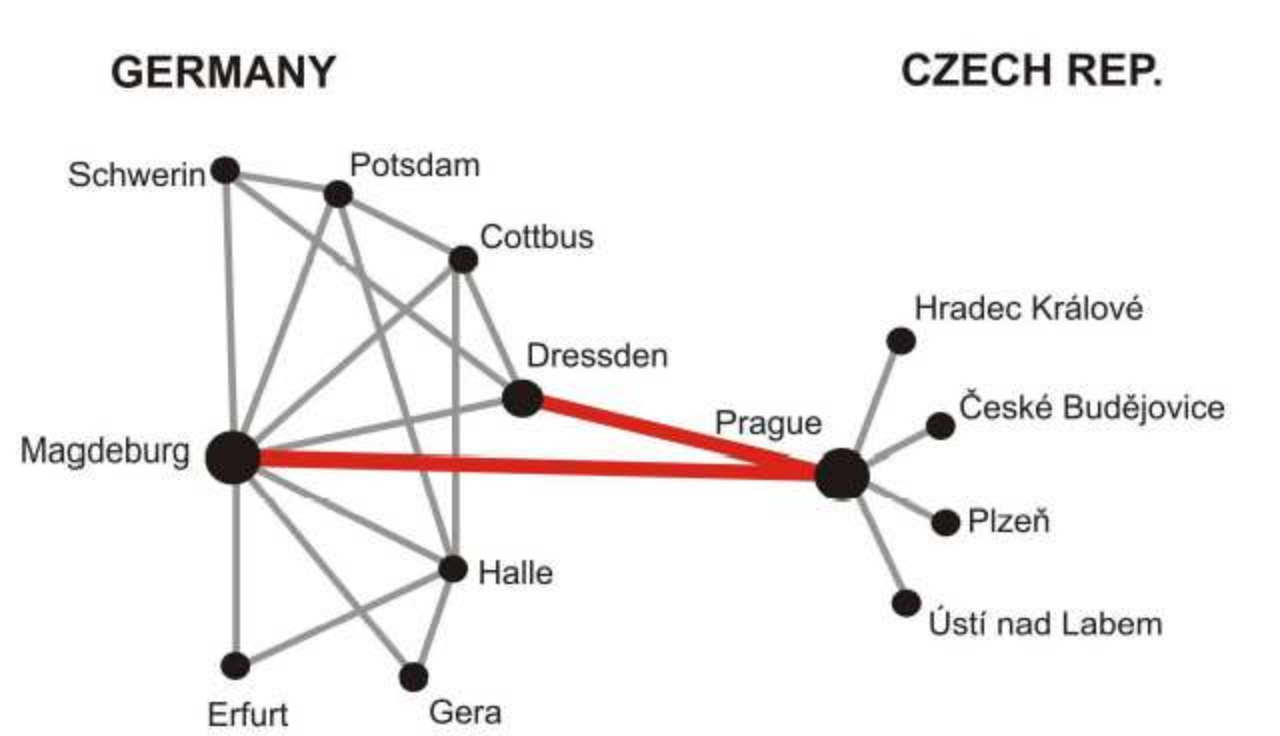
Common Flood Forecasting System Structure



WSA-waterways administration
LfUG-land administration

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Data and Information Exchange

based on bilateral agreement given on the level of governmantal representatives

Czech Republic → Germany

water levels, discharges, precipitation, hydrological forecasts

web sites http://hydro.chmi.cz/hpps http://voda.gov.cz

300 watergauges, 80 reservoirs, 52 forecasting sites (measured data are updated hourly)

selected set of data is sent using ftp server (twice a day, in flood hourly)

Germany → Czech Republic

water levels, precipitation in border areas

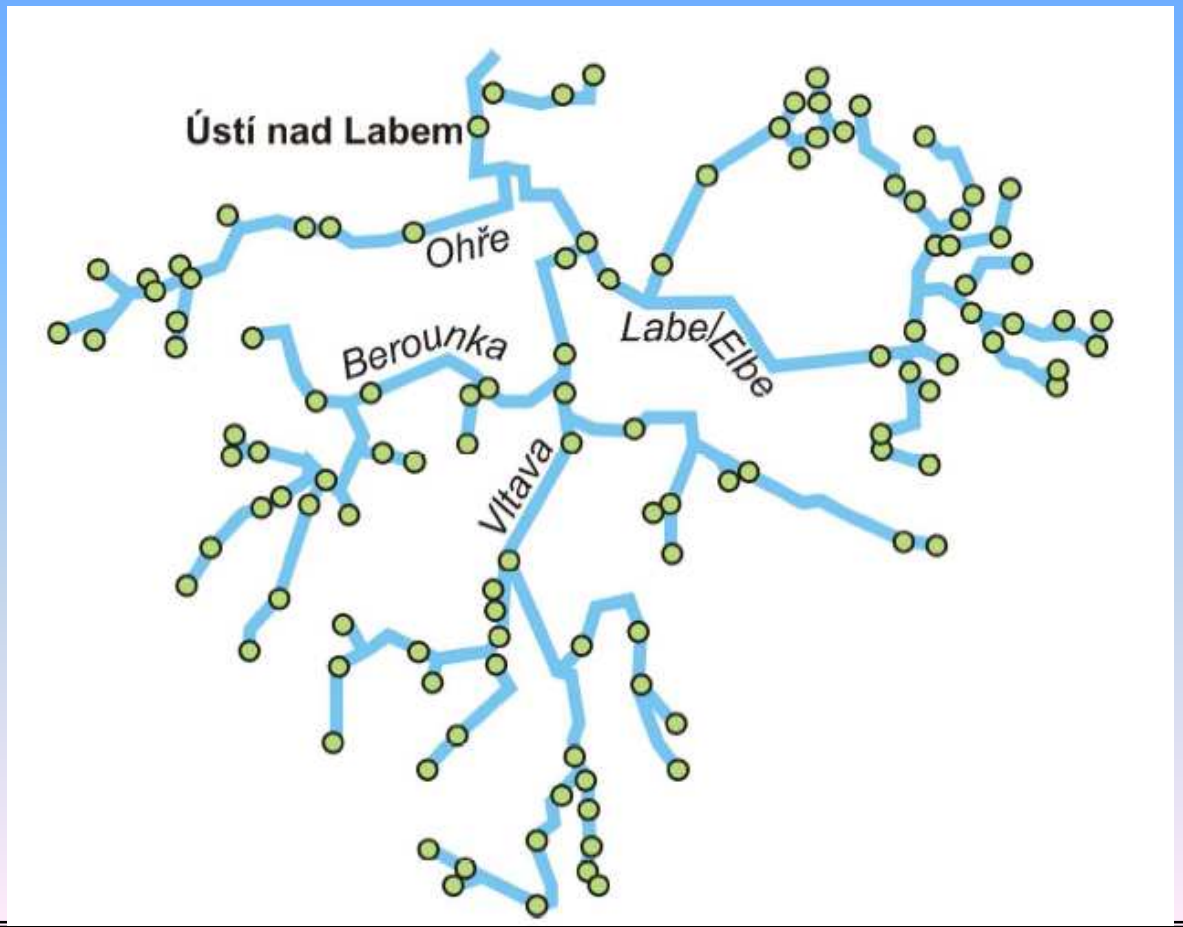
Flood Forecasting Methods – Czech part

AQUALOG system

QPF as input
snow model SNOW17
rainfall-funoff SAC-SMA
channel routing
concerning influence:
reservoirs operation

Forecast lead time:

48 hours standard
5 days estimation



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Flood Forecasting Methods - Germany

WAVOS model

1-D model
concerning influence:
flood plains,
levees and polders

Forecast lead time:

2 days in Dresden
8 days in Geesthacht

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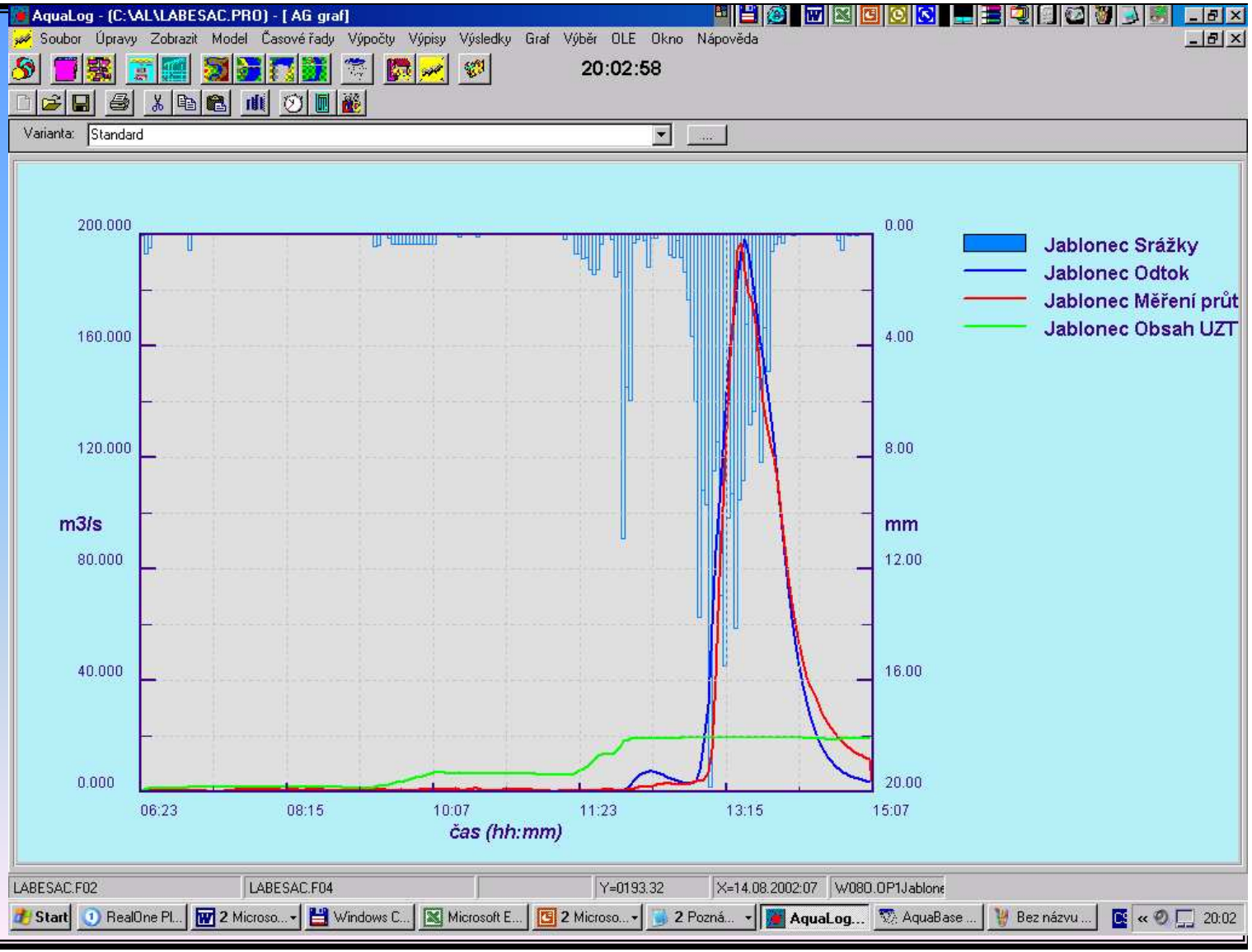
Example

Output from AQUALOG model



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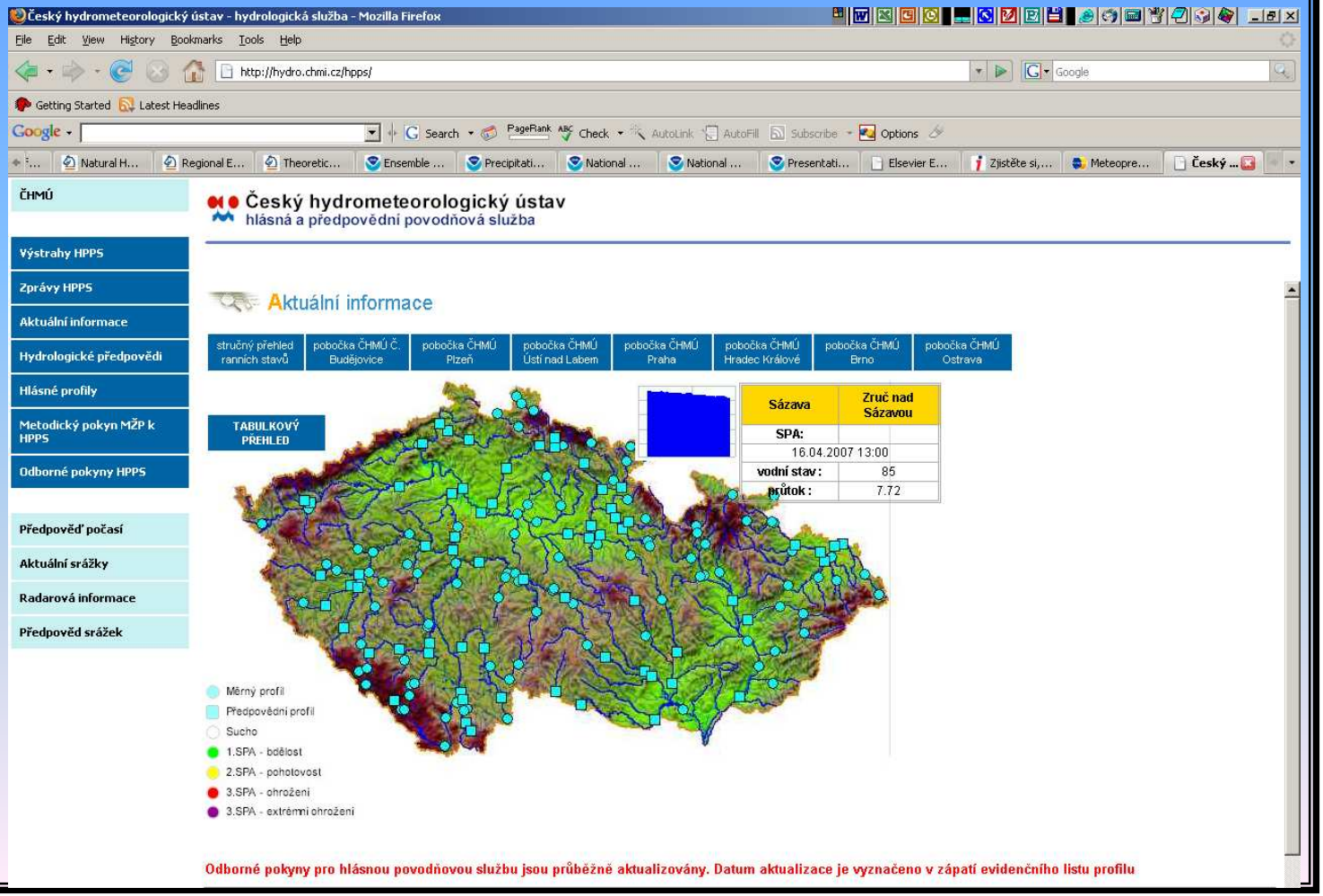
Flood Forecasting and Warning web site

Main page

Gauging sites overview



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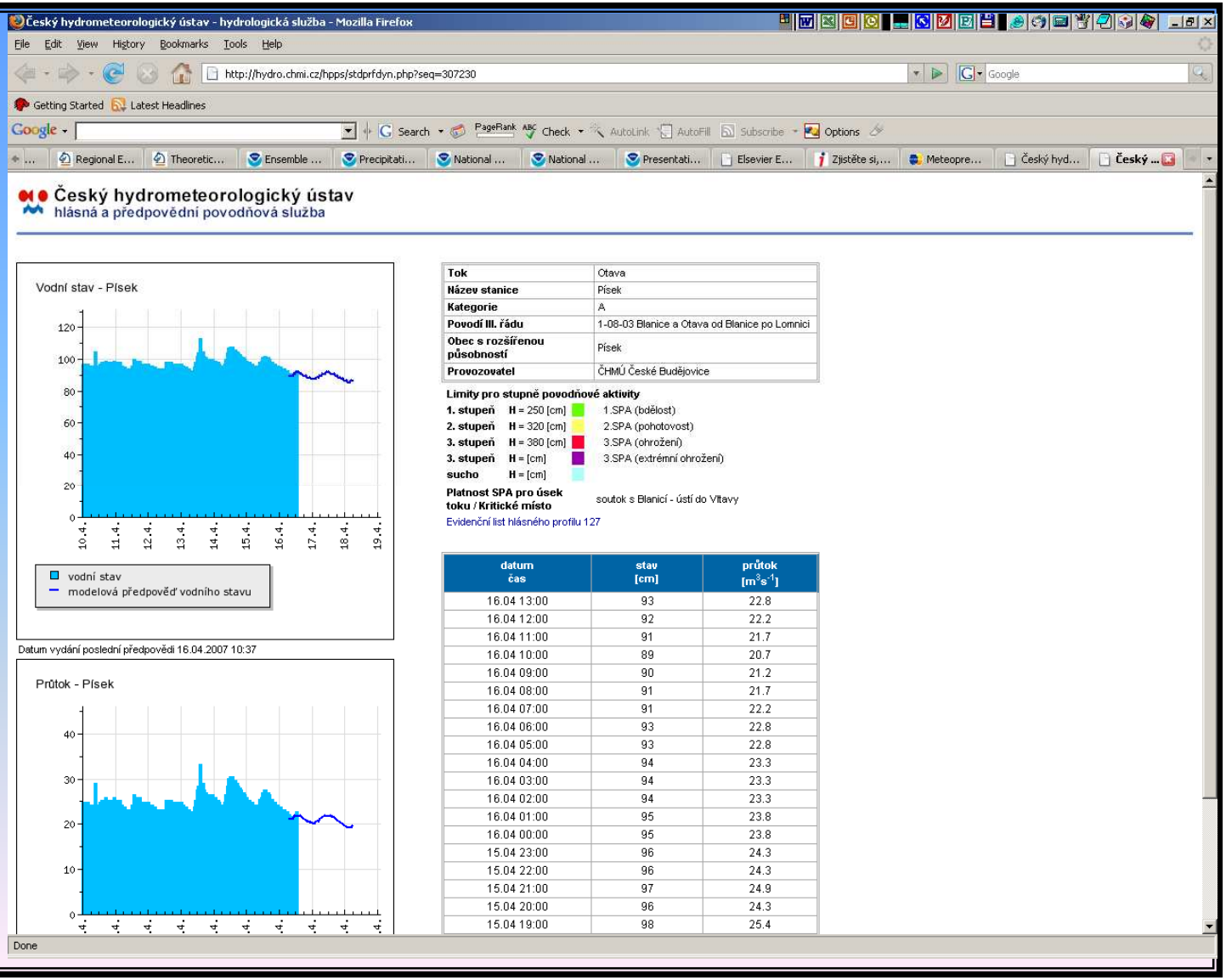
Hydrological forecast

-water level

-discharge



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Flood Forecasting and Warning WEB

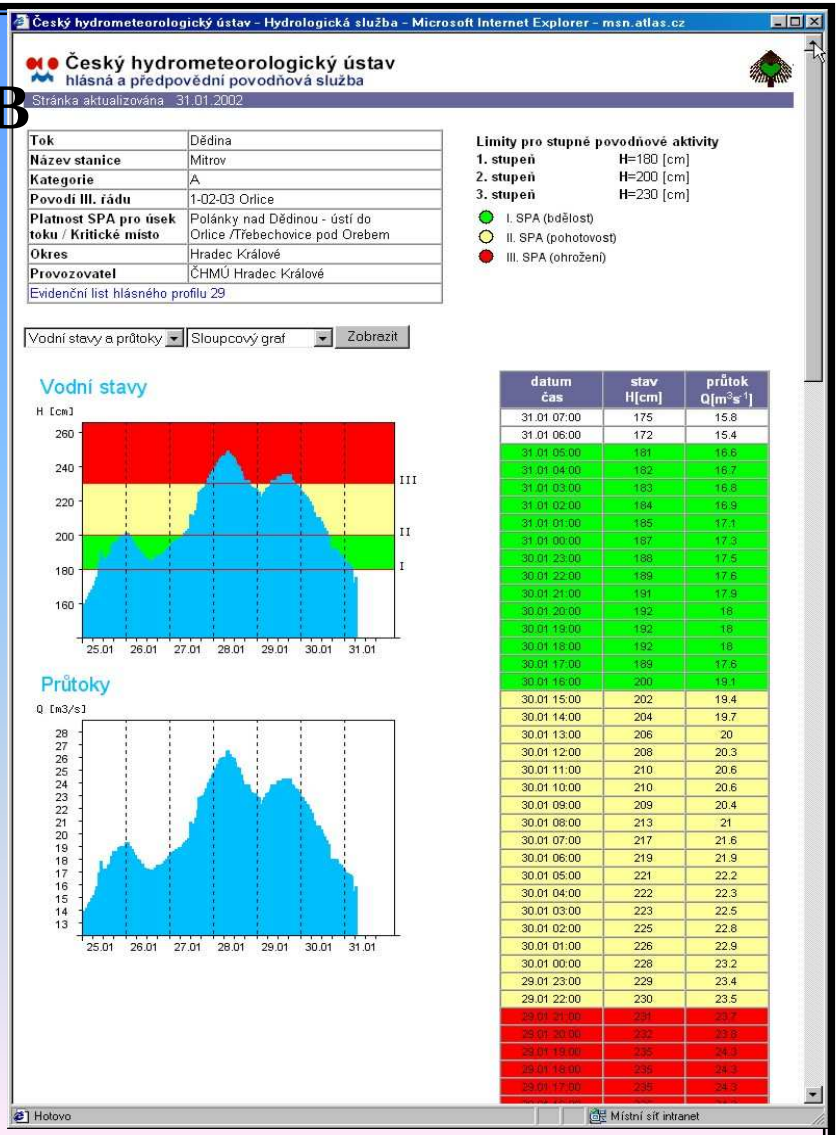
Flood warning limits - flood danger

1st degree (green) - low

2nd degree (orange) - medium

3rd degree (red) - high

4th degree (violet) - extreme



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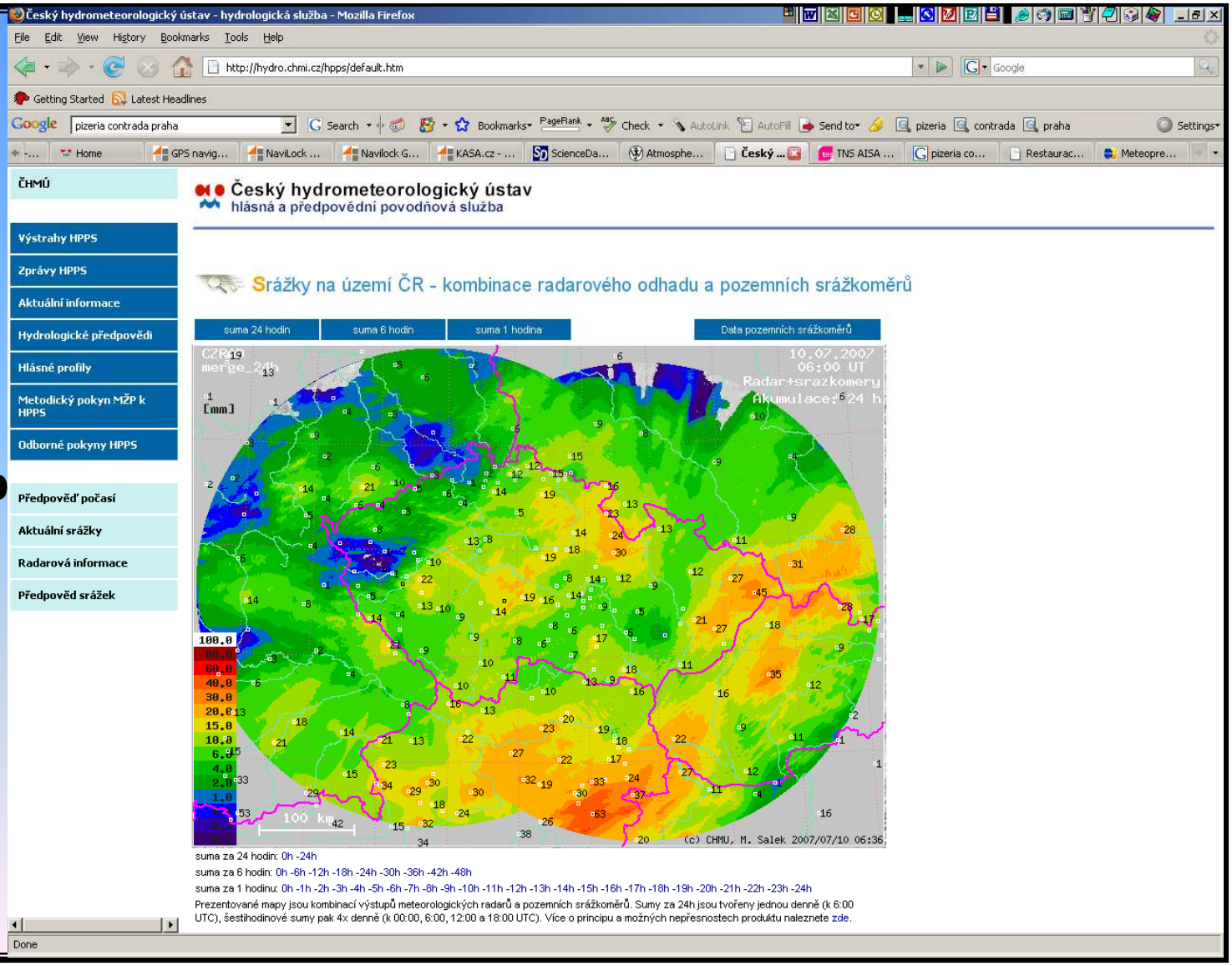
Precipitation information on WEB

merged from radar and gauging statio



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What elements are pushing flood protection systems forward?

- **extreme situation occurence = need of measures**
  real floods show actual needs, problems and week points (1997, 2002, 2006)
- **political will of decission sphere to support a development and realization of such systems (technicaly, financely)**
- **cooperation and personal contacts of involved bodies**
  (research – development – operation)
  (meteorology – hydrology – water bodies – users)

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Flood 1890
HQ 100 y

Centre of Prague

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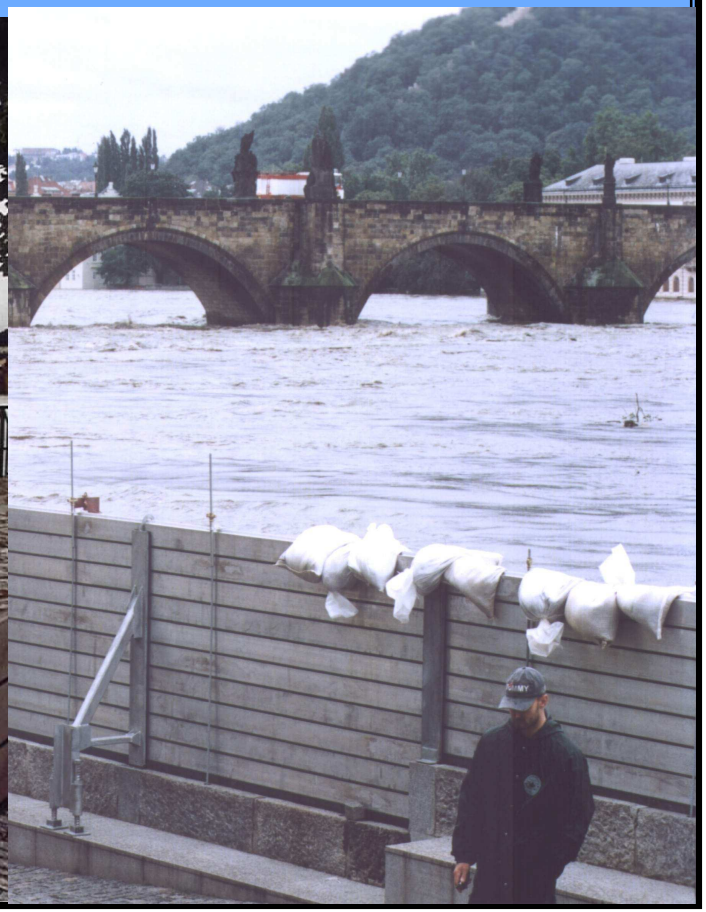
Centre of Prague in 2002 flood

HQ 500 y



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Centre of Prague in 2002 flood

water level +1 to +1,5 m

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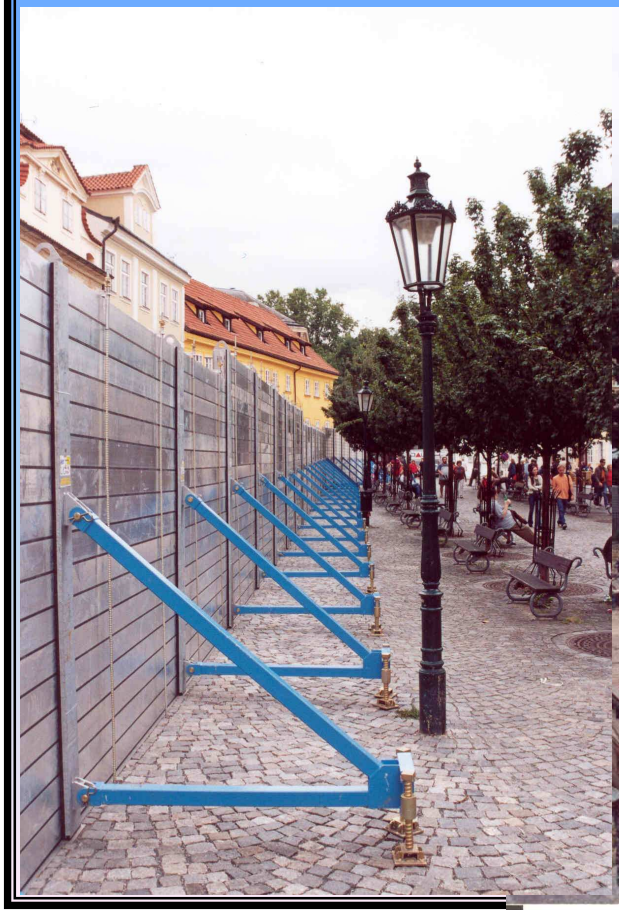
Centre of Prague in 2007



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Centre of Prague in 2007

Area for cooperation improvment

- a) There is still a room for technical improvement of forecasting procedures in terms of their higher reliability and lead time prolonging. It seems to be ongoing process linking with increasing level of knowledge and technical facilities.
- b) Close linkage among forecasting offices and improvement of personal contacts among their staff is still desirable. There are remaining language troubles in oral contact and maybe English as a common communication means could be introduced.
- c) In the future a common international forecasting office with responsibility of the whole basin could be established, as a base for implementation of common regional forecasting systems, eg. EFAS or regional flash flood guidance, in the Elbe basin.

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Thank You for Your Attention

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