



НАЦИОНАЛЕН ИНСТИТУТ ПО МЕТЕОРОЛОГИЯ И ХИДРОЛОГИЯ

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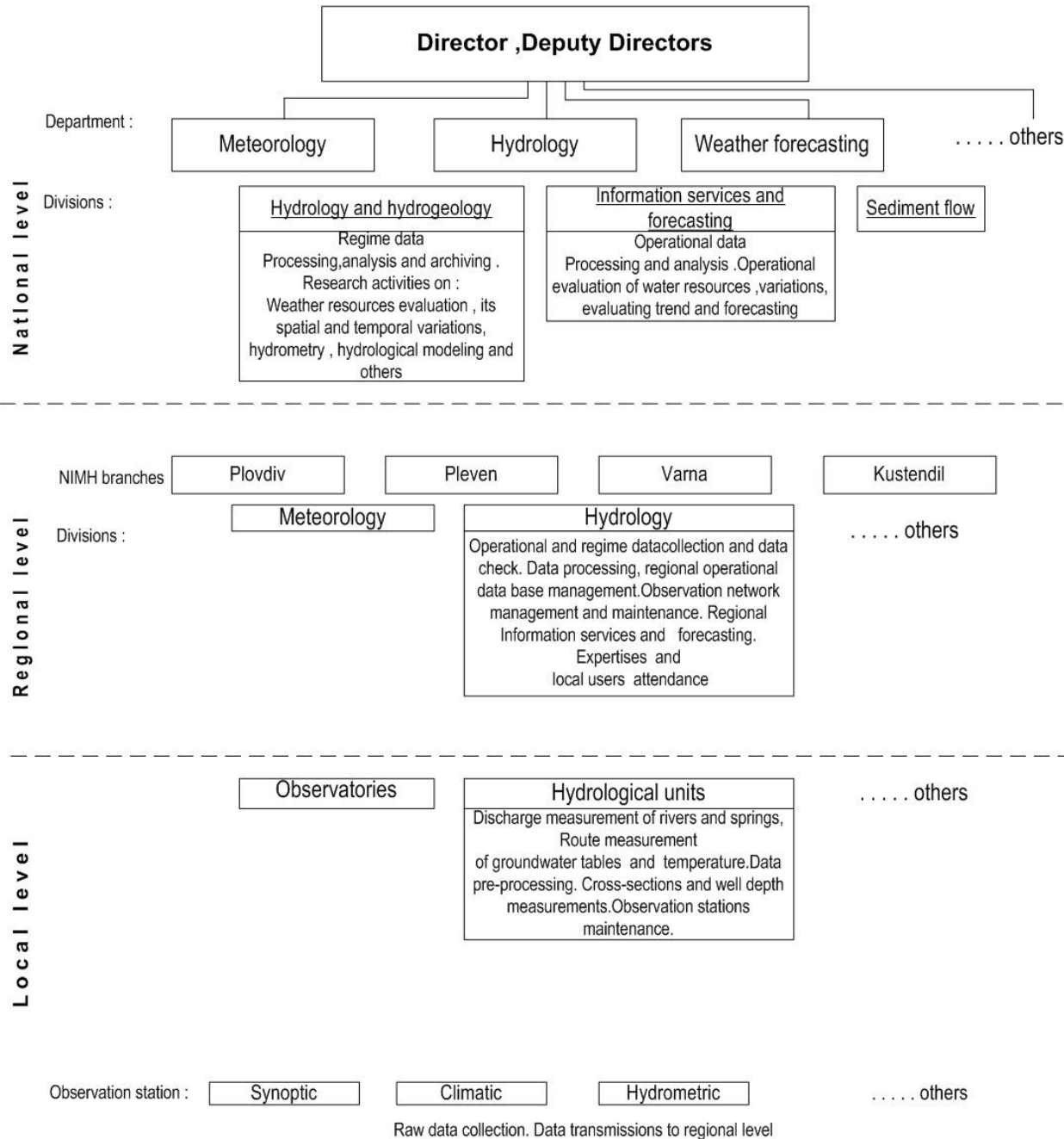
The Floods in Bulgaria in 2005, challenges and lessons learned

- *About NIMH as hydromet service and expert body*
- *The floods in 2005*
- *Was this an extraordinary event*
- *Rainfall and hydrological forecasts*
- *Lessons learned, present needs of NIMH to serve better the society*
- *Some photos*

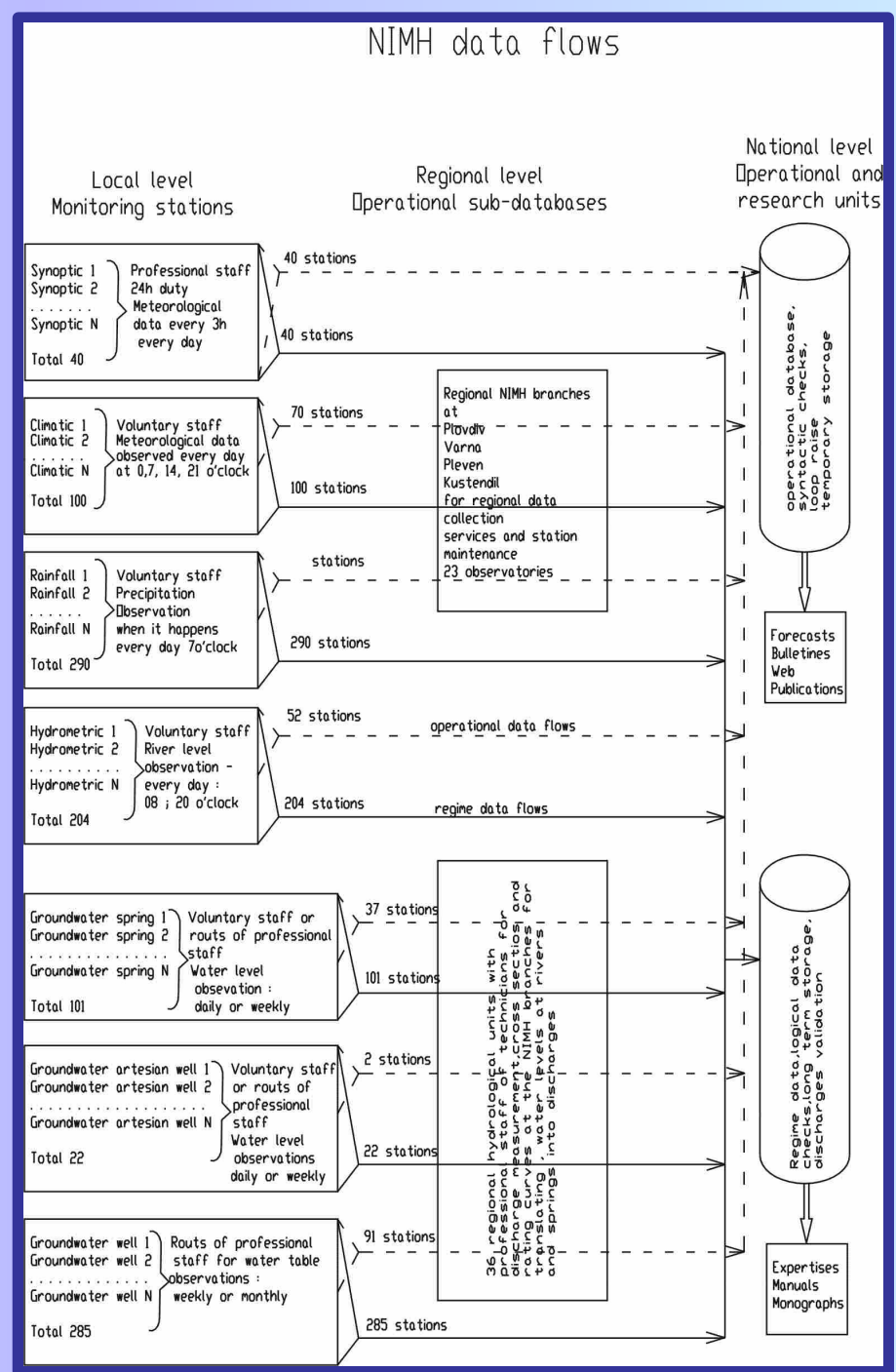
NIMH as hydromet service and expert body:

- *Structure : Headquarters in Sofia, Dept. of Meteorology, Hydrology, Weather forecasting, Chemical composition of Hydrosphere and Atmosphere, Information centre, others.*
- *Four branches in Plovdiv, Varna, Pleven, Kjustendil*
- *Observatories and hydro-meteorological stations all over the country*
- *Represents Bulgaria in the World Meteorological Organisation, EUMETSAT, EcoMet*
- *Provides a wide range of expertise in the field of hydrology and meteorology, participates in a number of projects financed by the EC 4,5,6th FP, Phare, Intereg, NATO, World Bank and other international and national donors*

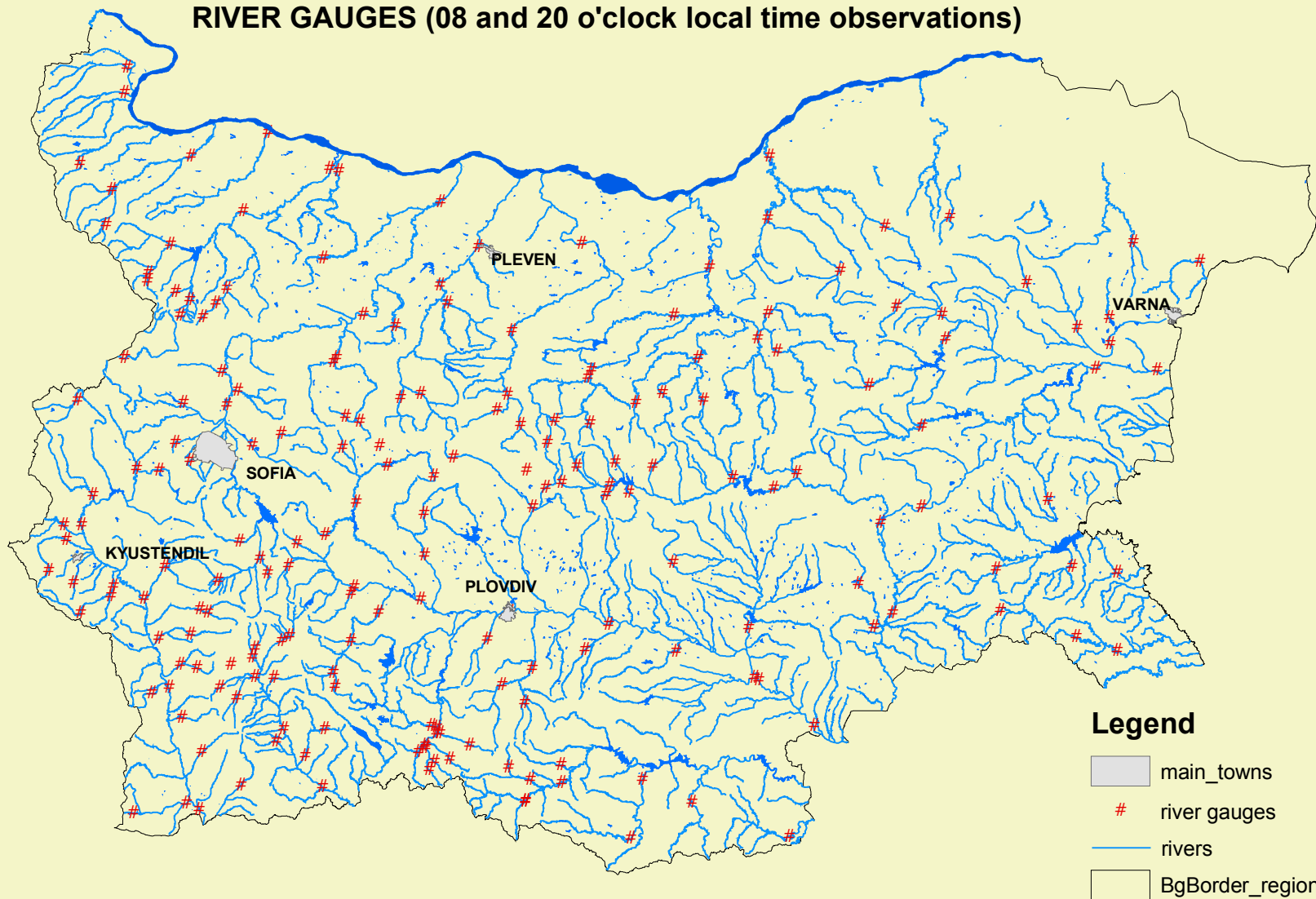
Principal scheme of The NIMH (Hydrology and hydrogeology)



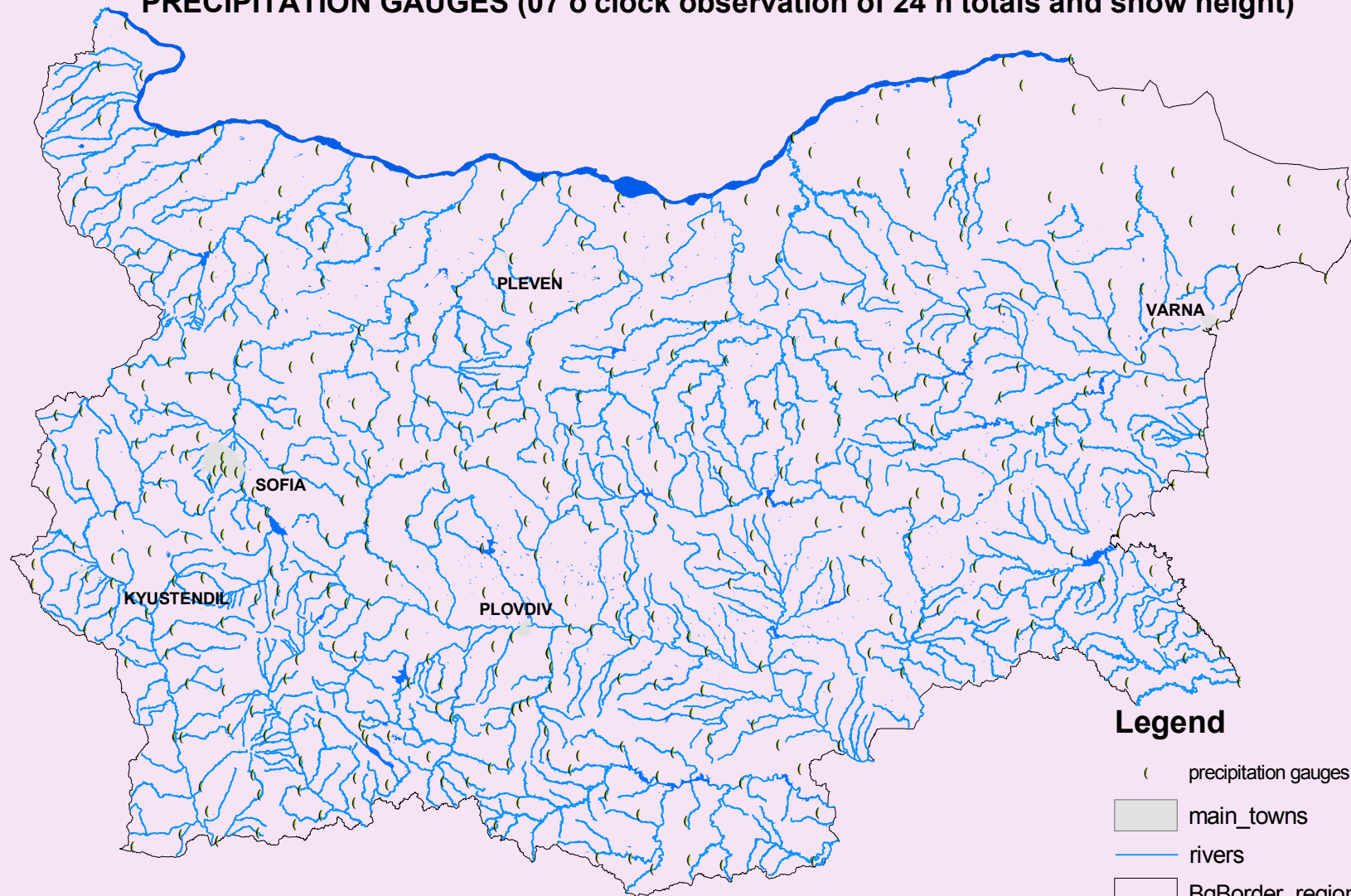
The scheme shows briefly the real time data flow (for operational purposes) and the off line data flow (for resource estimation purposes and other expert tasks)



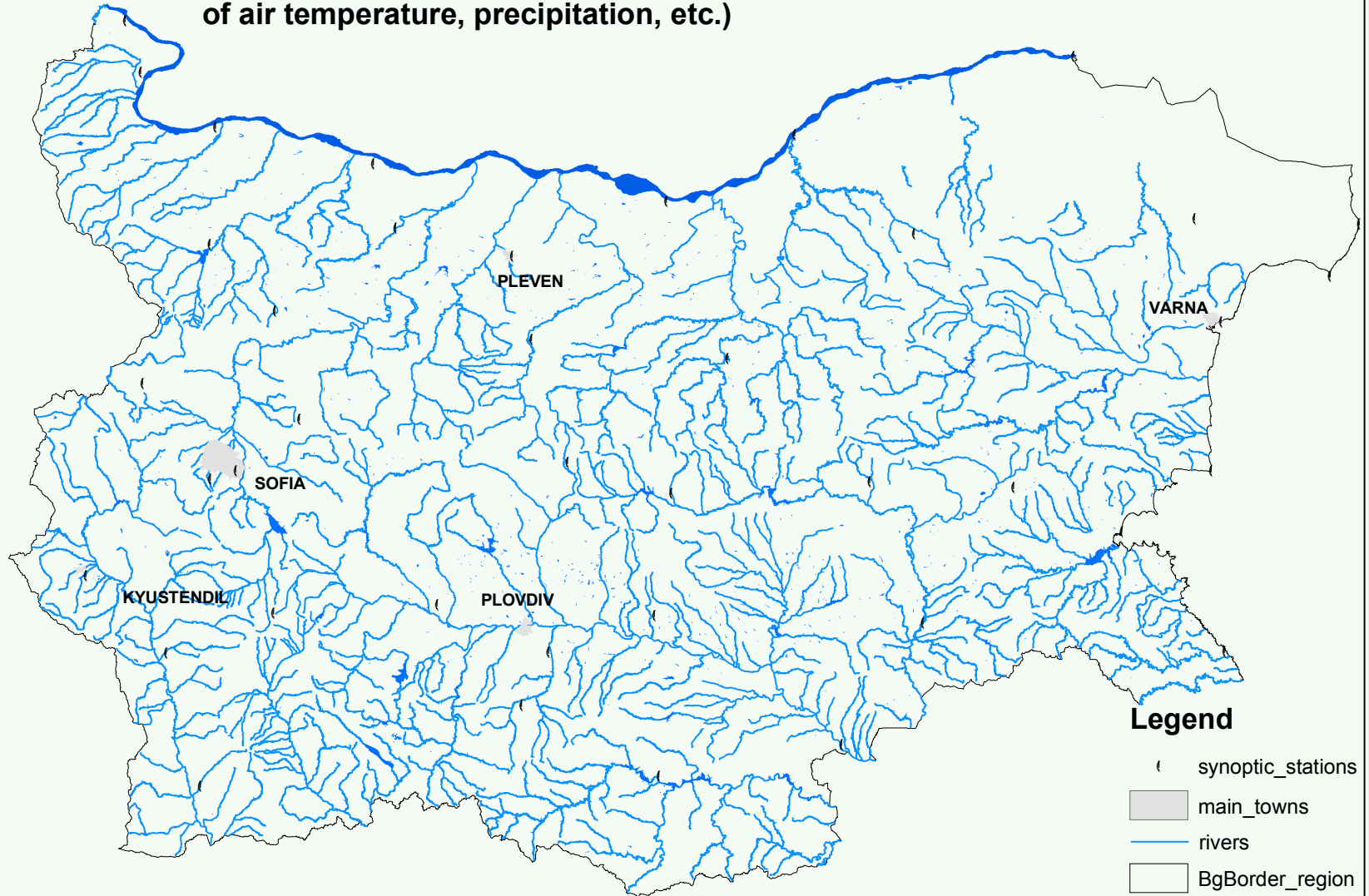
RIVER GAUGES (08 and 20 o'clock local time observations)



PRECIPITATION GAUGES (07 o'clock observation of 24 h totals and snow height)



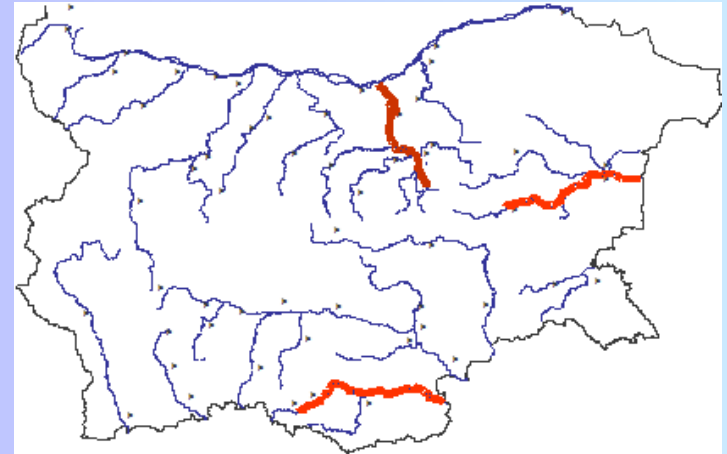
SYNOPTIC STATIONS (3 hourly observations with real time data transmission of air temperature, precipitation, etc.)



The floods in 2005

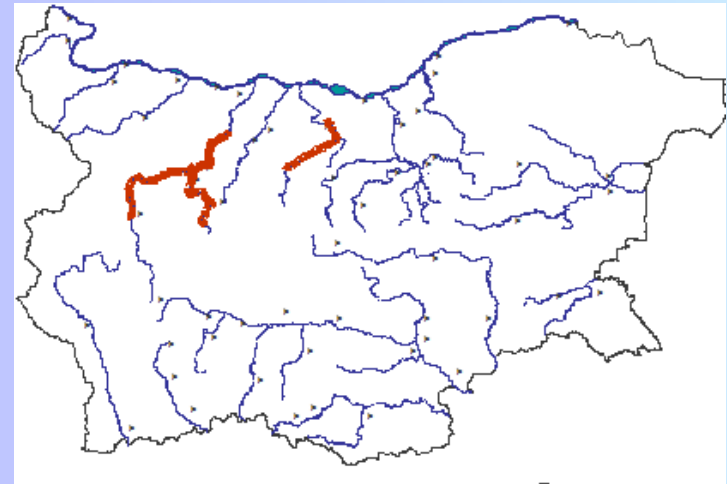
14-28.02.2005

Snow coverage - 15.20 cm, up to 50cm, sstormy wind - 30 m/s, rainfall 80-150 mm/day. Water level raise:15 – 16.02 at Arda 100-300 cm, Yantra and Kamchia 200-400 cm; Overflow of Ivaylovgrad dam about 800 m³/s. Big flood in Turkey.



25-30.05, 06-08.06.2005

Convergent zone between high pressure field and Maloasian cyclone with a high index of fluctuation and the cyclone “Iskar” – south of the Alps, forming at noon and evening every day massive convective systems. Frequent intensive precipitation 50-180 mm, daily. The soils became oversaturated in large areas hazardous floods in Sofia region.



01-04.07.2005

Cyclone “Targovishte” from the northwest, cold front, convective systems - torrential rainfalls. Pathways generated by different mechanisms - overlapping.

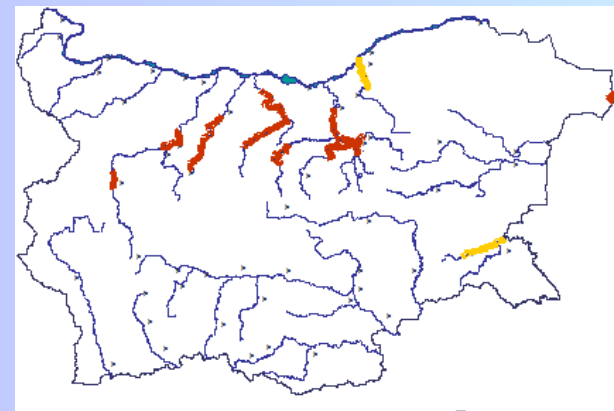
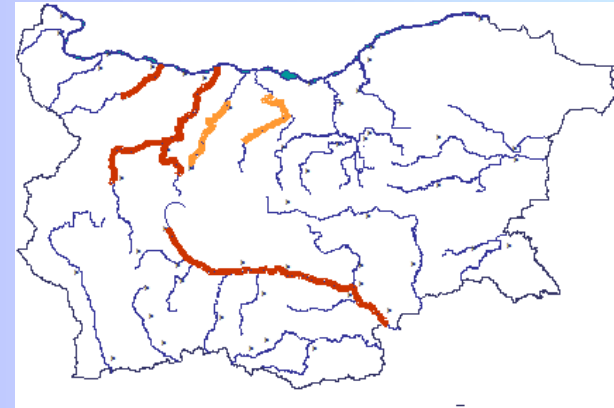
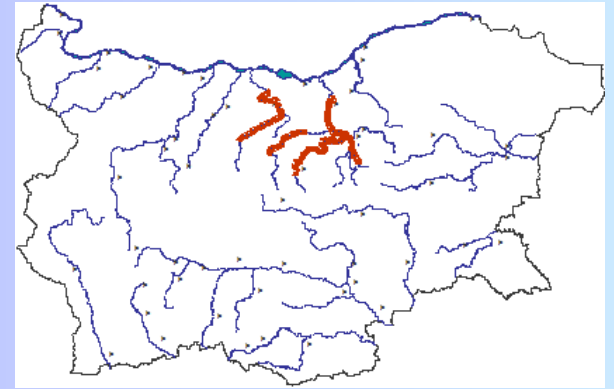
Daily rainfall up to 250 mm. For the period between 2-14 July in the basins of Osam and Yantra rivers rose more than 8 m.

04-08.08.2005

The most devastating cyclone “Ihtiman”, relatively static front line with intensive rainfalls. Convection magnified by the relief. For the period precipitation amount over the Marica river basin is between 150-350 mm, daily maximums at Ihtiman - 230mm

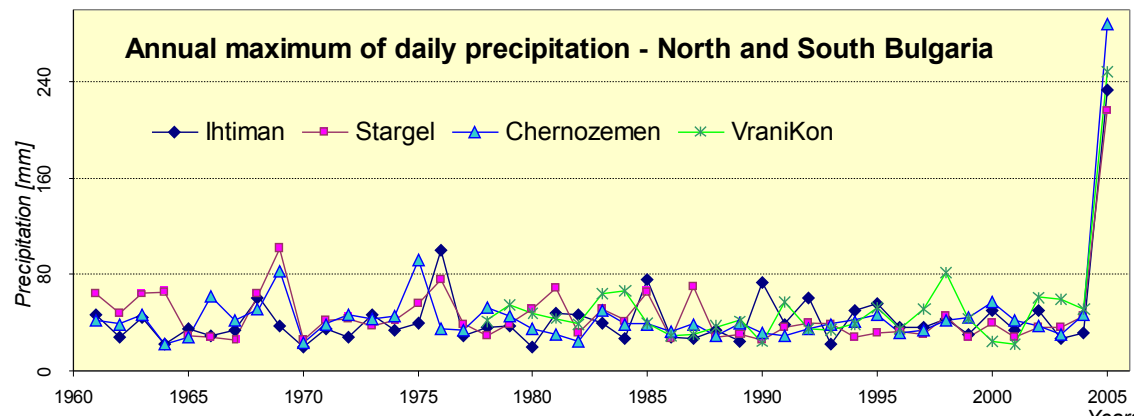
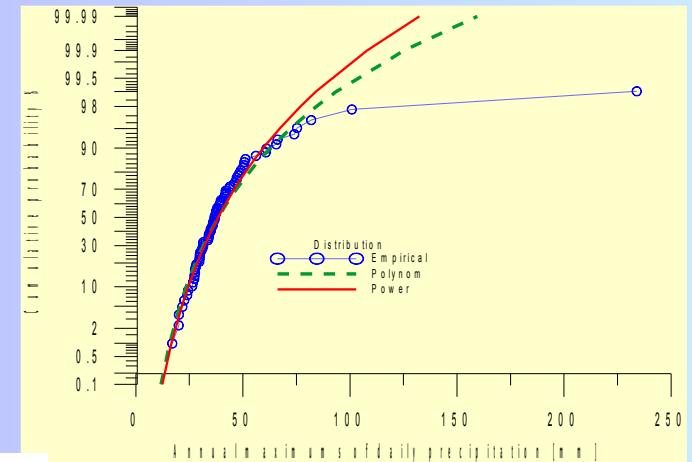
14-16.09, 18-23.09.2005

In the basins of river Vit and Osum the precipitation was between 80-200 l/m², During the period along river Yantra - 150-260 l/m², on 20.09 at Chernozemen – 288 l/m². At Shabla station Black Sea coast more than 360 mm for one week.

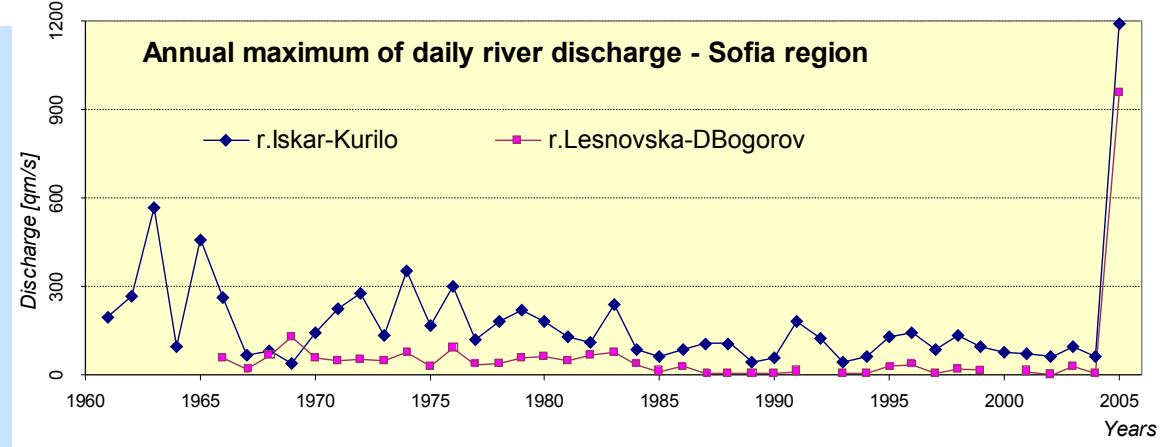


Was this an extraordinary event

The probability distribution of the annual maximums of daily precipitation shows how far (the right most) is the one observed on 05 August at Ihtiman.



Time plots of annual precipitation maximums of precipitation and

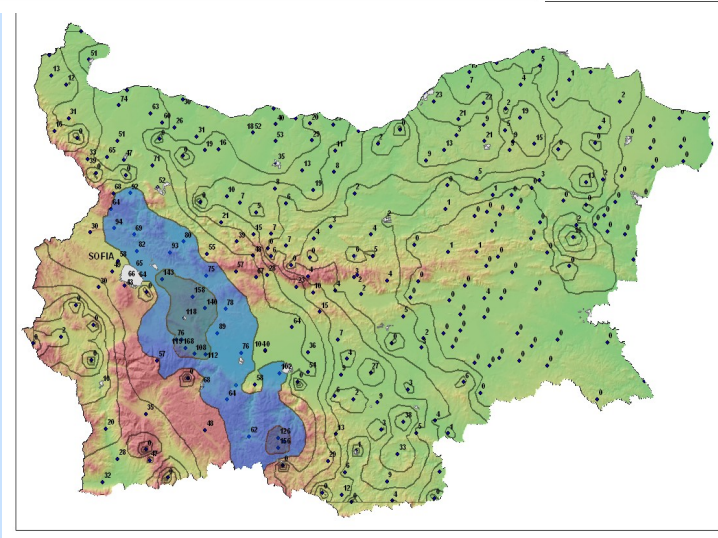
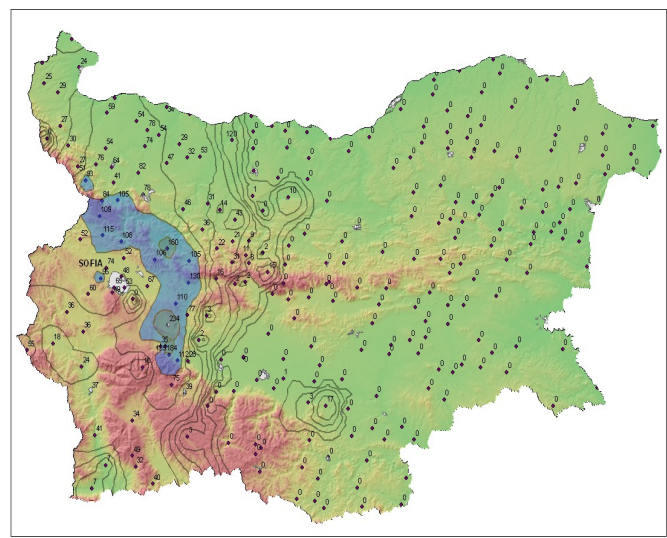


discharges.

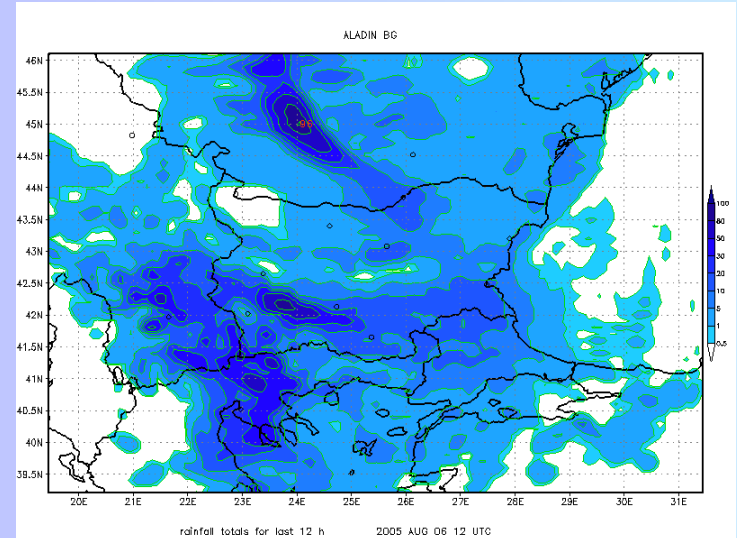
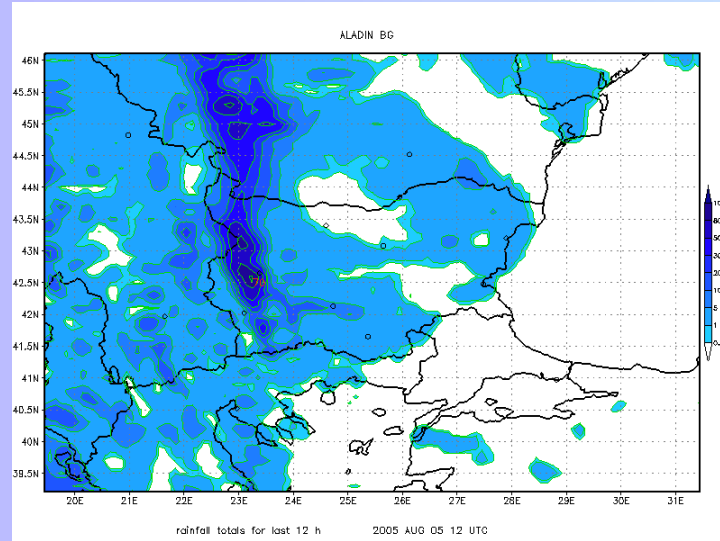
Rainfall and hydrological forecasts

- precipitation patterns of 04 and 05 August 2005

Observed:



Predicted by the HIRLAFM Aladin

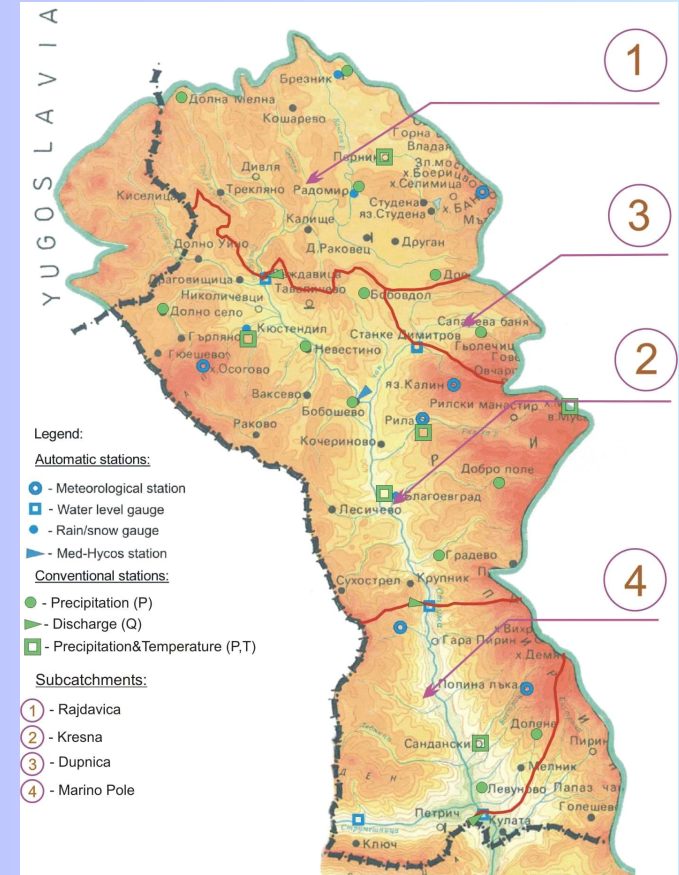
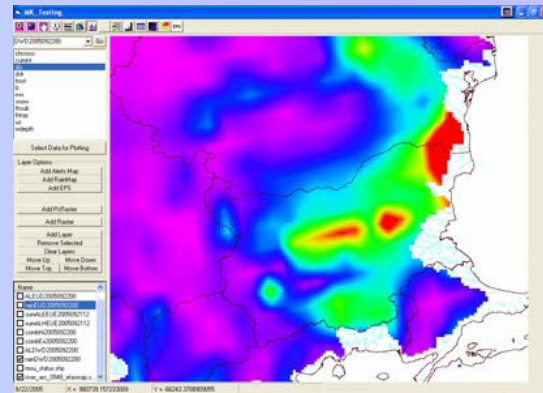
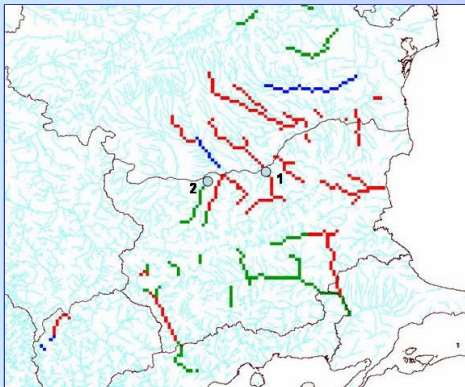


Hydrological forecasting:

- Experience with HBV and MODCOU calibrated for Struma and Maritza basins in the frame of EC 5th FP – EFFS project, not available operationally.

Summary of accuracy criteria achieved for HBV

Calibration period	Struma river sub-basins							
	Rajdavitza		Dupnitsa		Kresna		Marino pole	
	R2	AccDiff	R2	AccDiff	R2	AccDiff	R2	AccDiff
Obs. 1990-99	0.58	-21.8	0.263	-111.0	0.61	-12.1	0.54	-82.6
Obs. 2001-03	0.433	-6.3	0.044	89.8	0.502	-29.2	0.57	-55.5
Forecast t+24	0.31	7.1	0.16	-18.3	0.1	-130	0.43	-51.6
Forecast t+48	0.38	-2.	-0.13	-68	0.06	-107	0.46	-11.1



In September 2005, NIMH started to receive the EFAS buletines with indicative hydrological forecasts

Lessons learned, present needs of NIMH to serve better the society

- Capacity building and improvement of information flows:
 - prompt delivery of data and products;
 - increasing the lead time of precipitation forecast, NIMH started a procedure to become a member of the European Centre for Medium-range Weather Forecasting;
 - hydrological models in use need to use hydraulic routing and ability to evaluate the flooded areas.
- Equipment needs:
 - urgent restoration of the 27 totally destroyed hydrometric stations during the floods;
 - hourly observation of precipitation and river levels by automatic telemetric stations;

Some photos



River Maritza at Stambolovo
06.08.2005г. 14:30h

River Maritza, bridge at v.
Ognyanovo
06.08.2005г. 14:40h



River Matica at Sofia –
Karlovo road



17 1:45 PM

River Mati Vir below Verinsko village, basin area 110 km²

Thank you!

Some references:

Dimitrov D., I. Gospodinov, S. Balabanova Conditions for the generation of the flood in the central part of Bulgaria in early August 2005. Bulaqua, 3, 2005.

D. Dimitrov The challenges of the recent hydro meteorological extreme events: urgent needs for online data and up-to-date products in Bulgaria. Finish-Visala Meteorological and Hydrological Workshop – 24.11.2005, Sofia.

D. Dimitrov, I. Gospodinov The 2005 Floods in Bulgaria and their Forecasting. Applied – Research Conference on Crisis Management and Civil Protection, Bulgarian Academy of Sciences – 10.11.2005, Sofia

Modev S., S. Kirilova Reservoir Influence on the Flooded Regions on the RBulgaria during the Period 04-08.08.2005. Applied – Research Conference on Crisis Management and Civil Protection, Bulgarian Academy of Sciences – 10.11.2005, Sofia