The new system of flash flood forecasting in the Czech Republic

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INCA-CE Nowcasting for Central Europe
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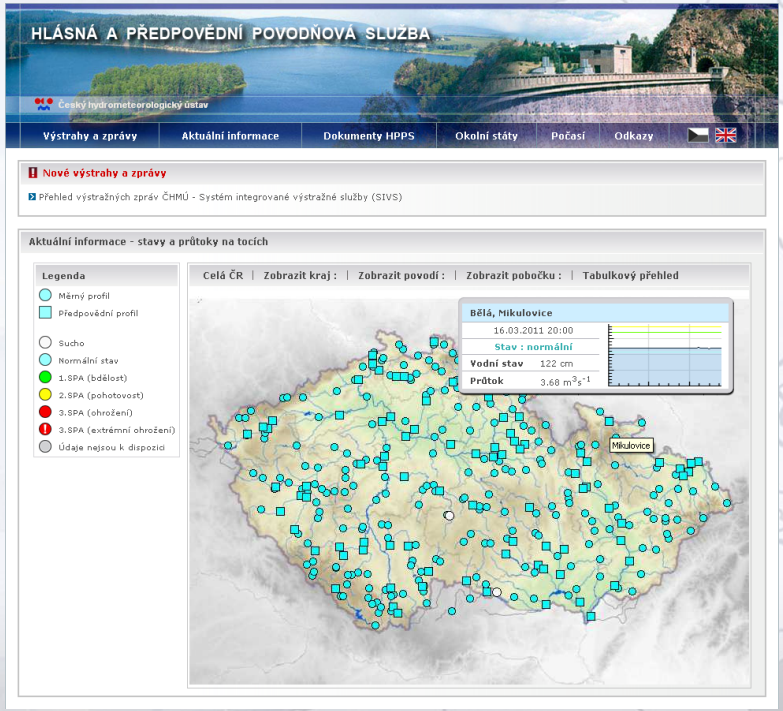
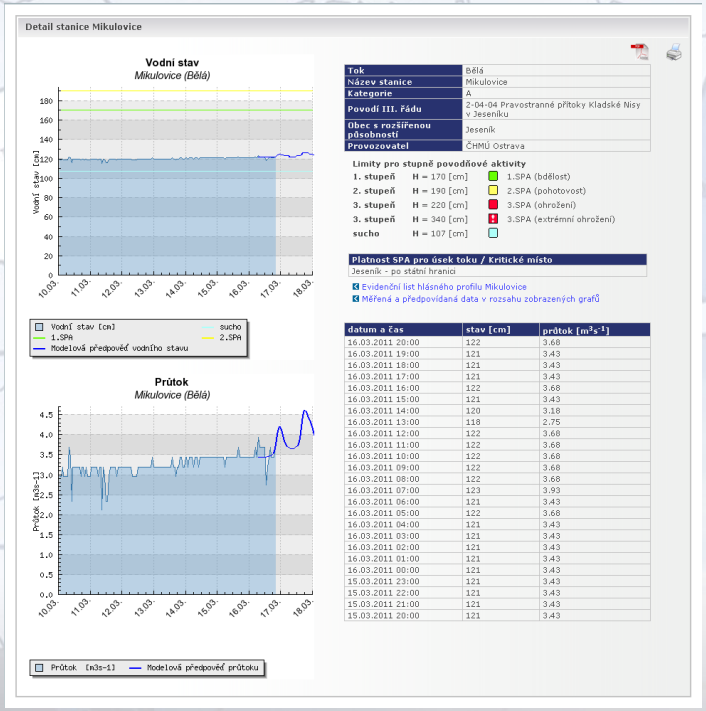
Operational hydrology in CHMI

- **Flood forecasting service**
  - 48h discharge forecast calculated daily for more than one hundred profiles
  - **89 profiles** published on website http://hydro.chmi.cz
  - Flash floods – hardly predictable, not standard part of operational service so far





Flood forecasting (hydrological modelling) - comparison

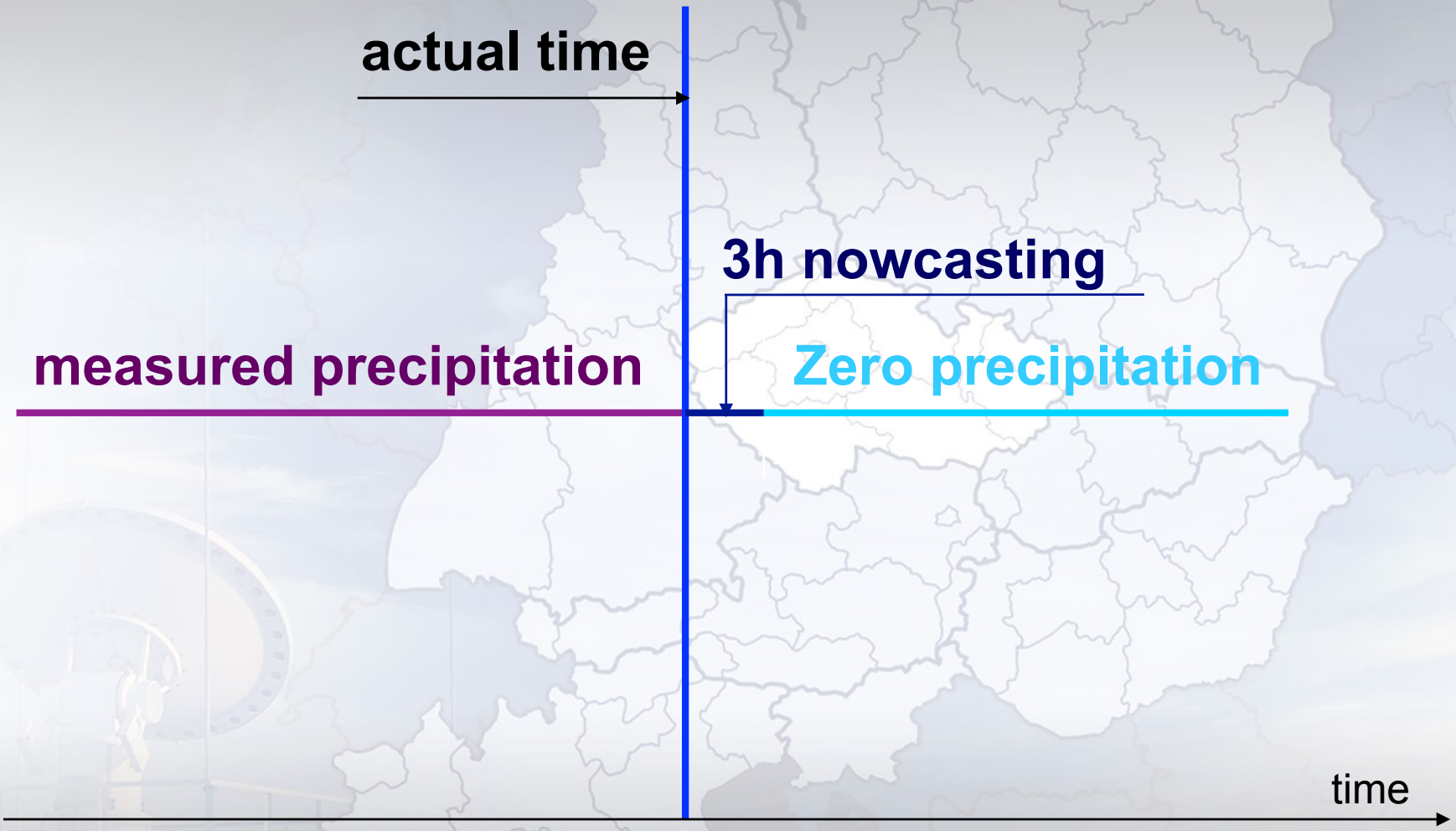
Large-scale floods

- Uncertainty is „relatively small“
- Results presented by hydrogram
- Accuracy of forecasts „in cm“
- Input data in 1 hour step
- Forecast updated in several hour step

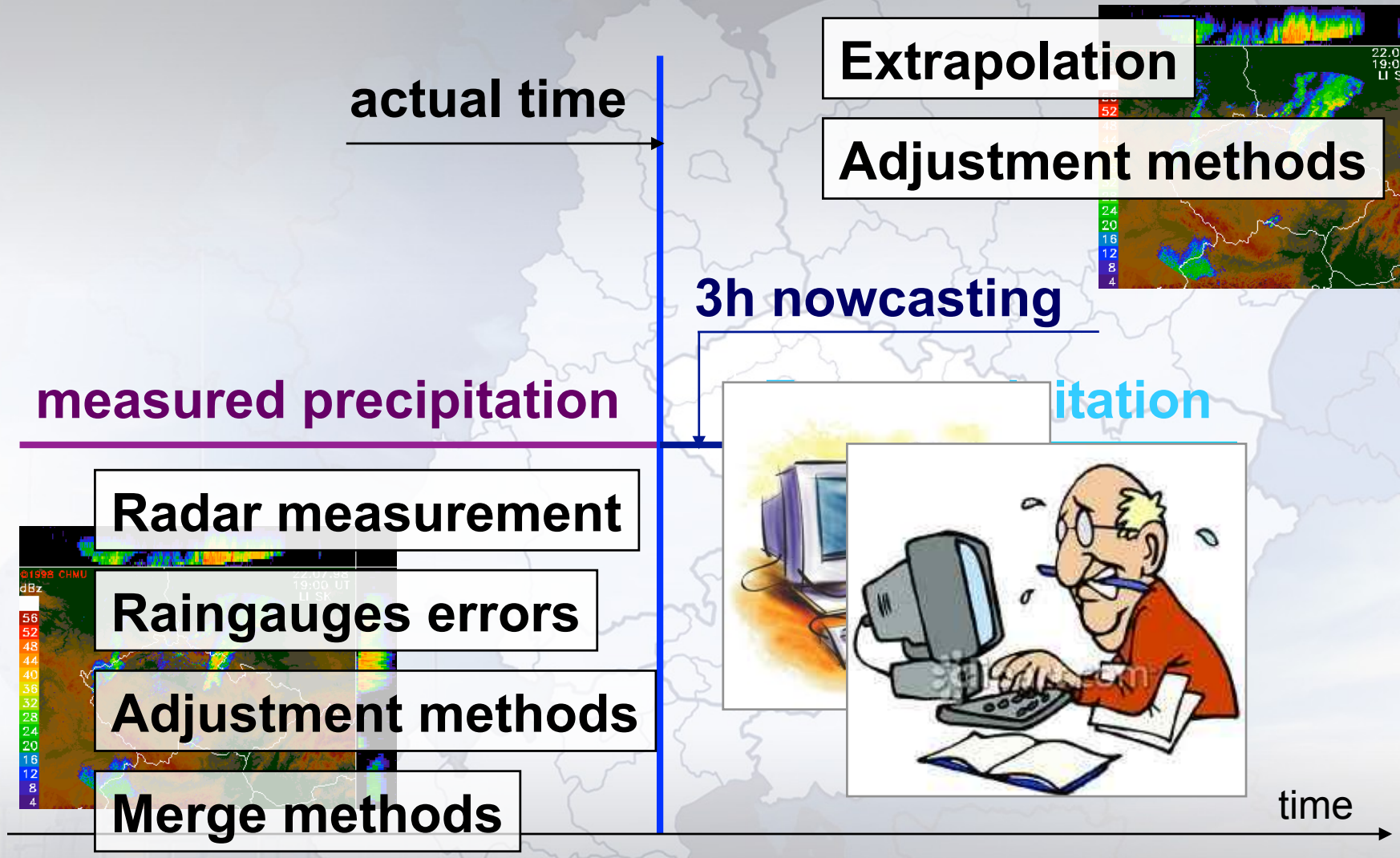
Flash floods

- Great uncertainty
- Single hydrogram is not relevant
- Accuracy of forecast
  - Danger of flood exists
  - Danger of flood does not exist
- Input data in 5-10 minute step
- Forecast updated in 5-10 minute step
- Observed/unobserved catchments

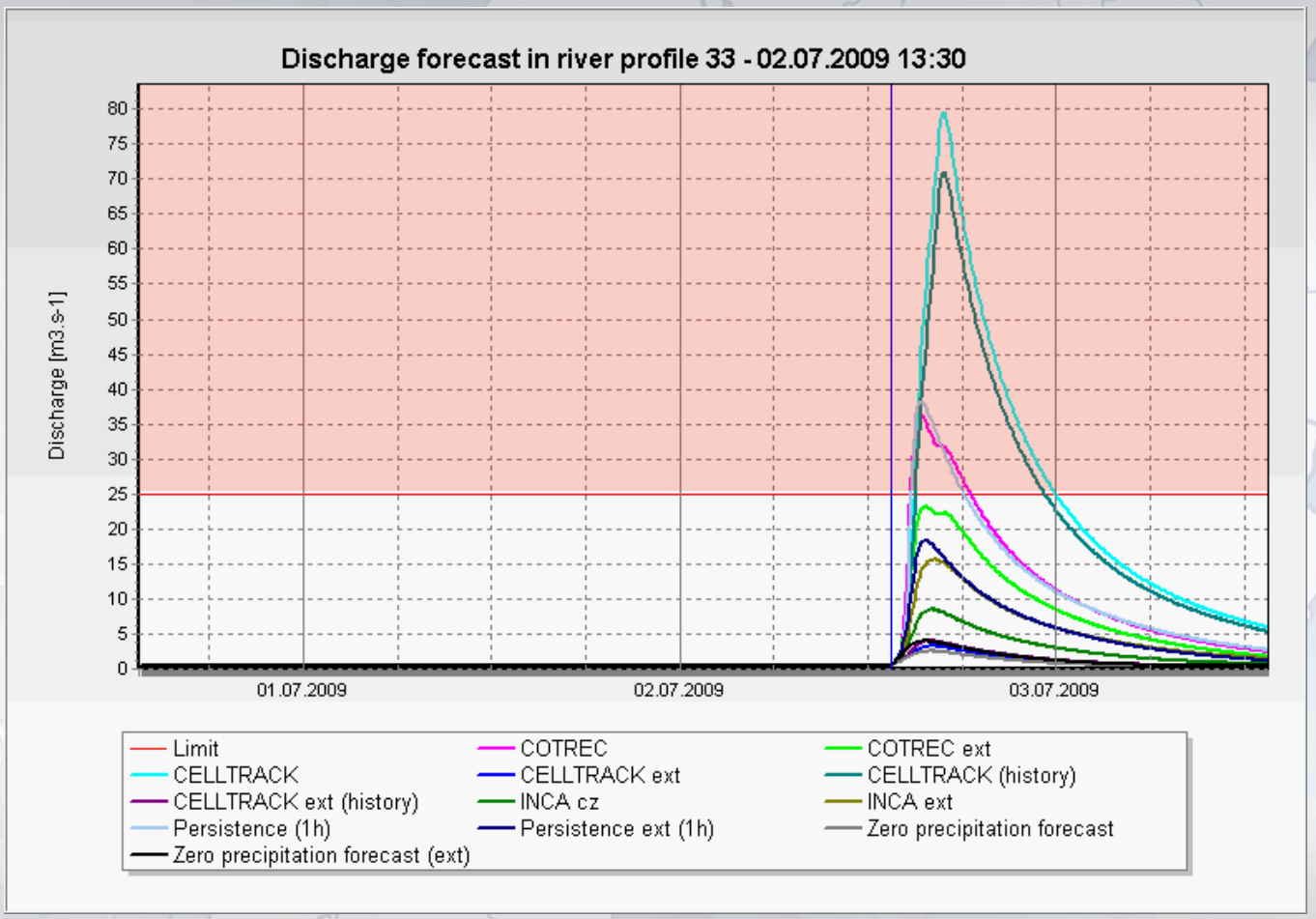
Precipitation scheme



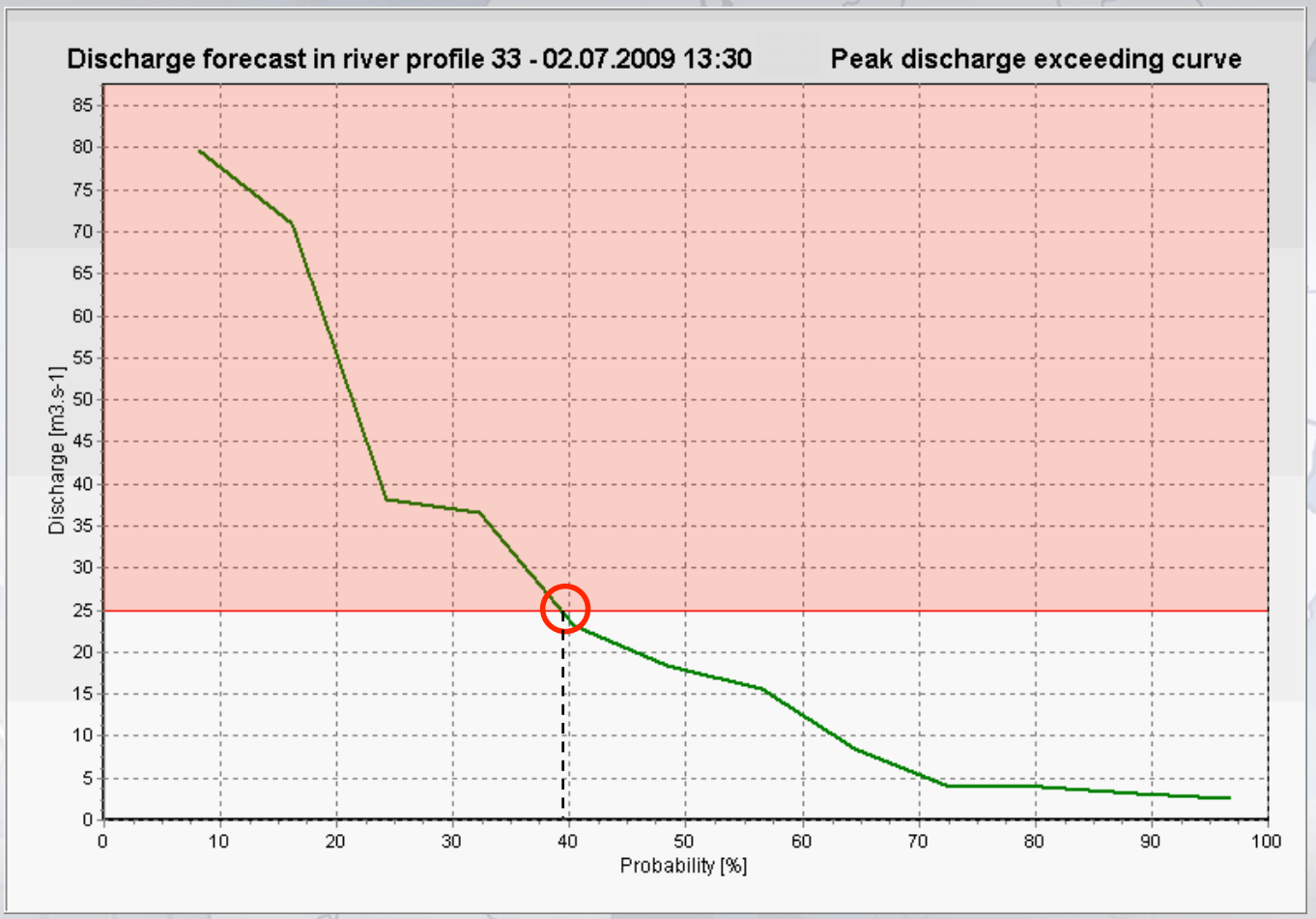
Uncertainties…



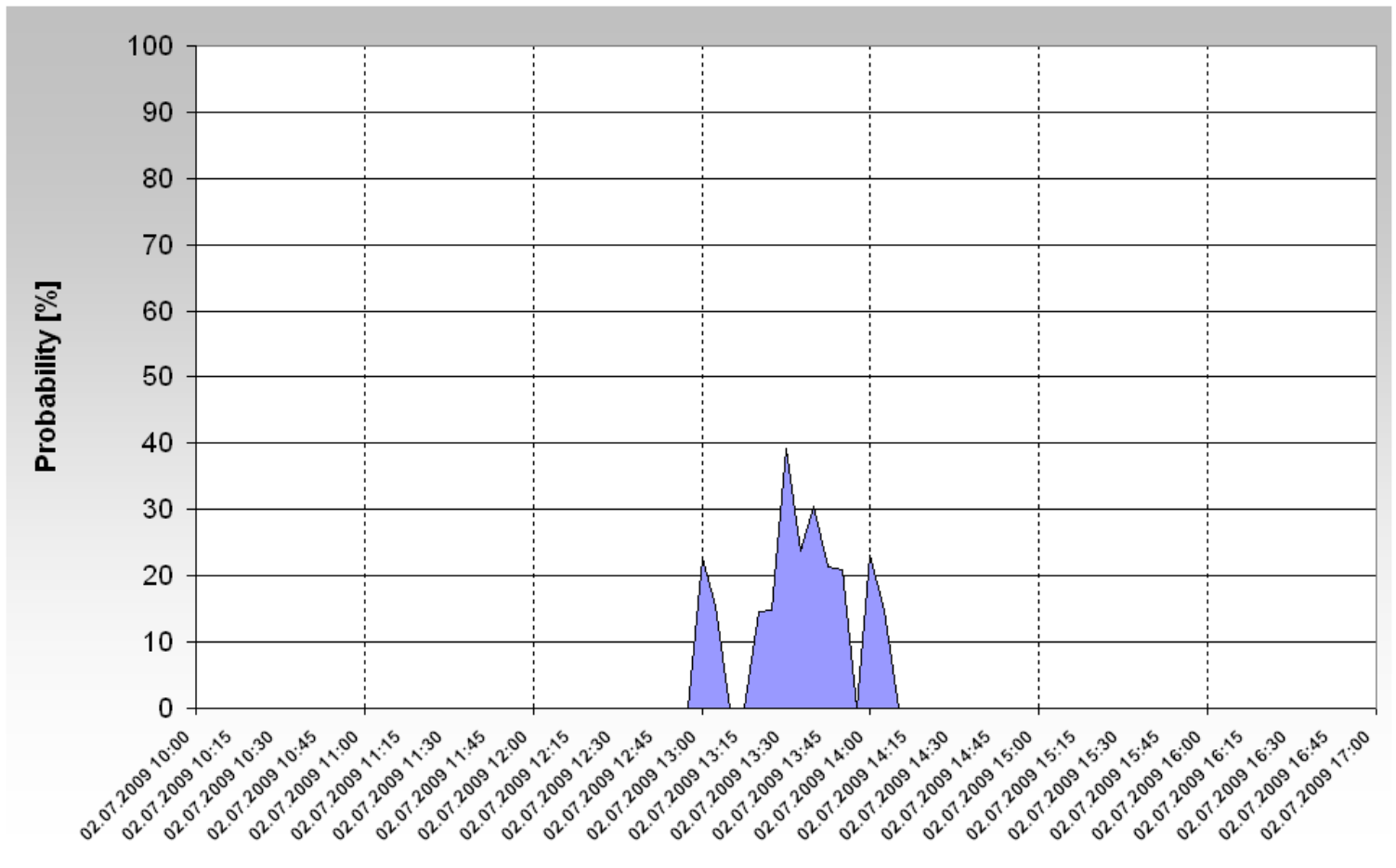
Variant discharge forecast



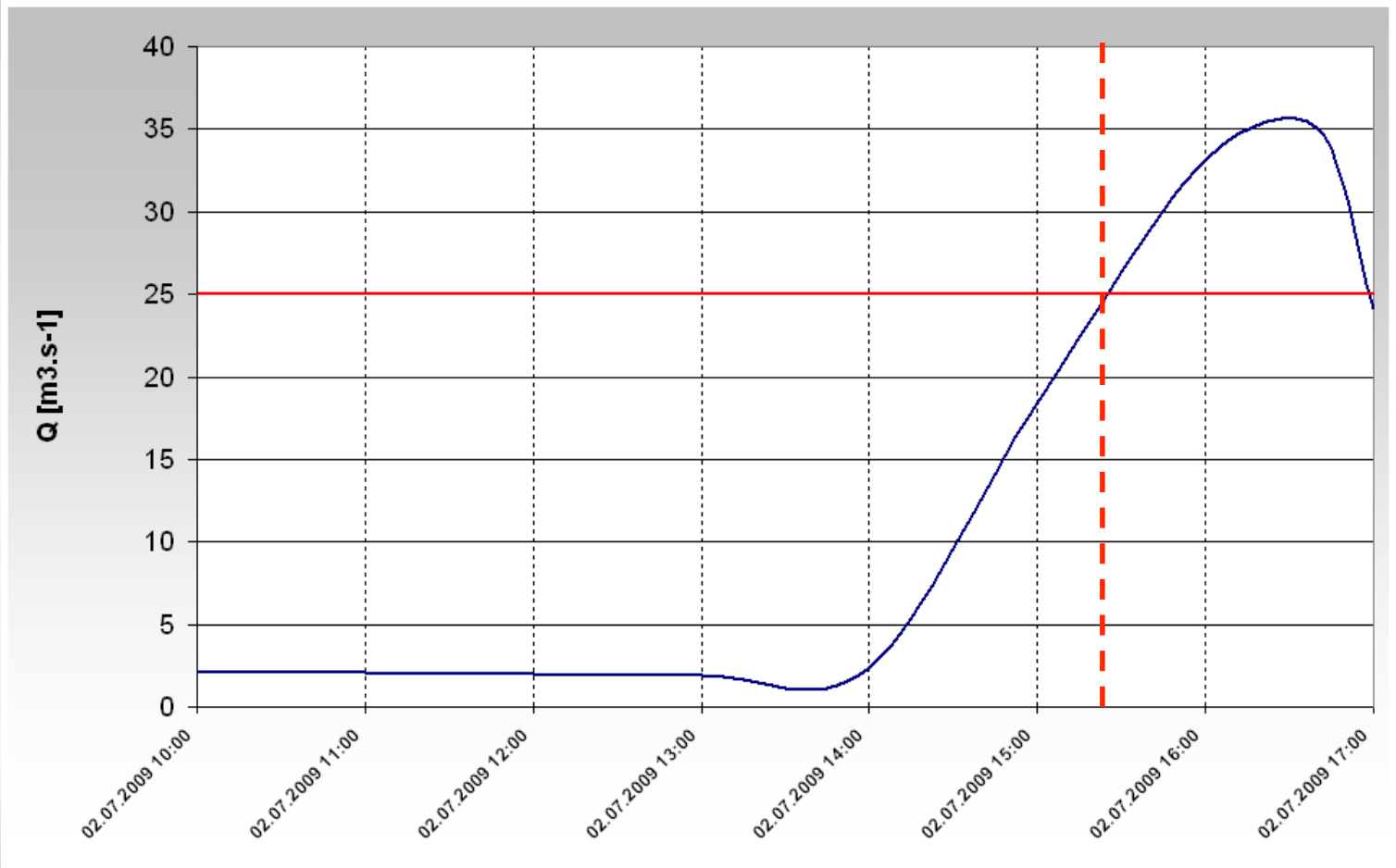
Peak discharge exceedance curve



Probability of limit discharge exceedance – Husí potok



Discharge time serie – Husí potok



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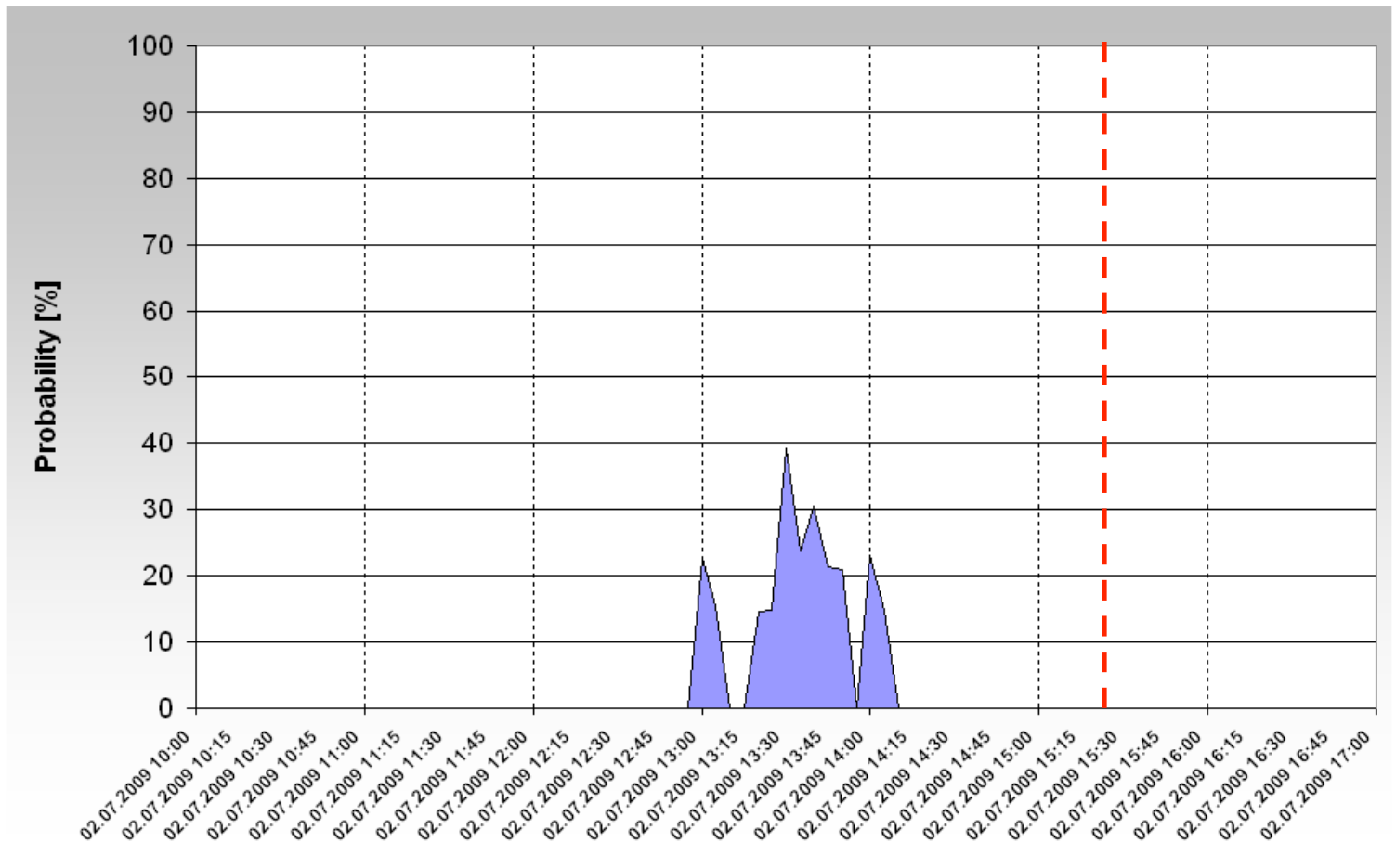


What was done…

- **Simulation of the operation** – 20 June to 20 July 2009
- 4 small catchments tested so far:
  - Husí potok
  - Jičínka
  - Luha
  - Romže
- **Measured precipitation:**
  - Radar raingauge merge algorithm (Šálek) used in operation in CHMI
  - INCA precipitation analysis
  - CZ radar network only, EXTended radar network (neighbouring countries)
  - 3 variants of measured precipitation

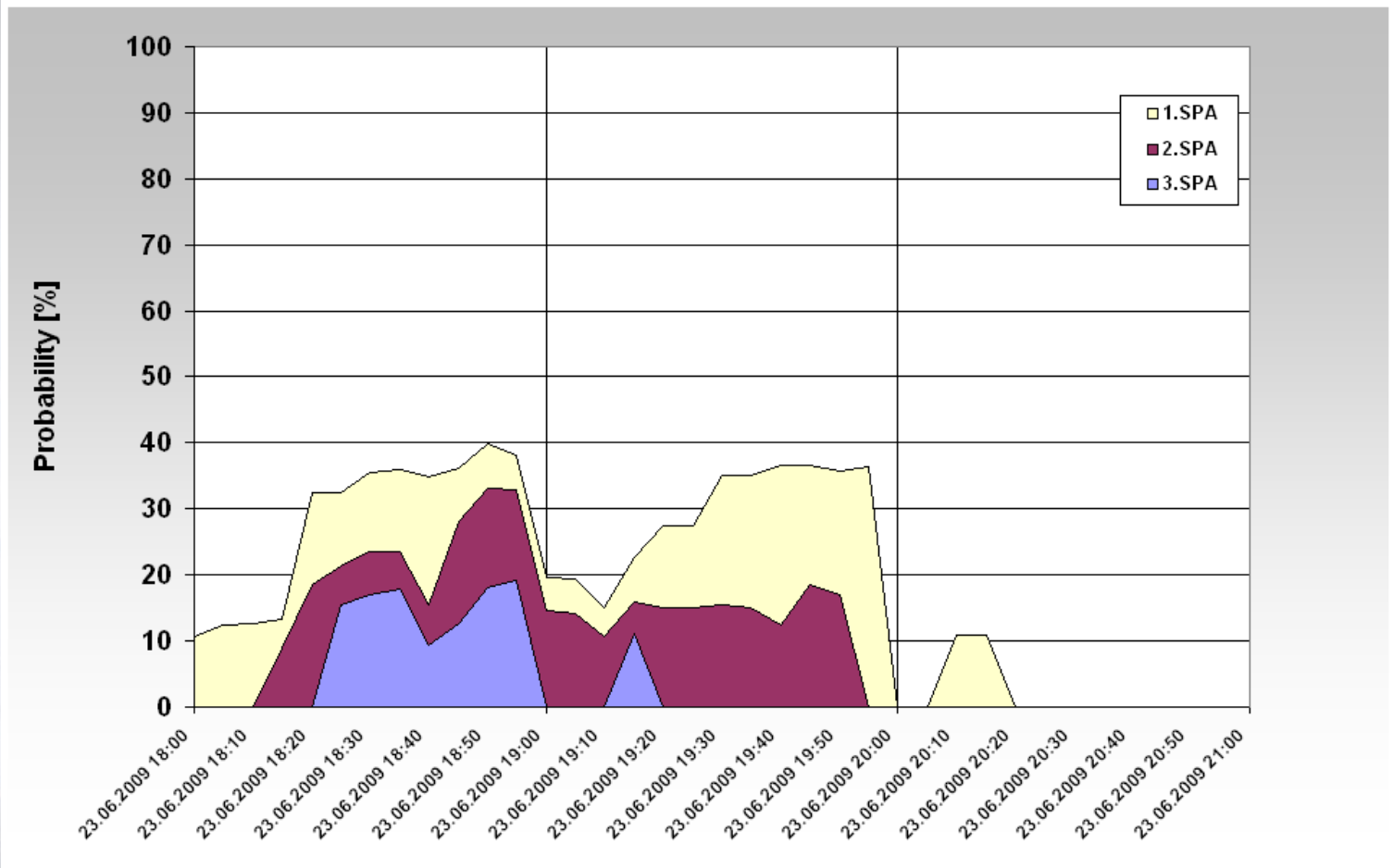
What was done…

- **4 precipitation nowcasting methods**
  - COTREC (Novák)
  - CELLTRACK, CELLTRACK-history (Kyznarová)
  - INCA
  - PERSISTANCE (1h)
  - CZ radar network only, EXTended radar network (neighbouring countries)
  - 8 variants of precipitation forecasts
- **Zero precipitation forecast**
  - For estimation of the influence of the measured precipitation („bottom limit estimation“)
  - CZ radar network only, EXTended radar network (neighbouring countries)
- **10 precipitation scenarios together**

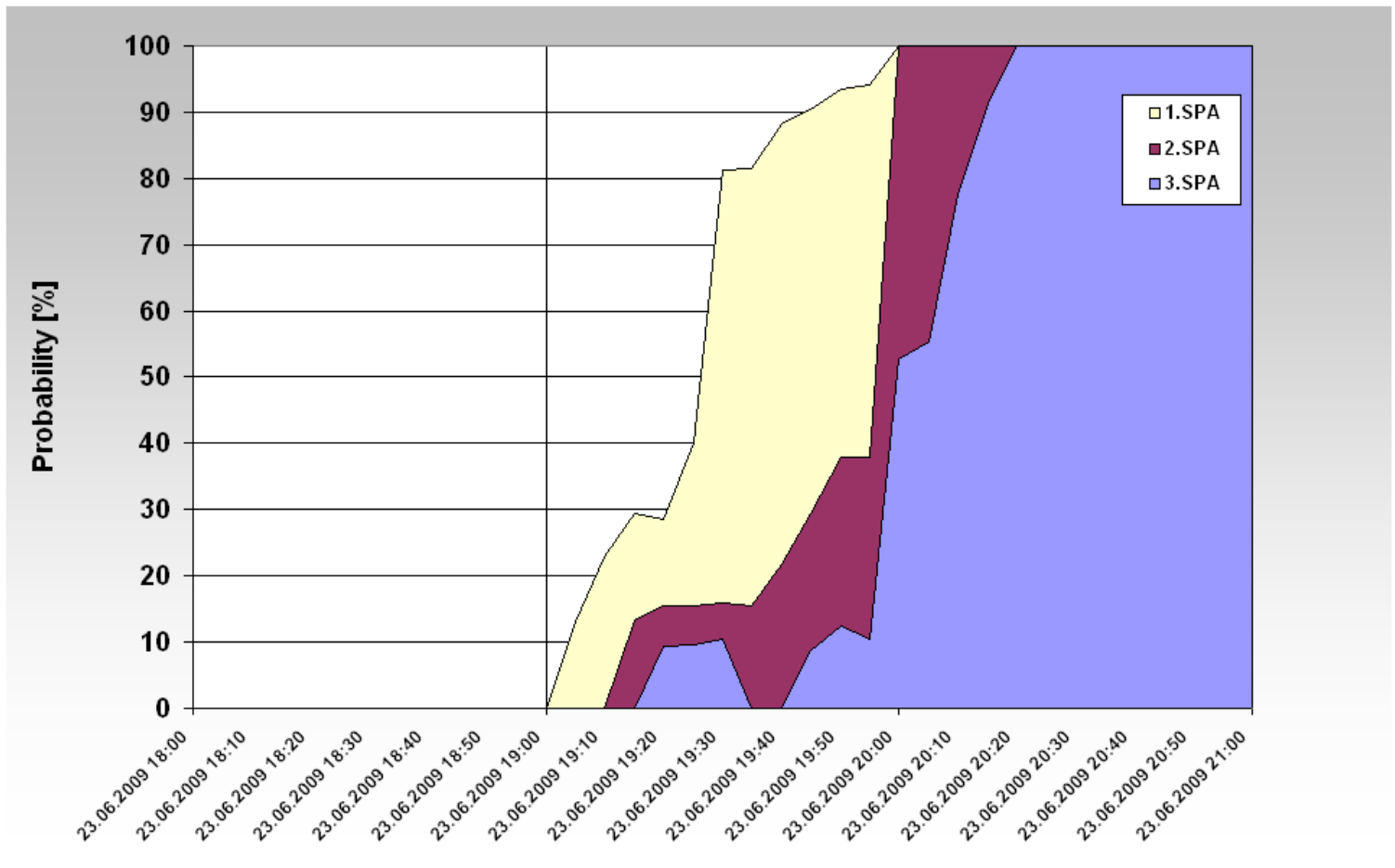
Simulation of the operation – first results

CATCHMENT	NUMBER OF FLOODS	NUMBER OF NON-ZERO EXCEEDANCE PROBABILITIES	NUMBER OF HIGHER THAN 25% EXCEEDANCE PROBABILITIES
Husí potok	1	1	1
Jičínka	1	2	1
Luha	1	1	1
Romže	0	10	7

Example: Various limit discharges - Jičínka



Example: Various limit discharges - Luha



Conclusion and other works

- Continue in testing operation (operative run in 2012 season)
- It is well known that flash floods can be predicted only **several tenths of minutes** in advance…
- **Various precipitation nowcasting methods…**
  - evaluate their benefit
  - calculate their flash flood detection probability
- **Each catchments has different behaviour** – necessary to set up different values for warning probabilities of exceedance of the limit discharge
- The improved calibration of the hydrological model can decrease the number of false alarms
- **Discussion with the end users**
  - Trainings necessary
  - feedback necesary (overwarning?)

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Thank you for your attention.

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