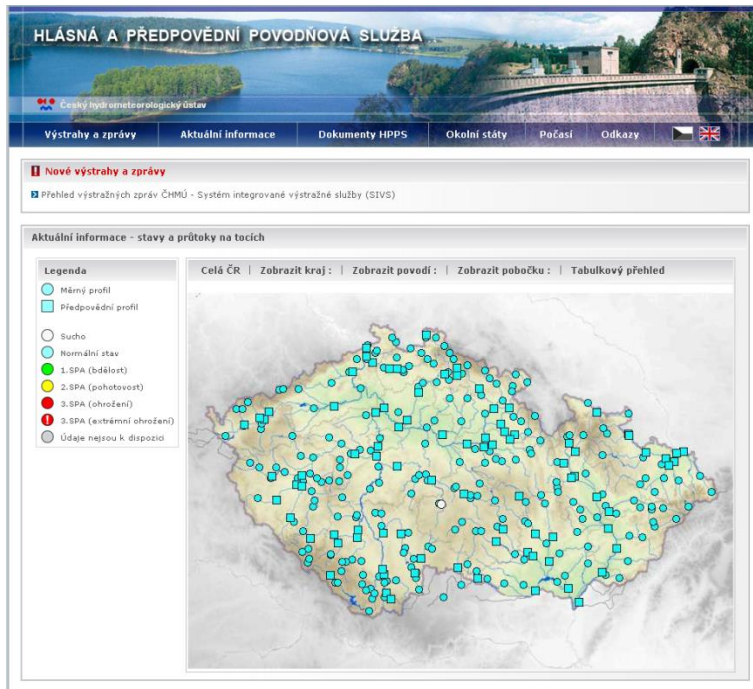


ČESKÝ  
HYDROMETEOROLOGICKÝ  
ÚSTAV

# FLOOD FORECAST AND INFORMATION SYSTEMS IN CZECH ELBE RIVER BASIN



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**INTERNATIONAL ELBE FORUM**  
**Dresden**  
**9. – 10. April 2019**

[www.chmi.cz](http://www.chmi.cz)

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## **WATER ACT (No. 254/2001 Sb., §73)**

**Flood Forecasting Service informs flood authorities and other flood involved subjects about the possibility of flood occurrence and next dangerous development...**

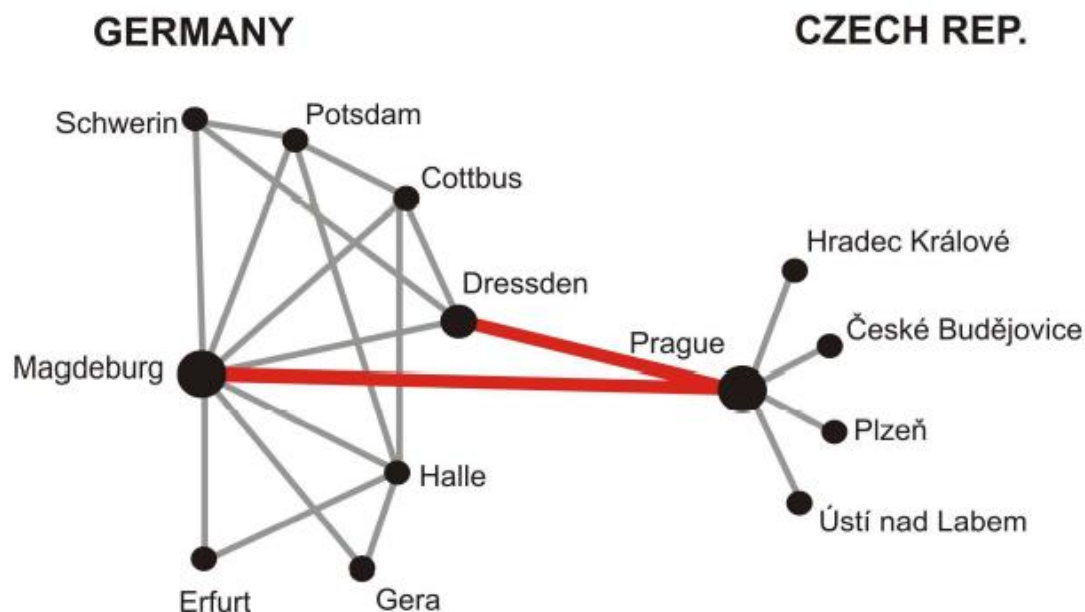
**Flood forecasting service is made by **Czech Hydrometeorological Institute** in cooperation with River Basin Companies.**



## WATER ACT (No. 254/2001 Sb., §73)

**Flood Information Service provides information to Flood Authorities (regional and local) for warning people and controlling of necessary protecting measures.**

**Flood information service is organized by local and regional flood authorities (with support of CHMI and river basin companies).**



# CHMI flood forecasting and warning products

## Regular reports

**Weather forecast**  
**Precipitation forecast**  
**Actual hydrological information**  
**Hydrological forecast**

## Extraordinary reports

**Warning on dangerous situation**  
**Extraordinary forecast**  
**Hydrological situation report**

## Product users

**River Basin Companies**  
**Fire Rescue Service**  
**State authorities**  
**Municipal authorities**  
**Public**

## Way of distribution

**Internet**  
**WEB Service**  
**E-mail**  
**Telephone**





# Web presentation of hydrological information

<http://hydro.chmi.cz/hpps/>

The screenshot displays the 'HLÁSNÁ A PŘEDPOVĚDNÍ POVODŇOVÁ SLUŽBA' (Flood Warning and Forecasting Service) website. The header includes navigation tabs for 'Výstrahy a zprávy', 'Aktuální informace', 'Dokumenty HPPS', 'Okolní státy', 'Počasí', and 'Odkazy'. A section titled 'Nové výstrahy a zprávy' (New warnings and reports) is visible. The main content area is titled 'Aktuální informace - stavy a průtoky na tocích' (Current information - states and discharges at gauges). It features a map of the Czech Republic with a legend for 'Měrný profil' (measuring profile) and 'Předpovědní profil' (forecasting profile). A detailed data box for 'Zábrdka, Dolní Bukovina' shows the date '14.04.2015 12:10', 'Stav : normální' (state: normal), 'Vodní stav : 42 cm' (water level: 42 cm), and 'Průtok : 0.322 m³·s⁻¹' (discharge: 0.322 m³·s⁻¹). The legend also includes categories for 'Sucho' (drought), 'Normální stav' (normal state), and '3.SPA (extrémní povodeň)' (3.SPA (extreme flood)).

<https://voda.gov.cz/portal/cz/>

The screenshot shows the 'VODOHOSPODÁŘSKÝ INFORMAČNÍ PORTÁL' (Water Management Information Portal) website. The header includes the logo of the 'MINISTERSTVO ZEMĚDĚLSTVÍ' (Ministry of Agriculture) and navigation tabs for 'Aktuální informace', 'Evidence ISVS', 'Plánování v oblasti vod', and 'Projekt ISVS - VODA'. A secondary navigation bar contains buttons for 'Stavy a průtoky', 'Srážky', 'Jakost vody', 'Technická evidence', 'Kontakty', and 'Odkazy'. The main content area features a map of the Czech Republic with a legend for 'Poslední aktualizovaná hodnota' (Last updated value) and 'Legenda hydrologických jevů' (Legend of hydrological events). The legend includes categories for 'údaj není k dispozici' (data not available), 'sucho' (drought), 'normální stav' (normal state), and '3. stupeň povodňové aktivity (extrémní povodeň)' (3. degree of flood activity (extreme flood)). A table on the right lists the last updated values for various river basins.

Poslední aktualizovaná hodnota	
Povodí Labe, s.p.	14.04.2015 12:00
Povodí Vltavy, s.p.	14.04.2015 12:10
Povodí Ohře, s.p.	14.04.2015 11:50
Povodí Odry, s.p.	14.04.2015 12:10
Povodí Moravy, s.p.	14.04.2015 12:09

**487 (290) water gauges**  
**115 (73) forecasting profiles**

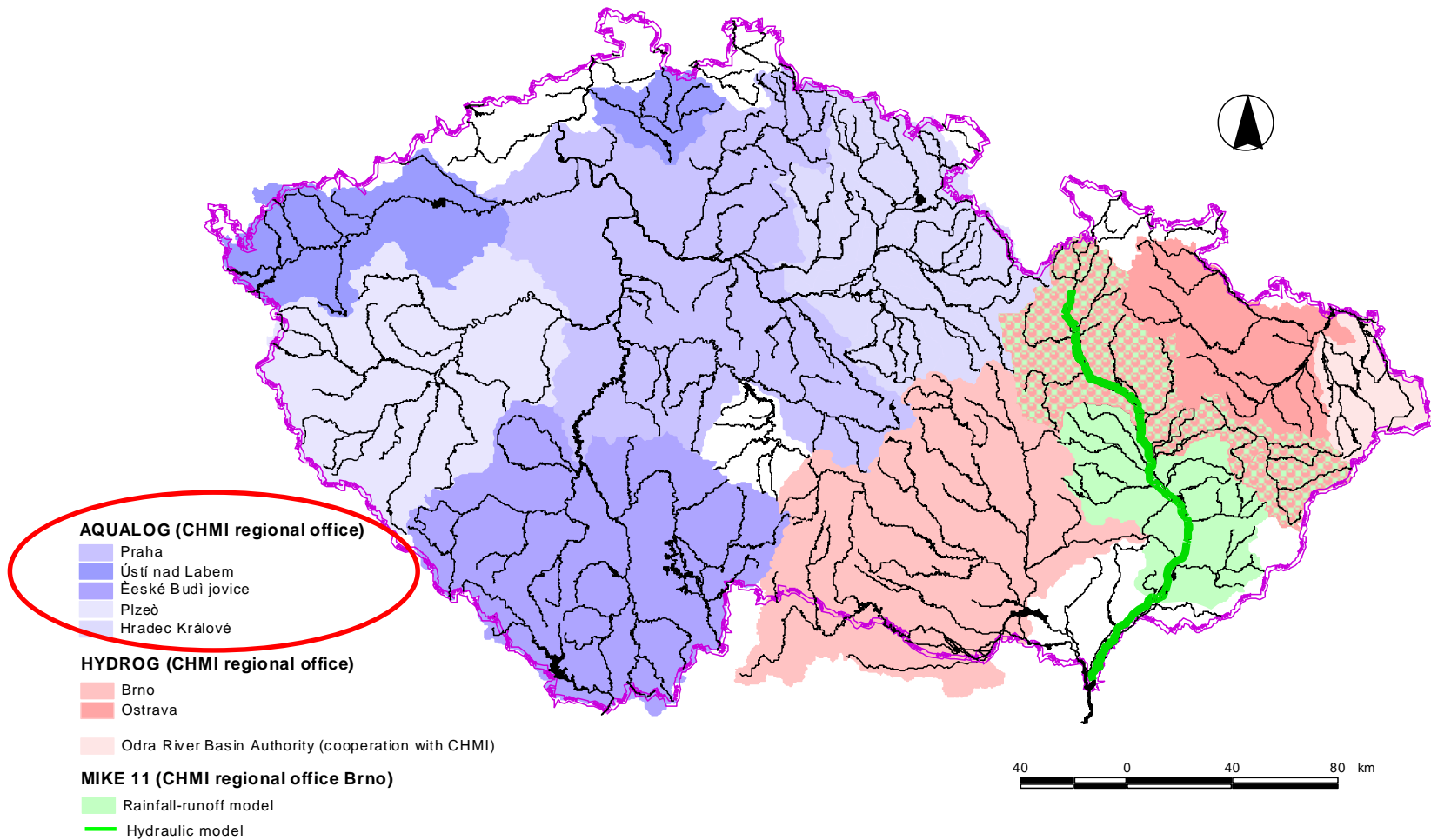


## **Hydrological forecast by CHMI**

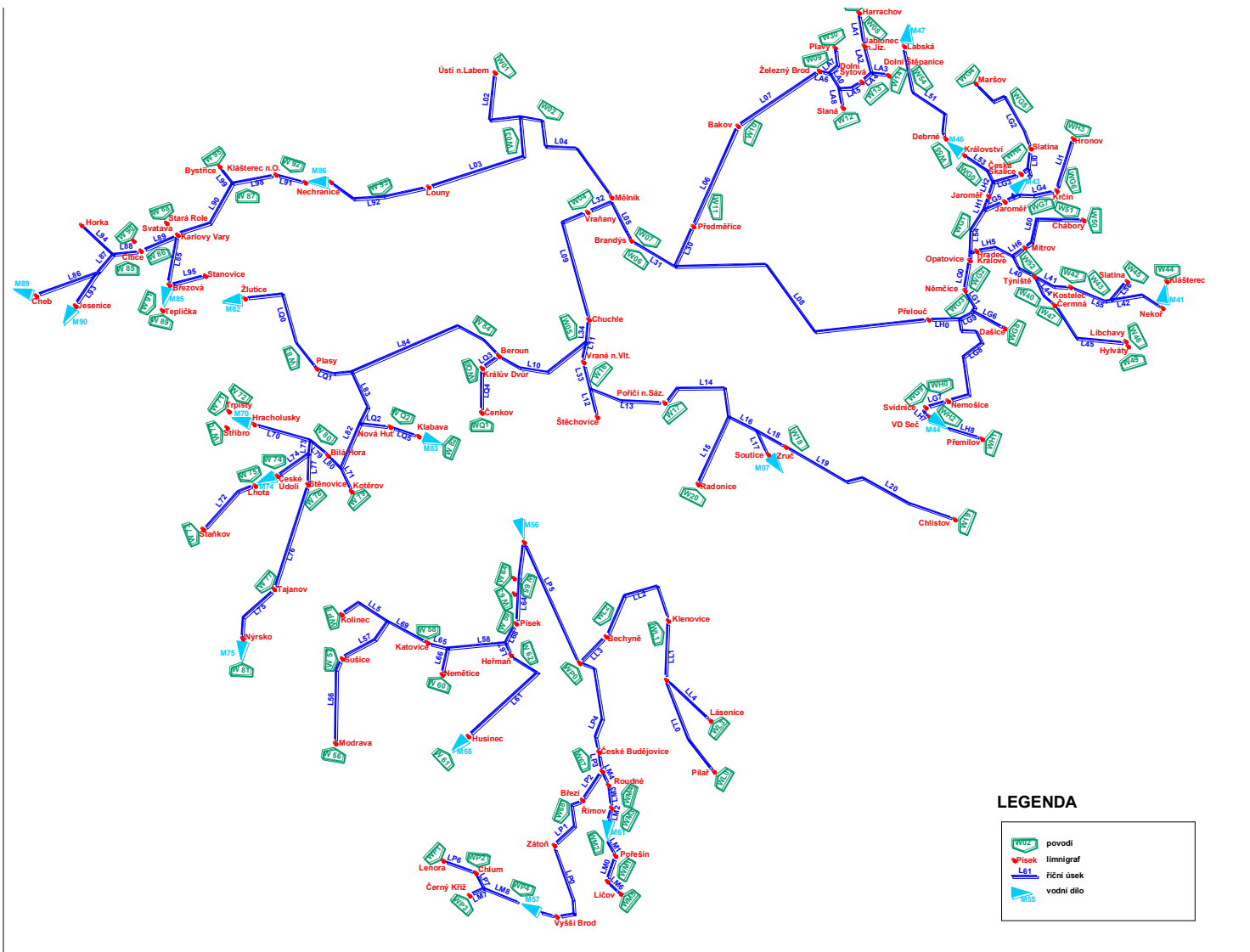
- Small basins, mountainous areas, travel time ranges between several hours up to maximum of one day**
- The forecasts are based on rainfall-runoff modelling with using of quantitative precipitation forecast (QPF)**
- Real-time data from a automated network of raingauge stations, network of water gauging stations and information on reservoirs operation**
- The standard lead time (with QPF) 66 hours**
- The standard hydrological forecasts are issued daily for a total of 115 water gauging sites**
- Forecasting models are introduced in all main catchments**



# Hydrological models used for flood forecasting



# Schema of hydrological model in the Elbe basin





# Water level and flow forecast for the Otava river

Český hydrometeorologický ústav - hydrologická služba - Mozilla Firefox

File Edit View History Bookmarks Tools Help

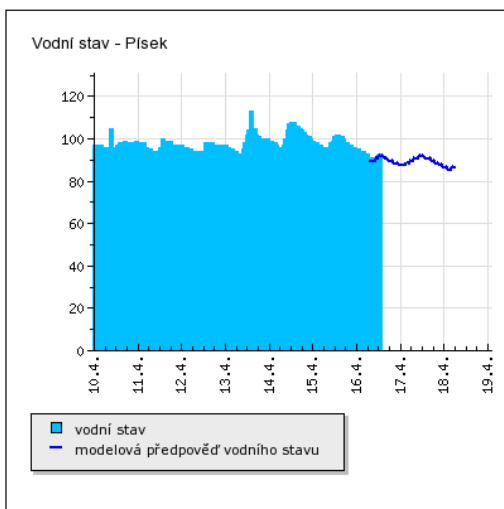
http://hydro.chmi.cz/hpps/stdprfdyn.php?seq=307230

Getting Started Latest Headlines

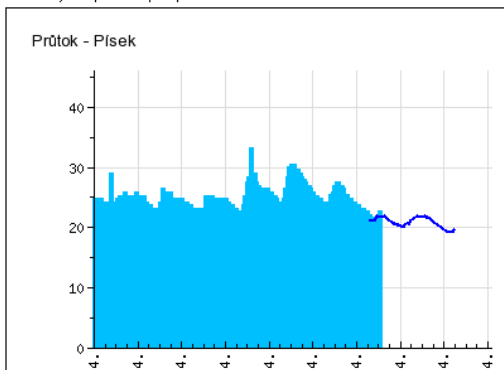
Google Search PageRank Check AutoLink AutoFill Subscribe Options

Regional E... Theoretic... Ensemble ... Precipitati... National ... National ... Presentati... Elsevier E... Zjistěte sj... Meteopre... Český hyd... Český ...

**Český hydrometeorologický ústav**  
hlásná a předpovědní povodňová služba



Datum vydání poslední předpovědi 16.04.2007 10:37



<b>Tok</b>	Otava
<b>Název stanice</b>	Plisek
<b>Kategorie</b>	A
<b>Povodí III. řádu</b>	1-08-03 Blаницe a Otava od Blаницe po Lomnici
<b>Obec s rozšířenou působností</b>	Plisek
<b>Provozovatel</b>	ČHMÚ České Budějovice

**Limity pro stupně povodňové aktivity**

- 1. stupeň H = 250 [cm] ■ 1.SPA (bdělost)
- 2. stupeň H = 320 [cm] ■ 2.SPA (pohotovost)
- 3. stupeň H = 380 [cm] ■ 3.SPA (ohrožení)
- 3. stupeň H = [cm] ■ 3.SPA (extrémní ohrožení)
- sucho H = [cm] ■

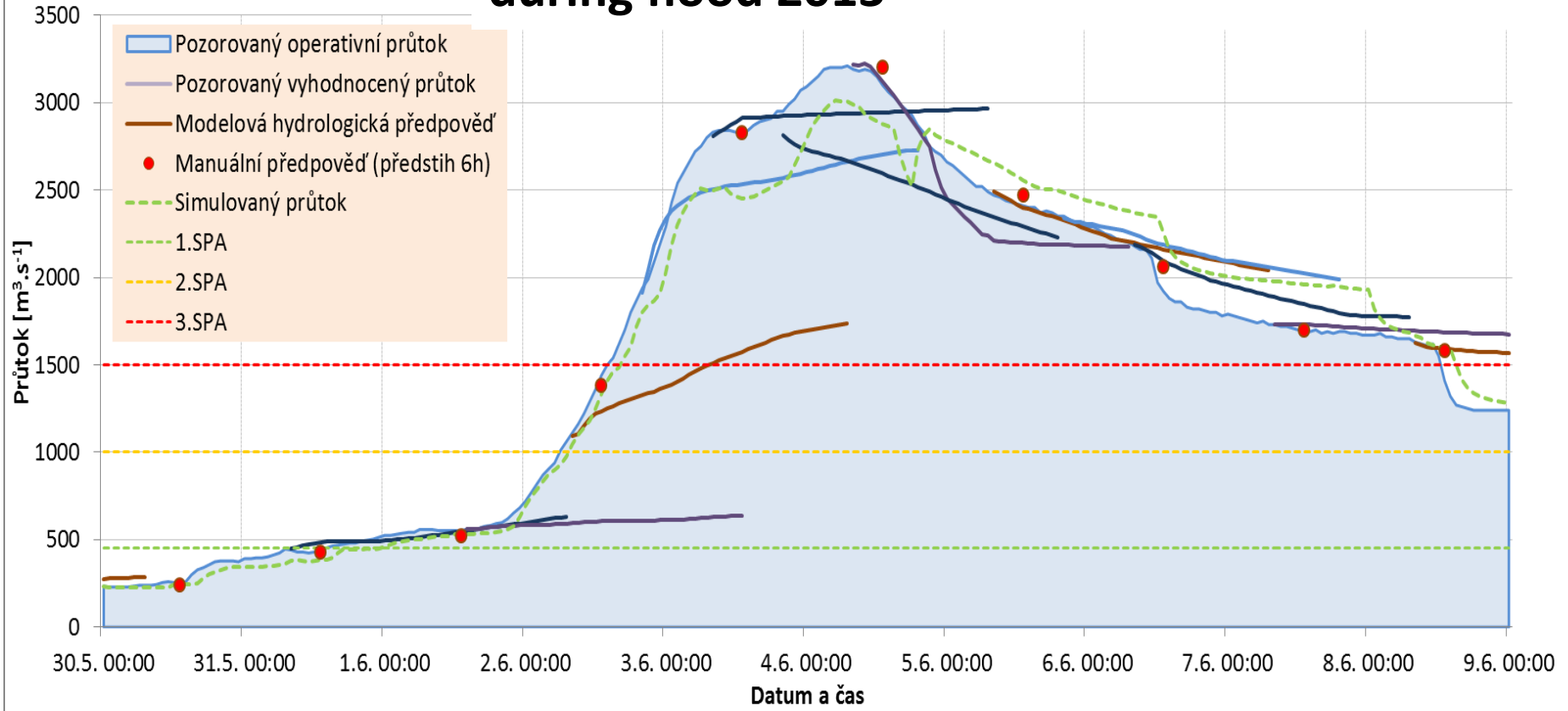
**Platnost SPA pro úsek toku / Kritické místo** soutok s Blanicí - ústí do Vltavy

[Evidenční list hlásného profilu 127](#)

datum čas	stav [cm]	průtok [m <sup>3</sup> s <sup>-1</sup> ]
16.04 13:00	93	22.8
16.04 12:00	92	22.2
16.04 11:00	91	21.7
16.04 10:00	89	20.7
16.04 09:00	90	21.2
16.04 08:00	91	21.7
16.04 07:00	91	22.2
16.04 06:00	93	22.8
16.04 05:00	93	22.8
16.04 04:00	94	23.3
16.04 03:00	94	23.3
16.04 02:00	94	23.3
16.04 01:00	95	23.8
16.04 00:00	95	23.8
15.04 23:00	96	24.3
15.04 22:00	96	24.3
15.04 21:00	97	24.9
15.04 20:00	96	24.3
15.04 19:00	98	25.4



# Hydrological forecast for the Vltava in Prague during flood 2013



**Forecast for 48 hours didn't suit to the origin of flood wave**

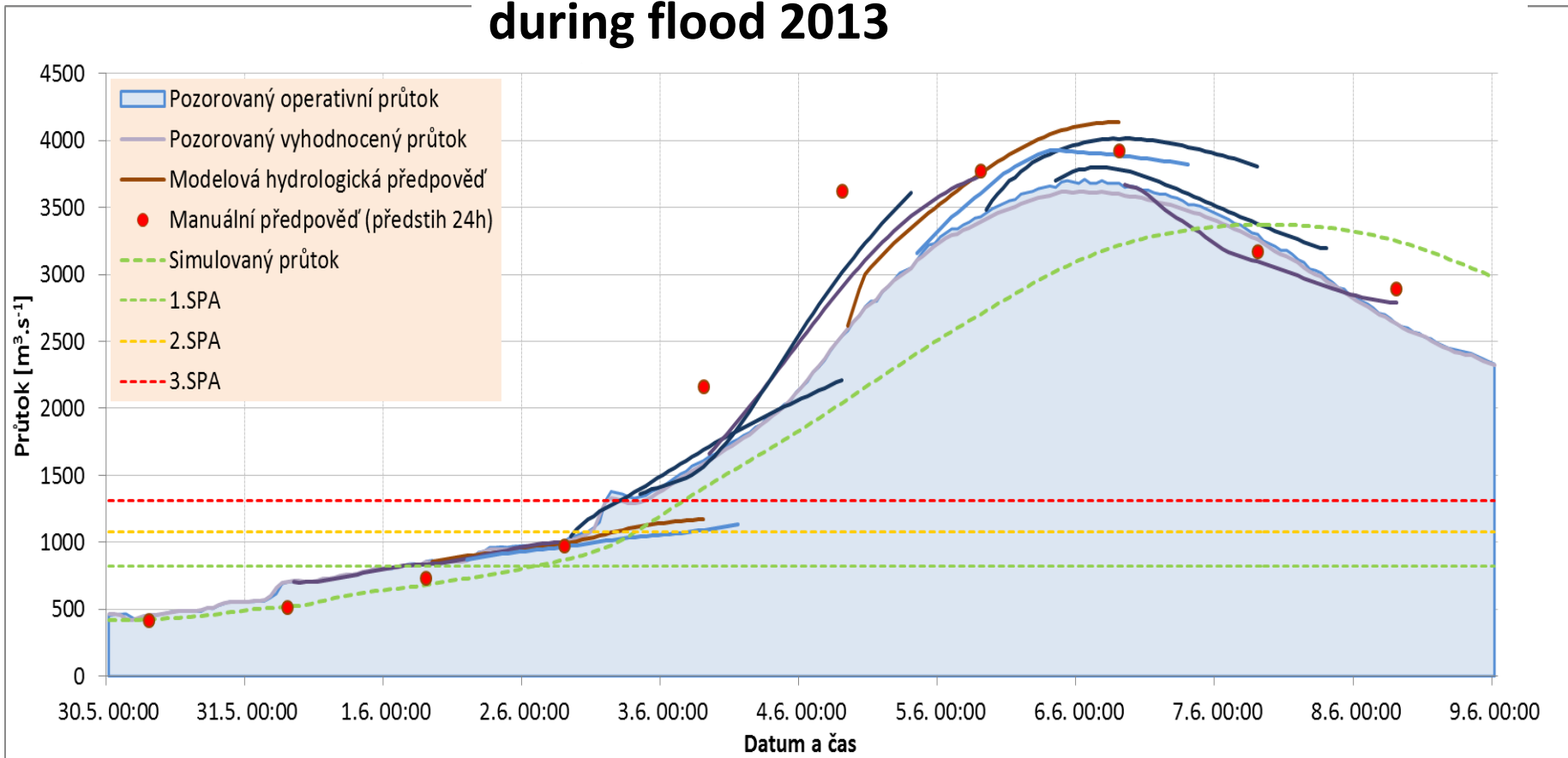
**main reasons – weak precipitation forecast**

- weak hydrological forecast for Berounka and Sazava rivers
- reports on outflow from the Vltava cascade (2/3 of flow in Prague)

**green line – resimulation of hydrograph according to real outflow from the Vltava cascade**



# Hydrological forecast for the Labe in Ústí n.L during flood 2013



**color lines – 48 hours forecasts by hydrological model**

**red circles – 24 hours manual according to flood course in upper sites**

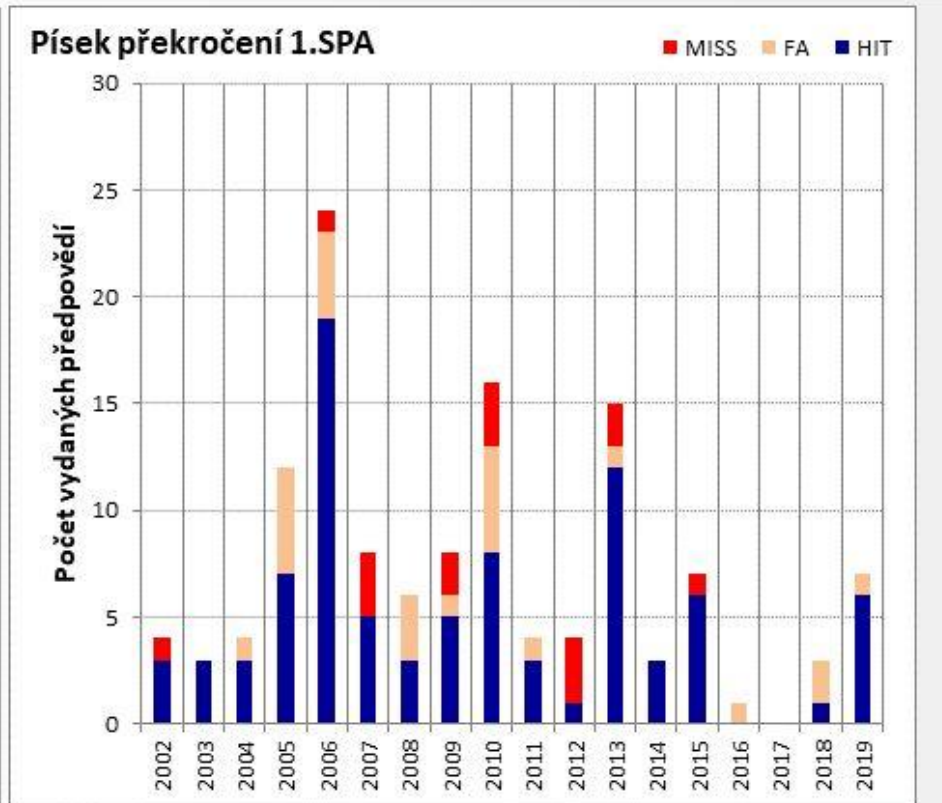
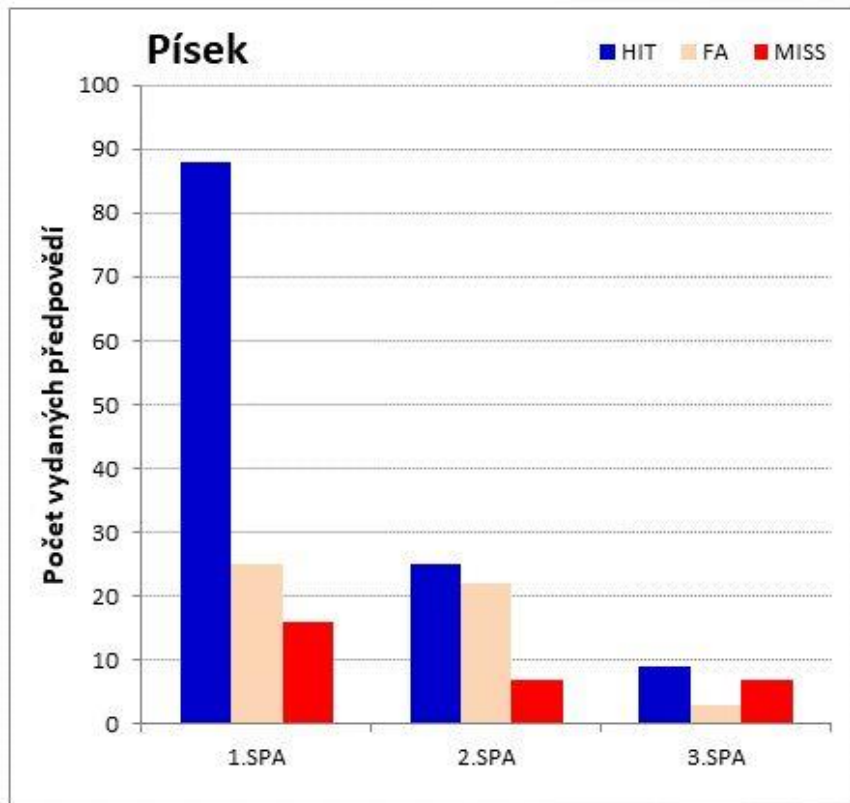
**didn't suit during the main part of flood wave**

**main reasons – doesn't depend on precipitation forecast**

- underestimated influence of large inundations (Mělník and Litoměřice areas)
- wrong information from upper gauging station (mainly from Prague) because of rating curve currently use during flood (difference about  $250 \text{ m}^3/\text{s}$ )

# Overall hydrological forecast evaluation

## The Otava river in Písek during 2012 – 1Q/2019



Number of forecast exceeding the 1., 2. and 3. flood level

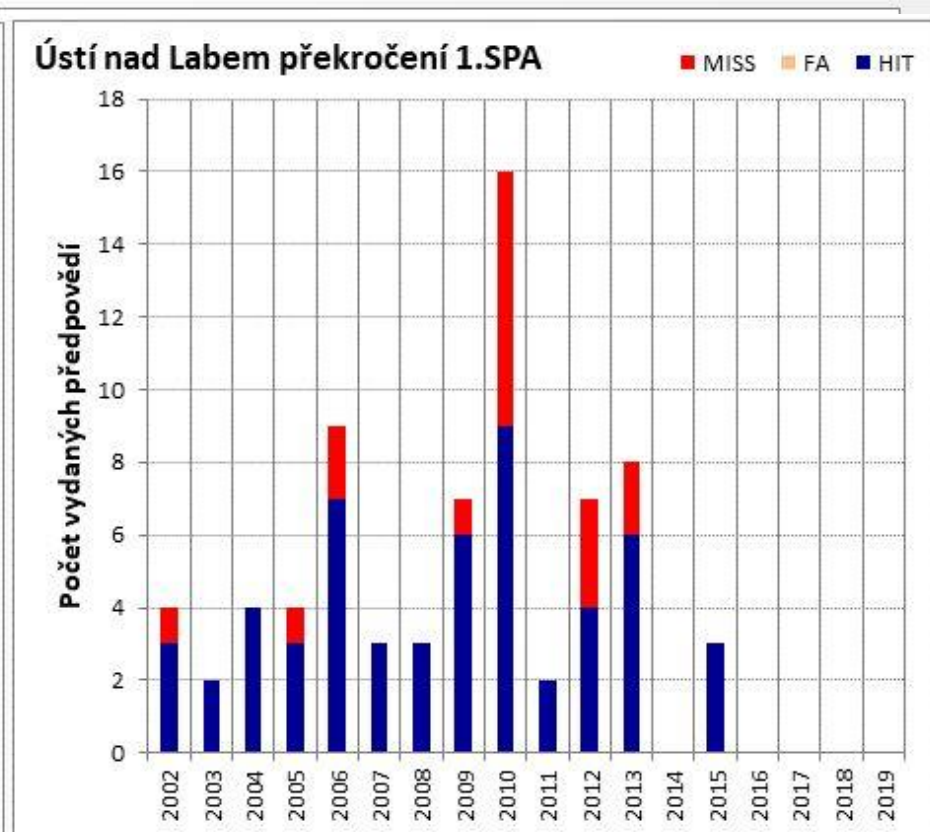
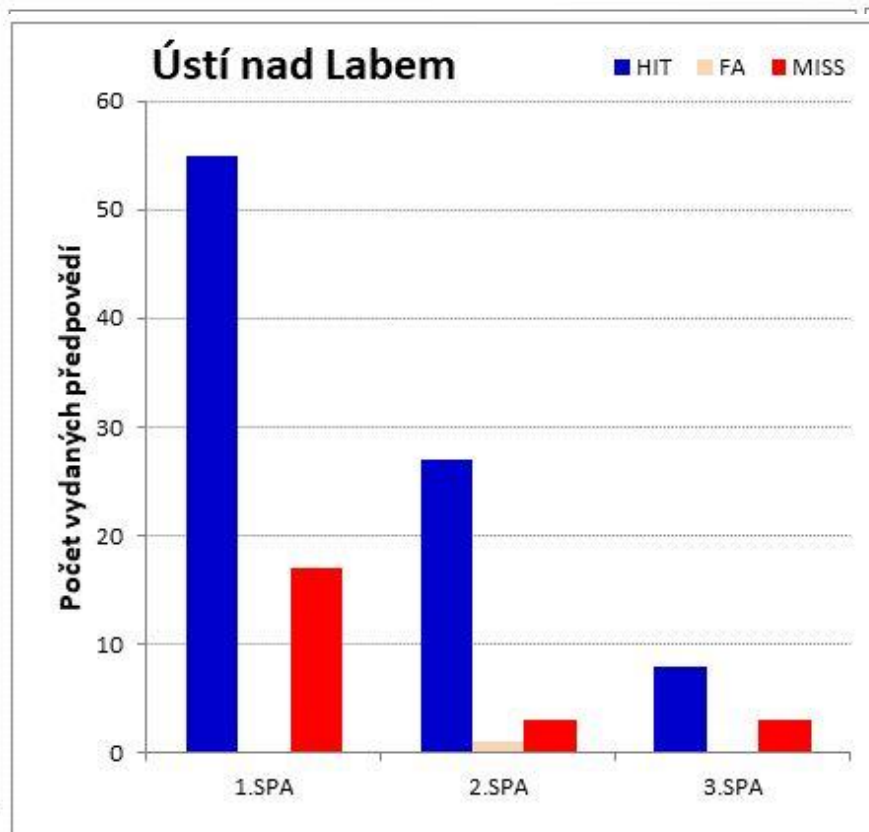
Number of forecast exceeding the 1. flood level in individual years

category of successfulness



# Overall hydrological forecast evaluation

The Elbe river in Ústí n. L. during 2012 – 1Q/2019



Number of forecast exceeding the 1., 2. and 3. flood level

Number of forecast exceeding the 1. flood level (450 cm) in individual years

category of successfulness  
hit  false alarm  miss 

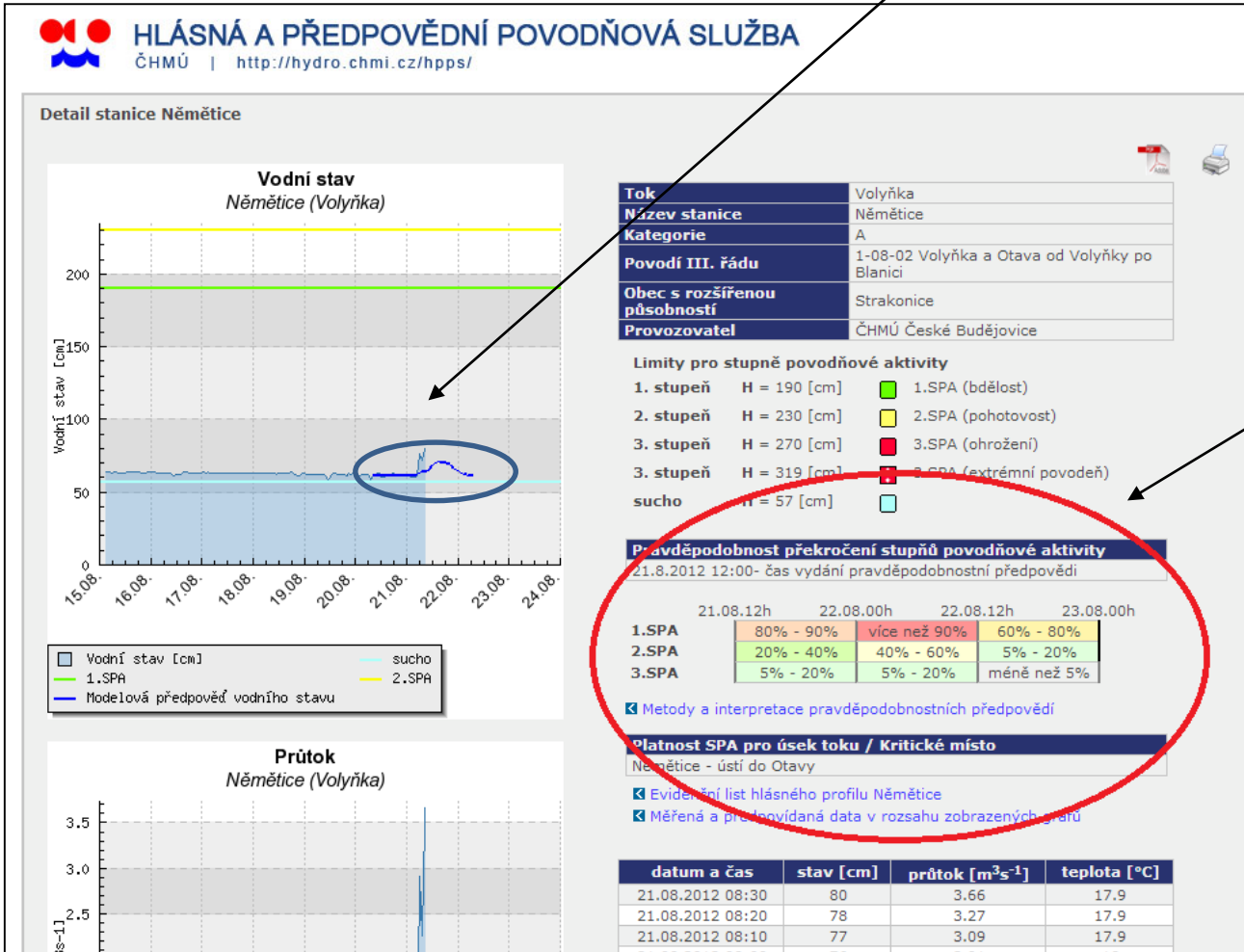




# Web presentation of flood forecast

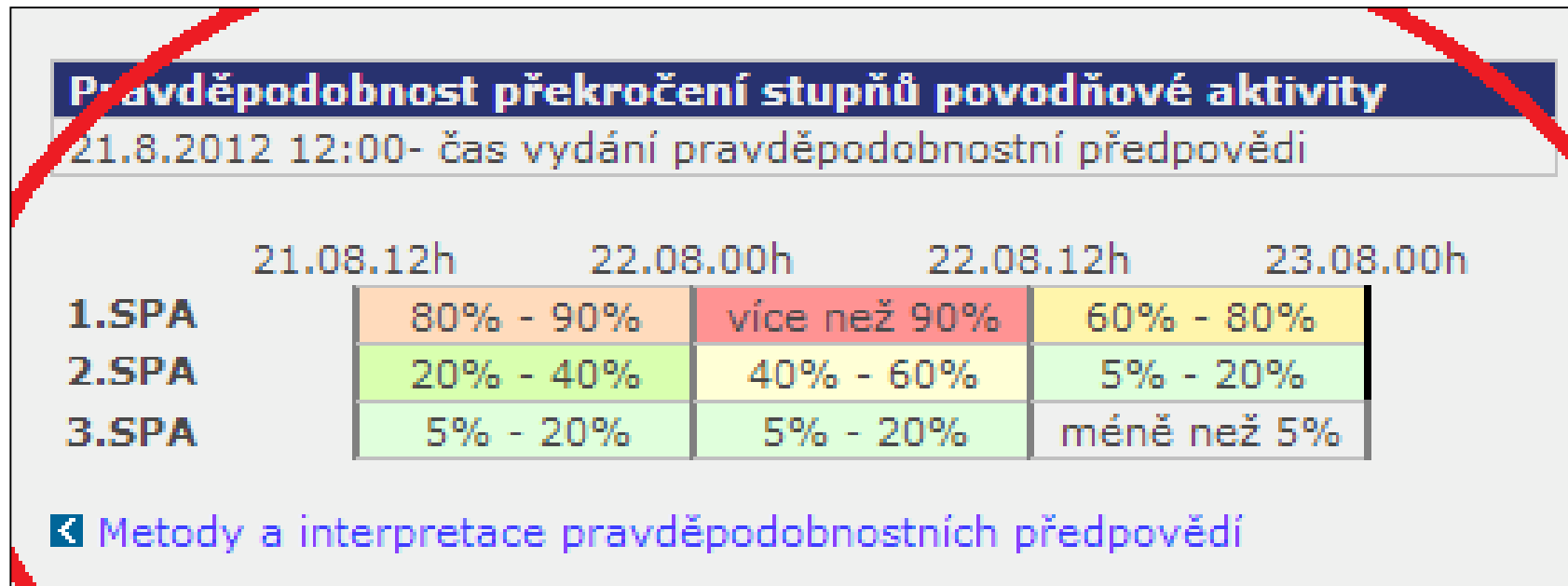
deterministic forecast

probabilistic forecast based on LAEF ensemble (16 realizations)



# Web presentation of probabilistic flood forecast

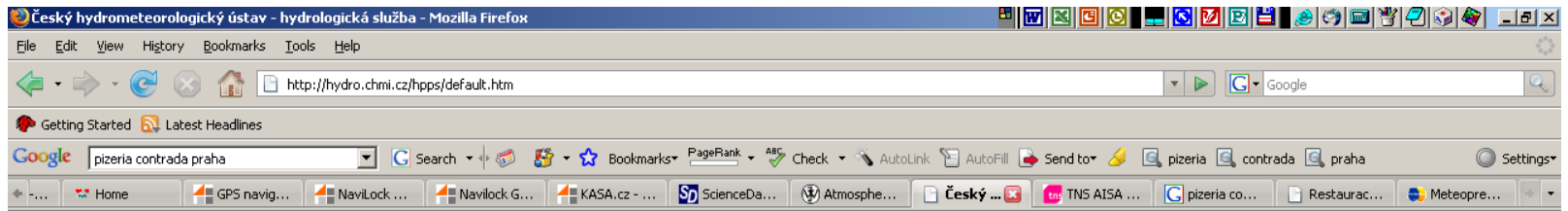
16 realizations of rainfall – runoff model based on LAEF precipitation ensemble



Probability of exceeding the 1., 2. and 3. flood level during next 48 hours



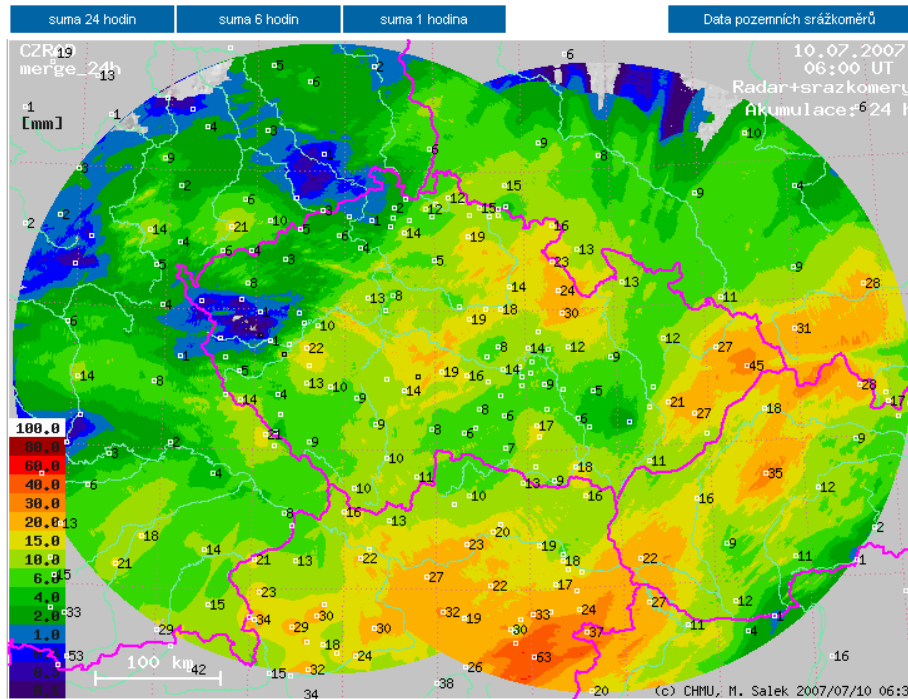
# Web presentation of precipitation



- ČHMÚ
- Výstrahy HPPS
- Zprávy HPPS
- Aktuální informace
- Hydrologické předpovědi
- Hlásné profily
- Metodický pokyn MŽP k HPPS
- Odborné pokyny HPPS
- Předpověď počasí
- Aktuální srážky
- Radarová informace
- Předpověď srážek

Český hydrometeorologický ústav  
hlásná a předpovědní povodňová služba

## Srážky na území ČR - kombinace radarového odhadu a pozemních srážkoměrů

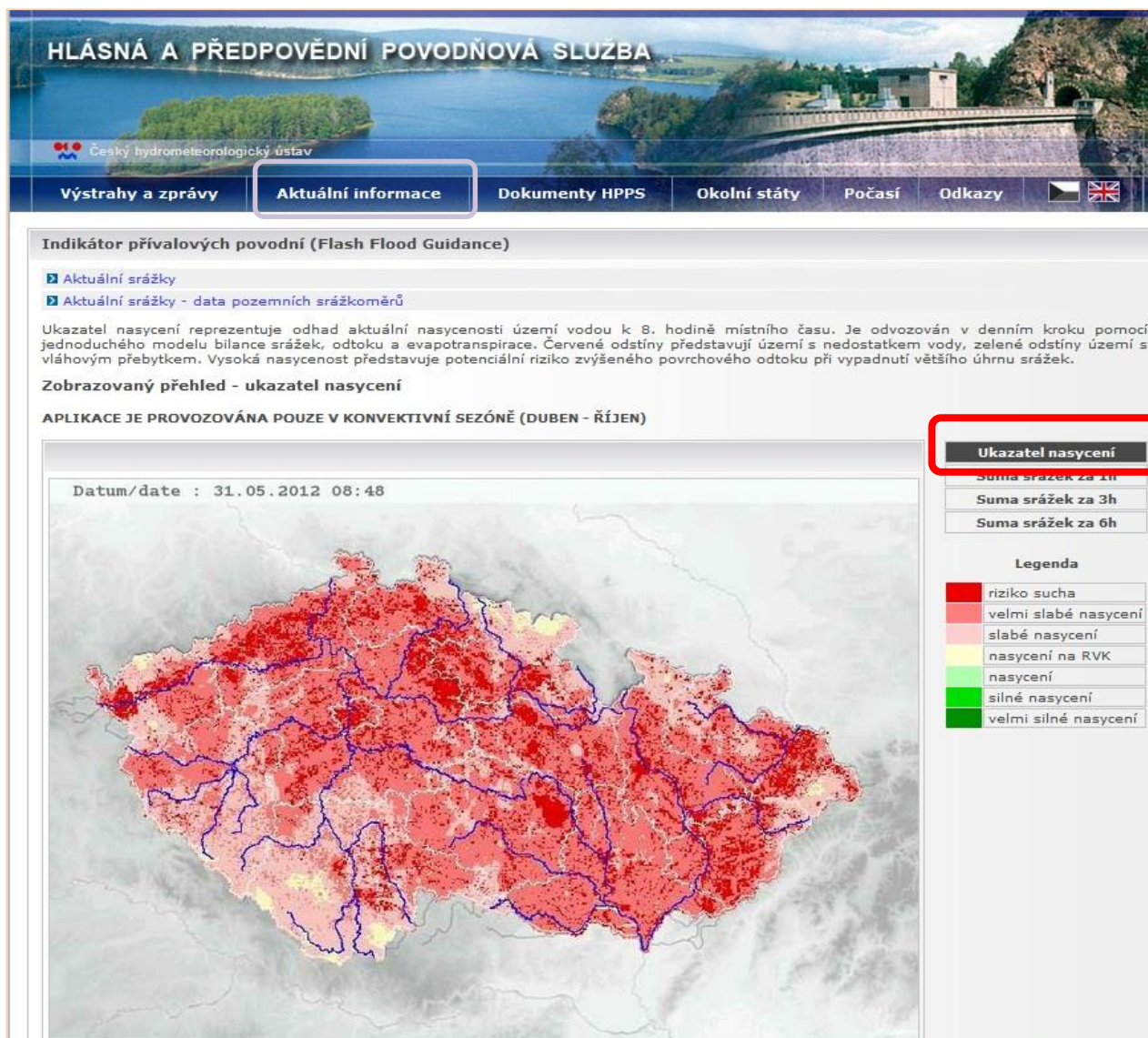


suma za 24 hodin: 0h -24h  
suma za 6 hodin: 0h -6h -12h -18h -24h -30h -36h -42h -48h  
suma za 1 hodinu: 0h -1h -2h -3h -4h -5h -6h -7h -8h -9h -10h -11h -12h -13h -14h -15h -16h -17h -18h -19h -20h -21h -22h -23h -24h  
Prezentované mapy jsou kombinací výstupů meteorologických radarů a pozemních srážkoměrů. Sumy za 24h jsou tvořeny jednou denně (k 6:00 UTC), šestihodinové sumy pak 4x denně (k 00:00, 6:00, 12:00 a 18:00 UTC). Více o principu a možných nepřesnostech produktu naleznete [zde](#).

1, 3, 6 and 24 hour precipitation based on combination of radar images and ground measurement

updating by 10 minutes  
updating by 1 hour

# Convective season – Flash Flood Guidance



Soil saturation estimate (modelled)

Legend:  
risk of drought  
very low saturation  
low saturation  
level of water capacity  
strong saturation  
very strong saturation





# Convective season – Flash Flood Guidance



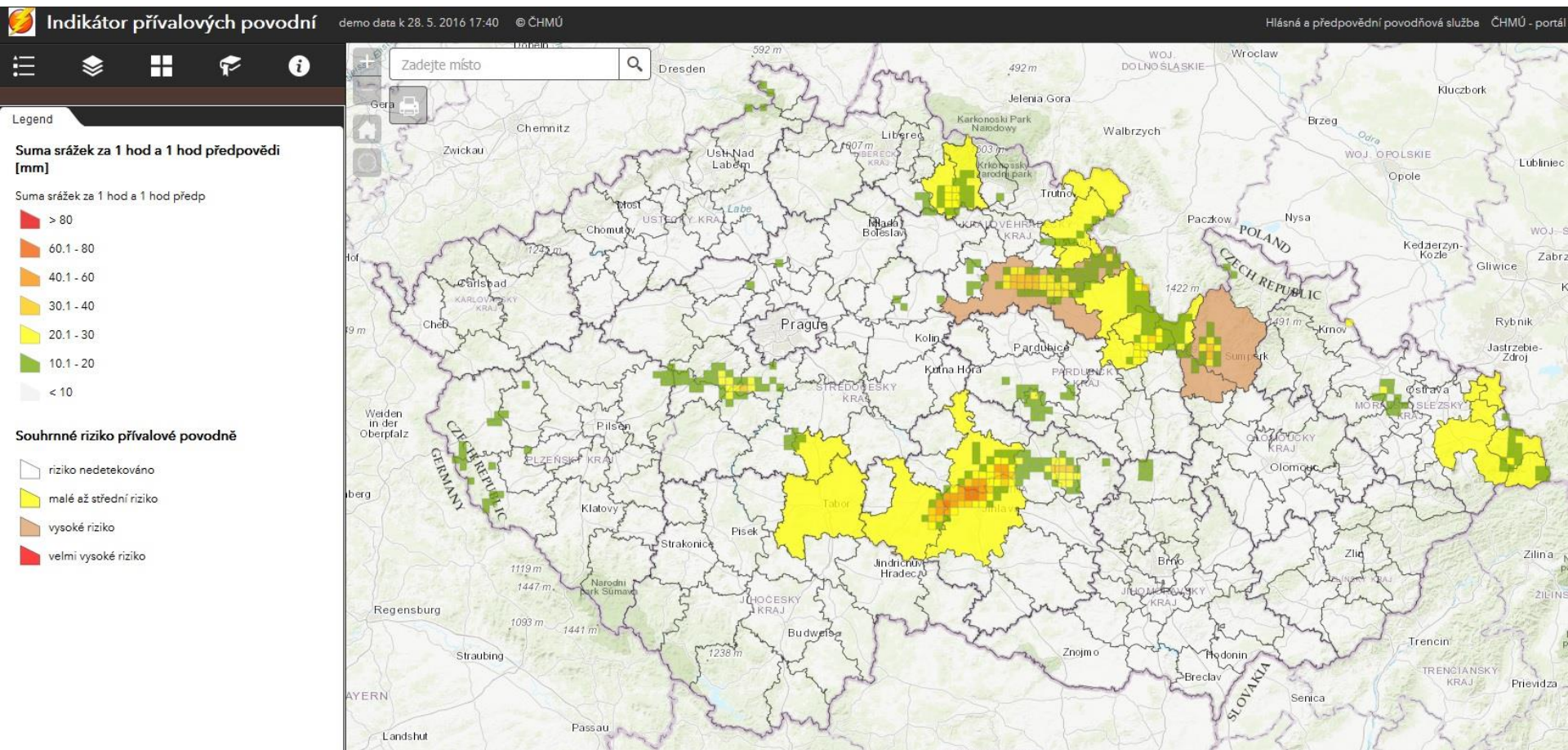
**Precipitation  
threshold for 1, 3, 6h**

**(potential rainfall  
that can cause risk  
of direct runoff)**





# Convective season – Flash Flood Guidance



Simple hydrological model in 3x3 km grid, based on geographical characteristics and rainfall by radar images, computation surface runoff in 15 minutes time step, estimates of overall risk of flash flood (low or middle, high, very high).





**Look at WEB address**

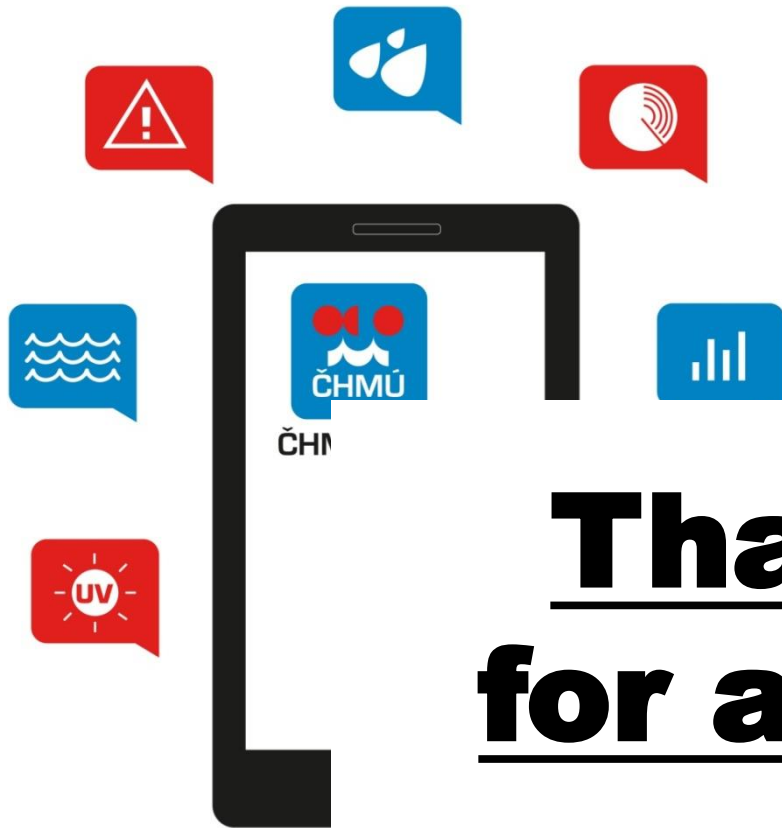


<http://hydro.chmi.cz/hpps/>  
<http://portal.chmi.cz>

**Předpověď' na dotek**  
**Forecast on touch**

Mobile application  
for Android and iOS





**Look at WEB address**



[https/](https://)

**Thank you**  
**for attention**

**Předpověď' na dotek**  
**Forecast on touch**

[jan.kubat@chmi.cz](mailto:jan.kubat@chmi.cz)  
[radek.cekal@chmi.cz](mailto:radek.cekal@chmi.cz)

**Mobile application**  
**for Android and iOS**

