Cagliari
WG F Workshop „Flash Floods and Pluvial Flooding“
May 2010

STORM RAINFALL DETECTION AND FORECASTING – THE CZECH EXPERIENCE

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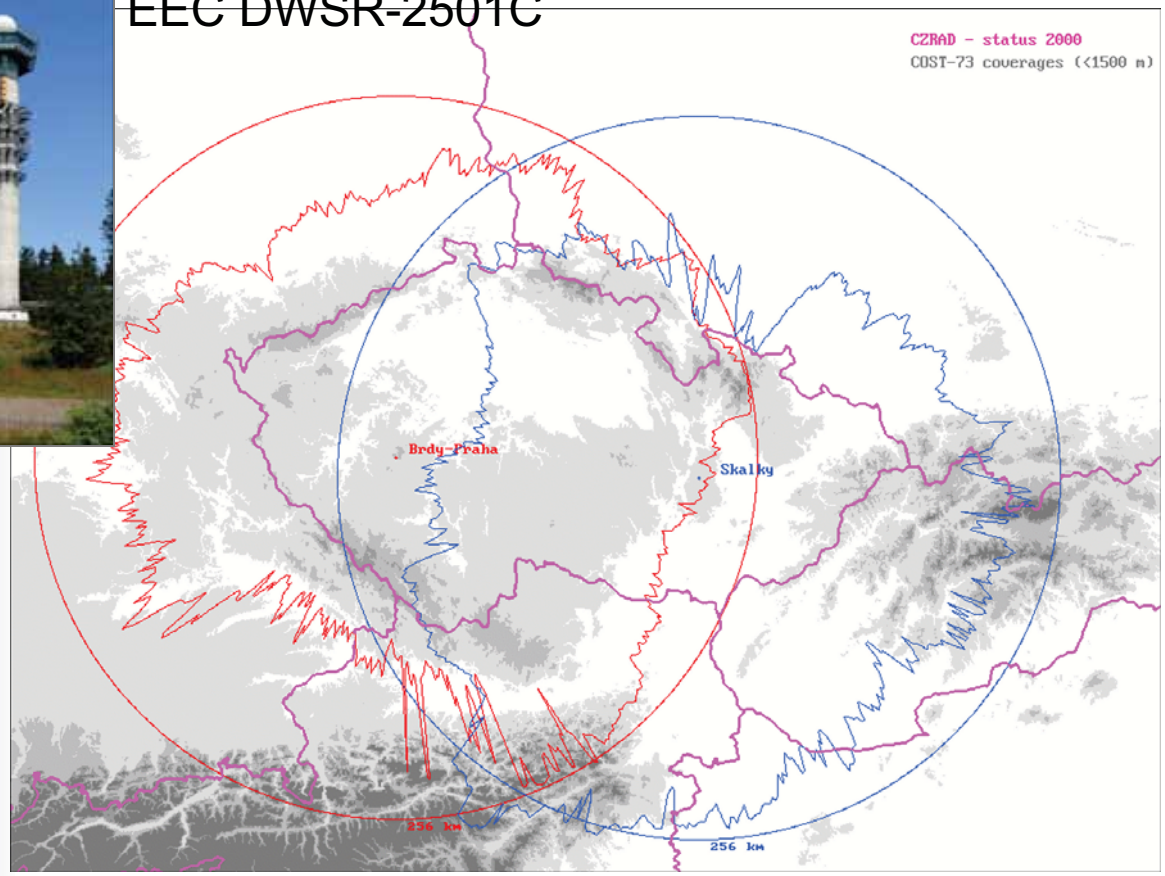
ČHMÚ

OUTLINE

- Meteorological radars and observation
- Example of June 2009 flash flood
- Nowcasting, WarnView and Flash Flood Guidance

Meteorological radars and observation

EEC DWSR-2501C



$Z = a \cdot R^b$

Z (mm6/m3)

R (mm/hr)

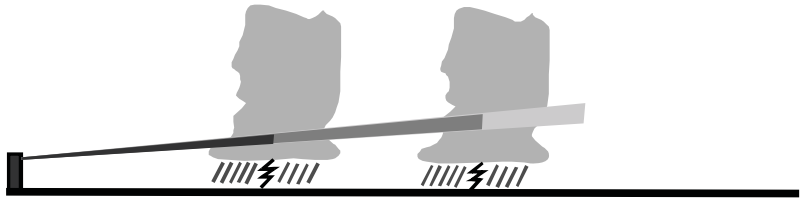
a = 200, b = 1,6

Gematronic
METEOR 360AC

- 2 C-band Doppler Weather radars (1km, 10 - 5 min)
- covered whole territory of the Czech Republic and near surroundings

Meteorological radars and observation

Radar errors:



Hardware

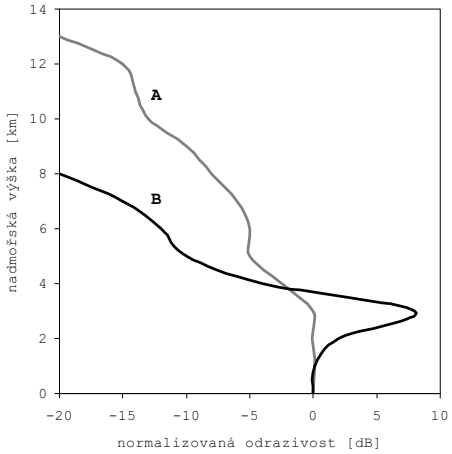
- calibration
- attenuation

$$729 * (1mm) = 1 * (3mm)$$

$$382 = 14 \quad [mm3]$$

Microphysics

- different size of rain drops
- snow / rain

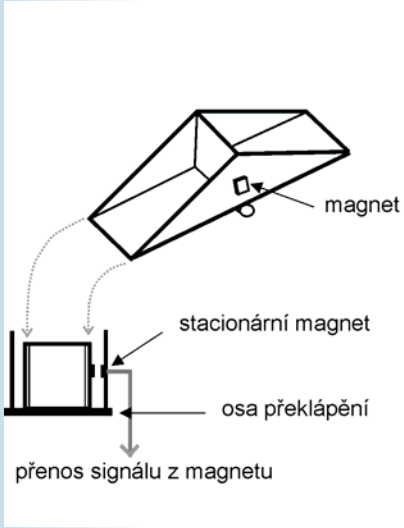


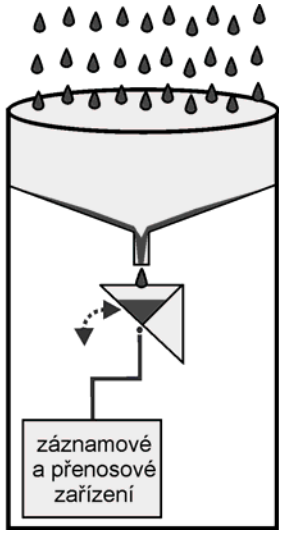
Sampling Geometry

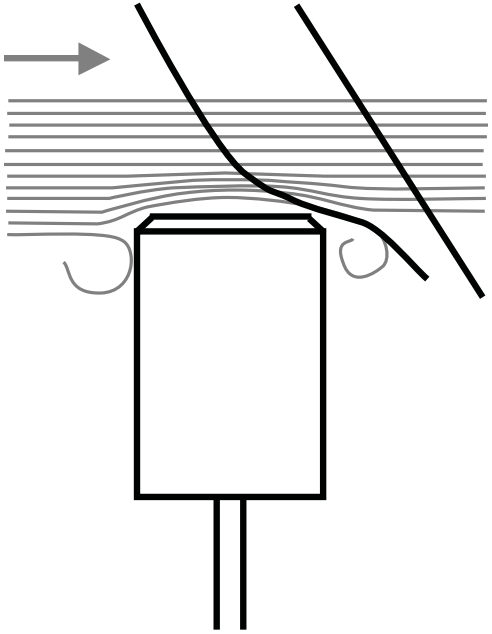
- beam blockage
- vertical profile of reflectivity

Meteorological radars and observation

Automatic rain gauges (250)
- GPRS
- 10 min
- „precise“ point measurement





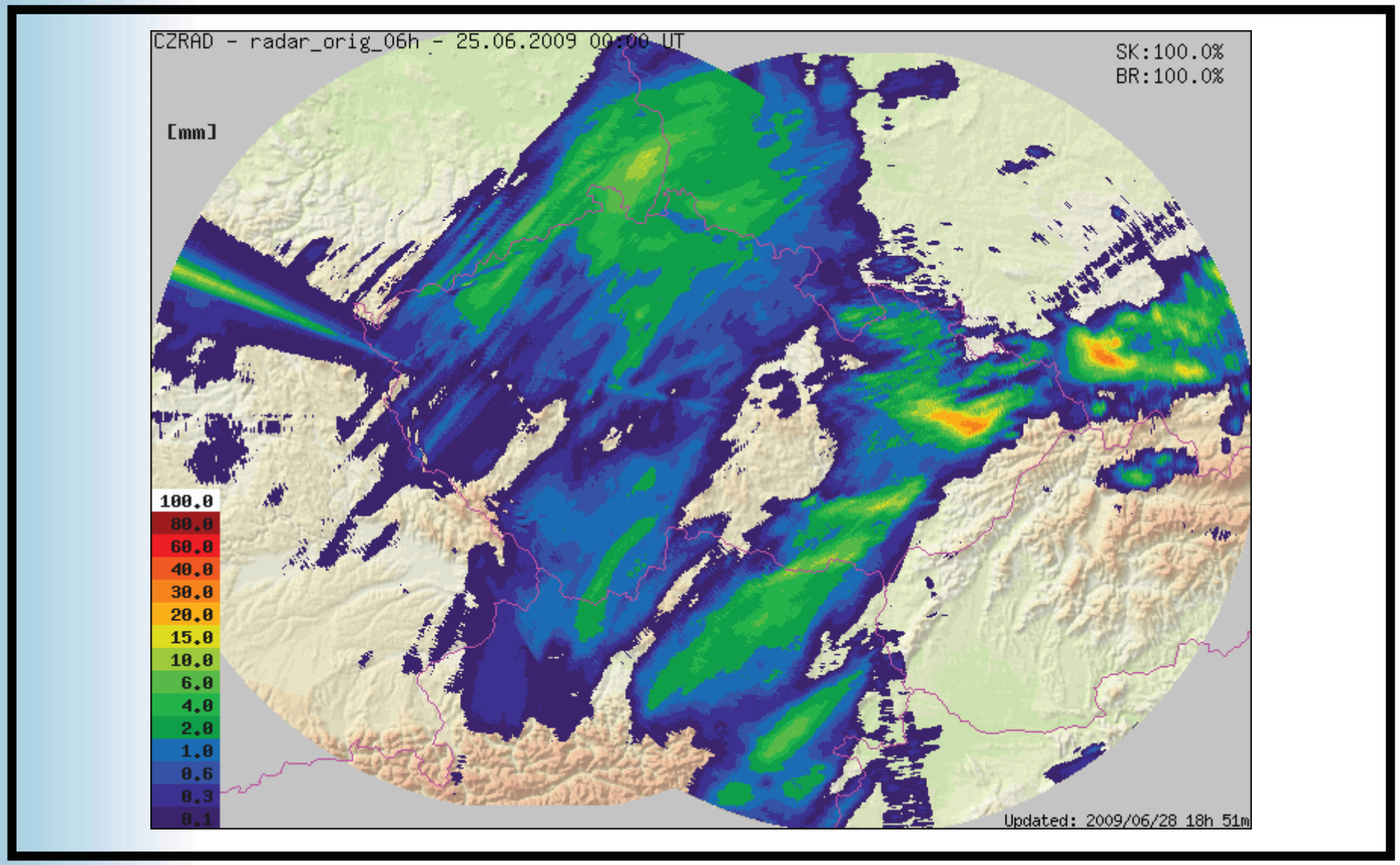


ČHMÚ

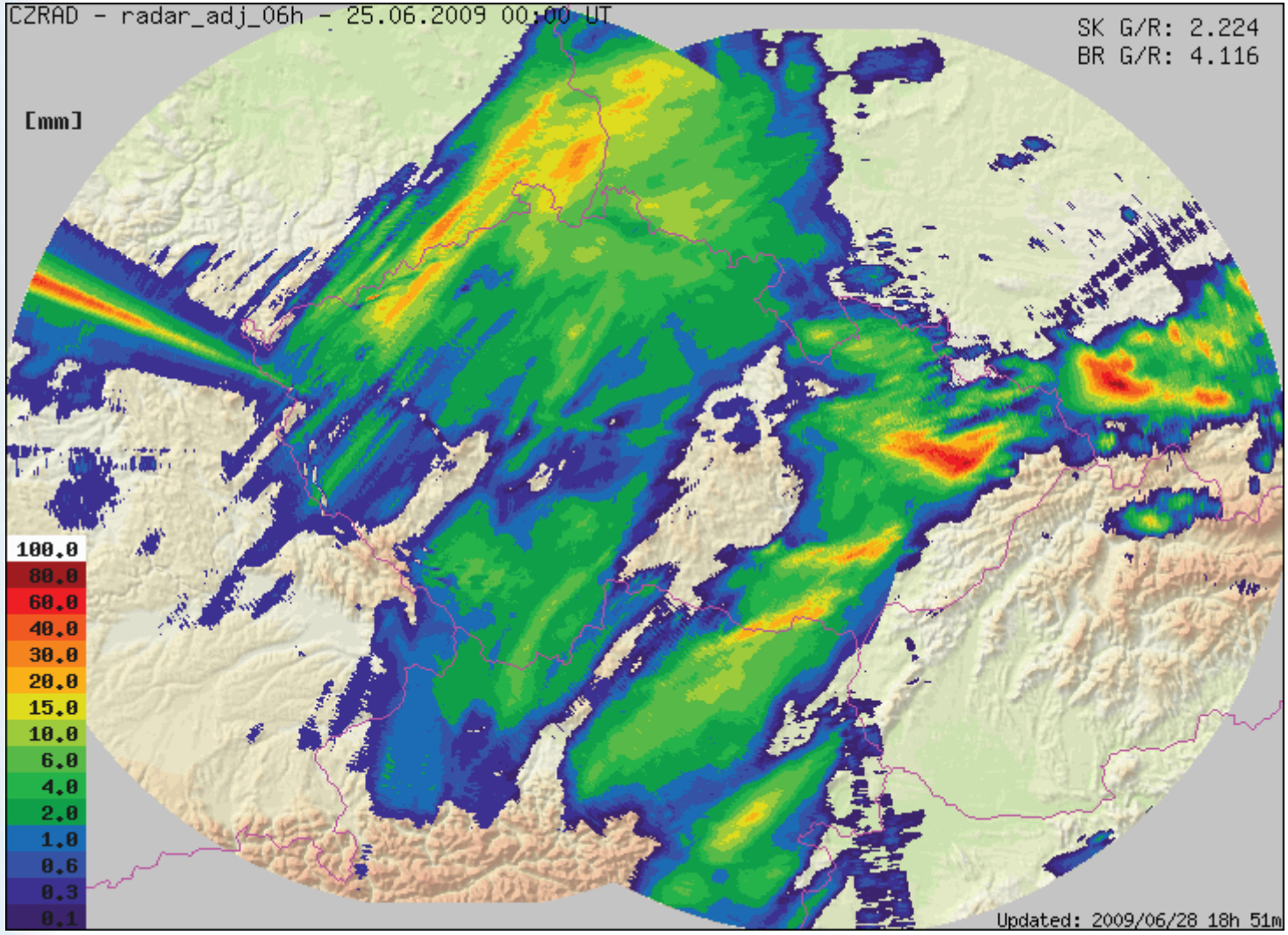
Meteorological radars and observation

Radar – rain gauge combination product
- regression krigging
- (if radar <80% of time – rain gauge only)
- 1-, 3-, 6-, 24-h sum
- 20h moving average of error used

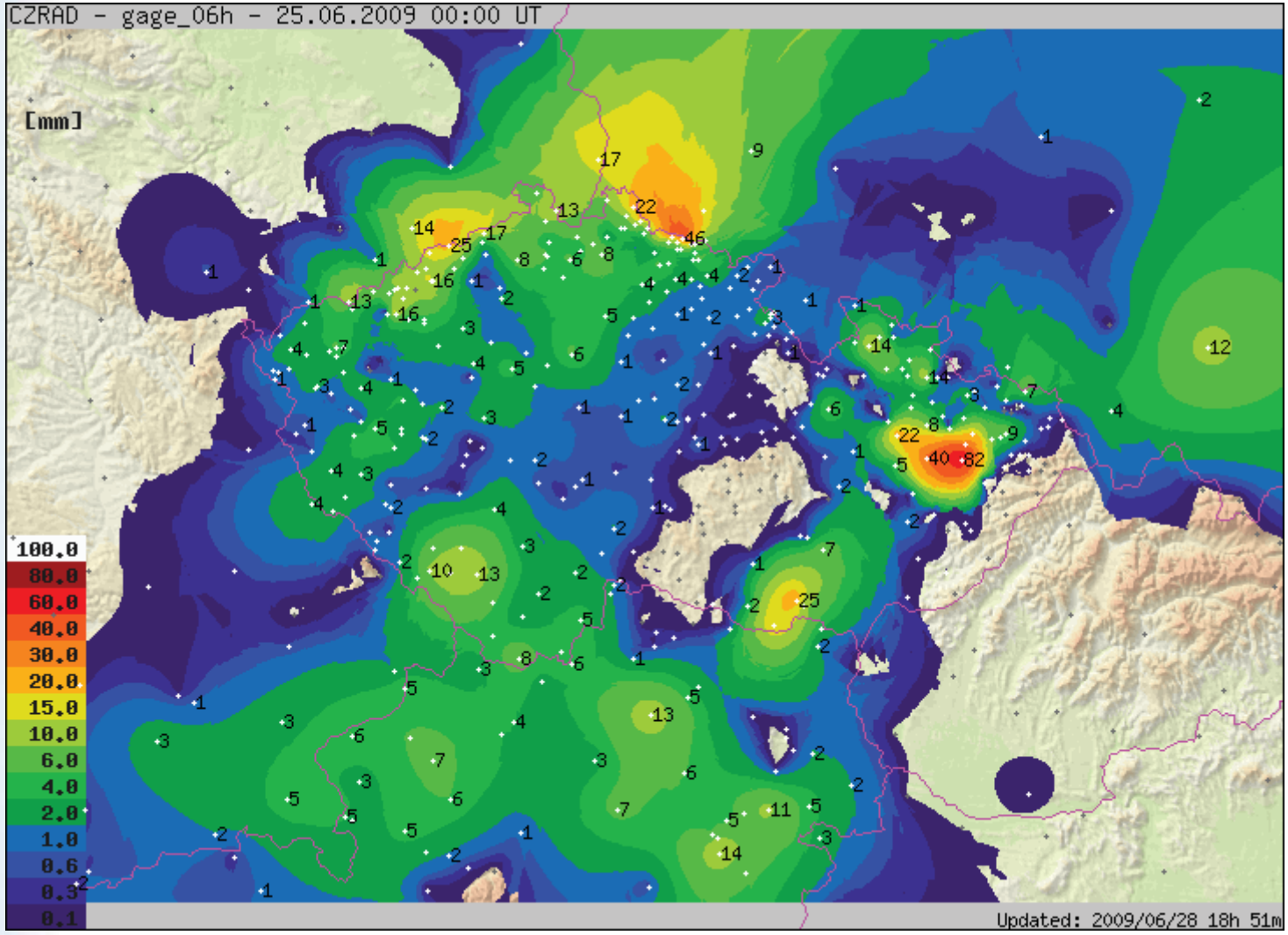
Meteorological radars and observation



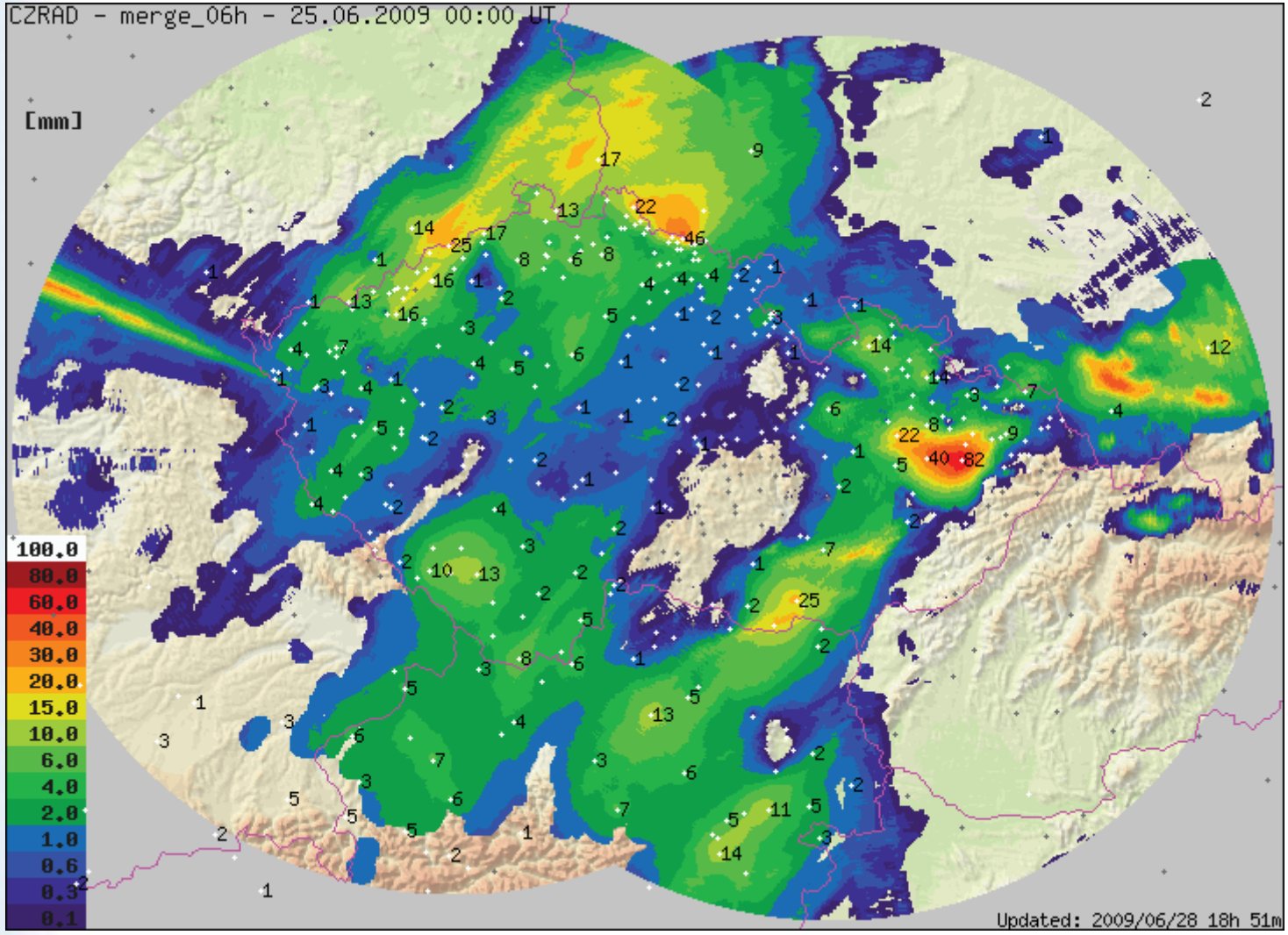
Meteorological radars and observation



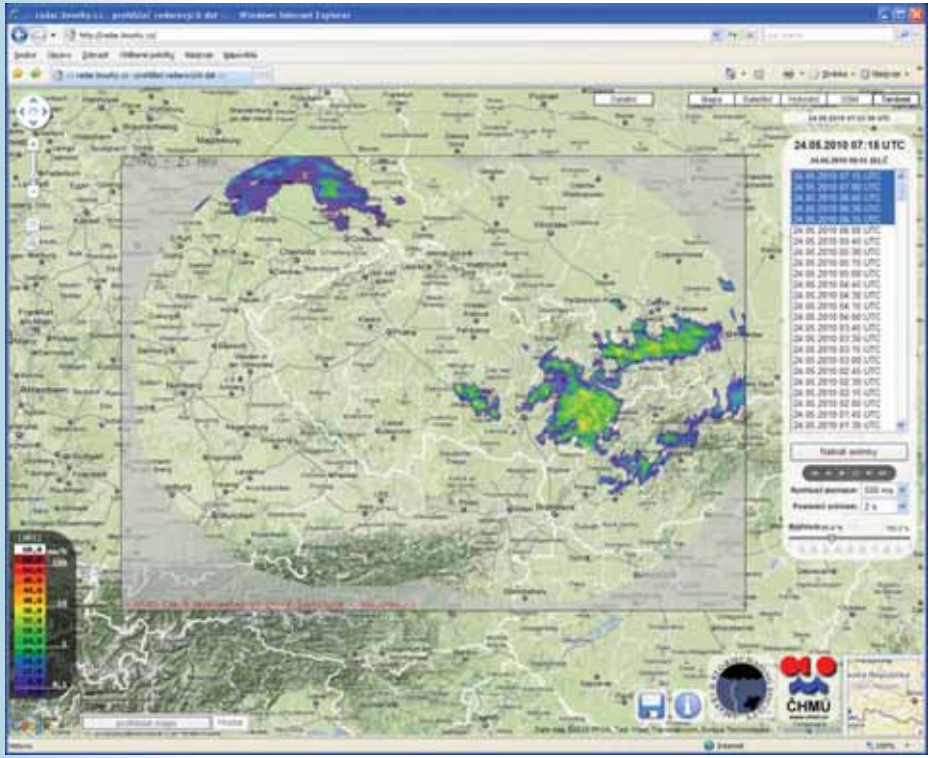
Meteorological radars and observation



Meteorological radars and observation

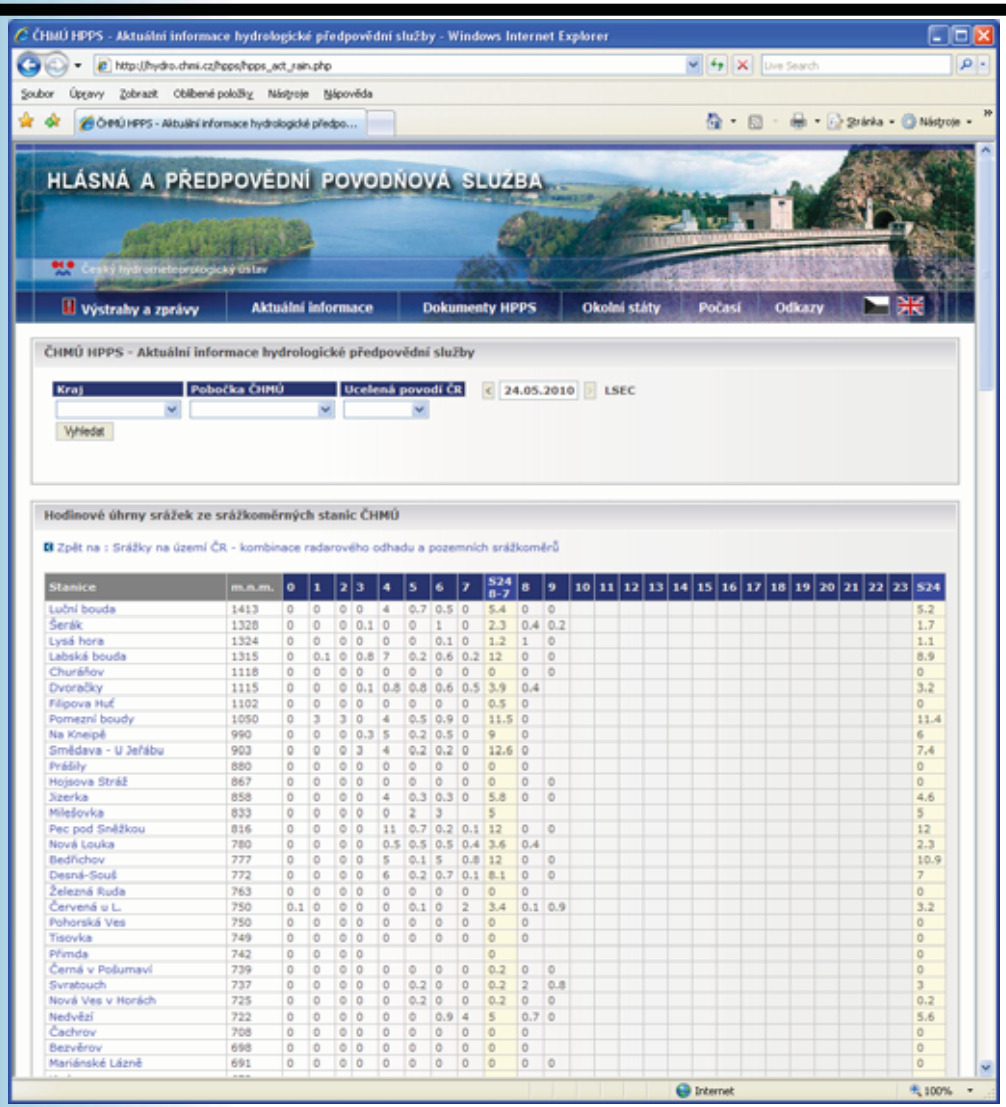


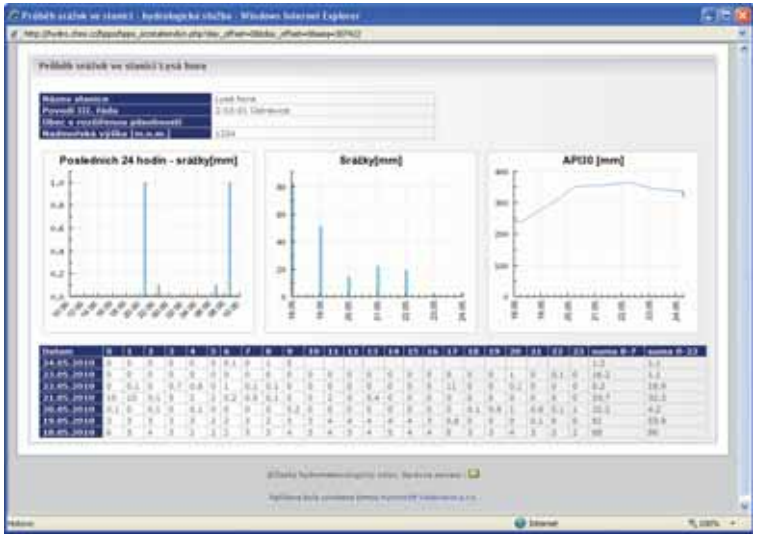
Data for public



http://radar.bourky.cz
http://www.chmi.cz

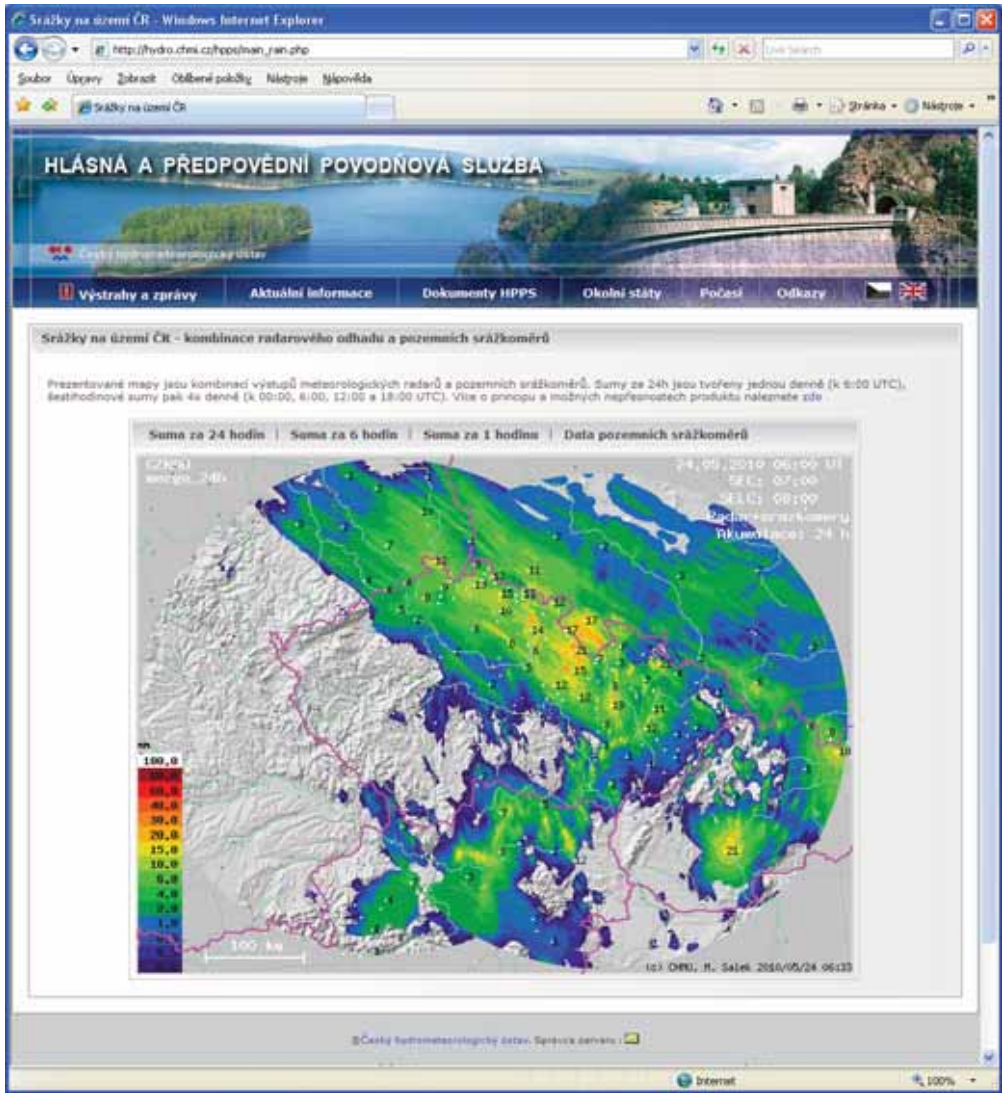
Data for public



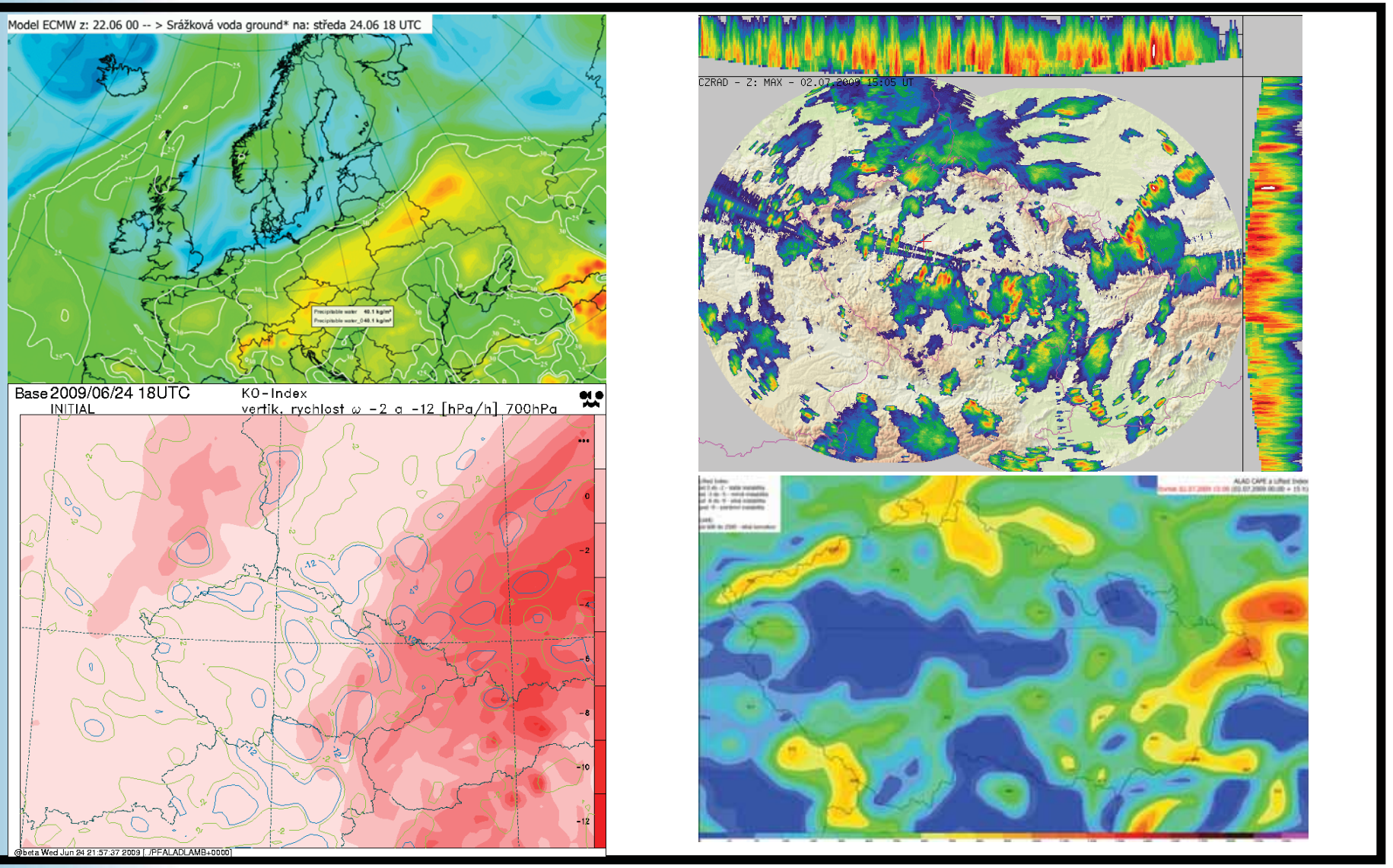


http://hydro.chmi.cz

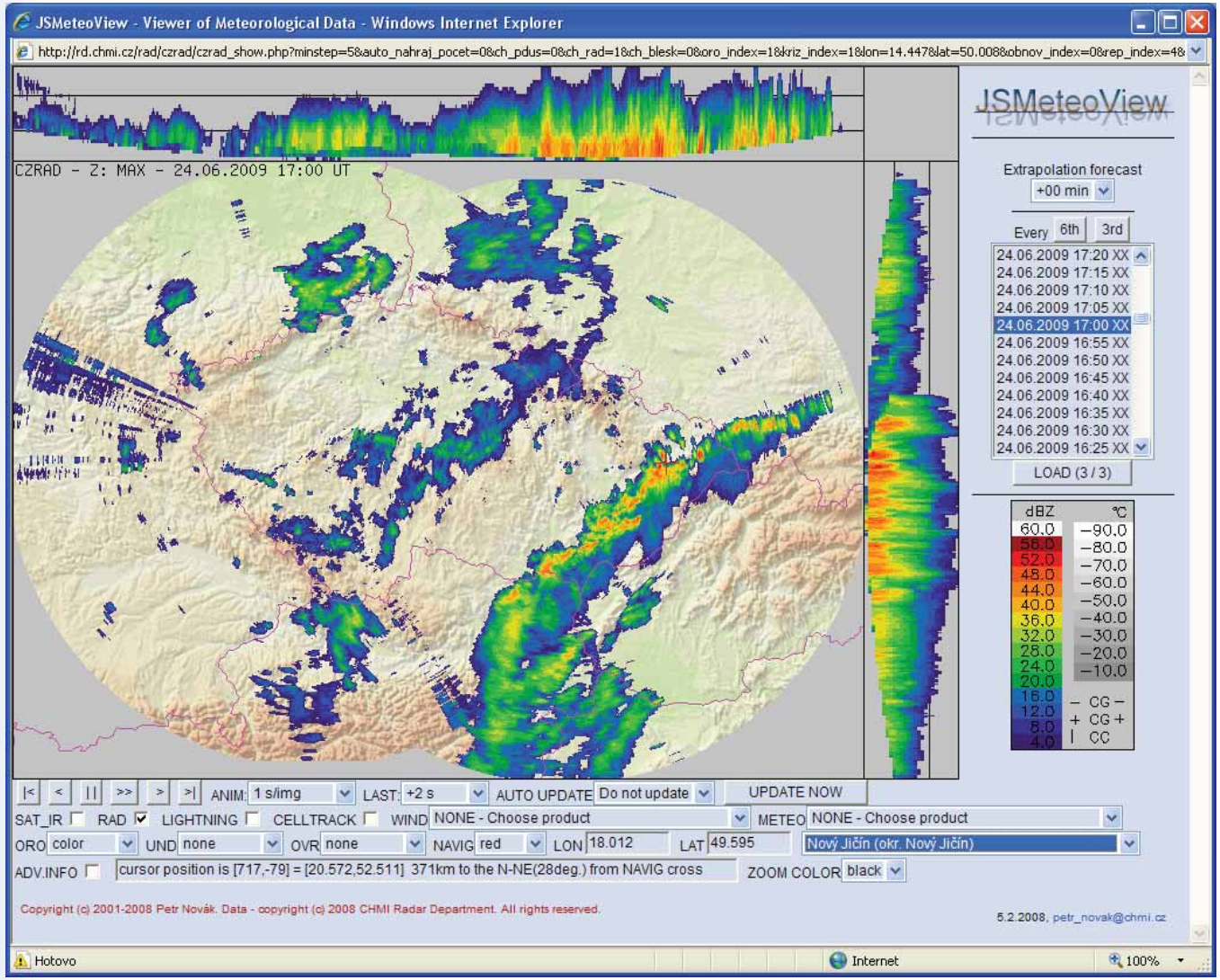
Data for public



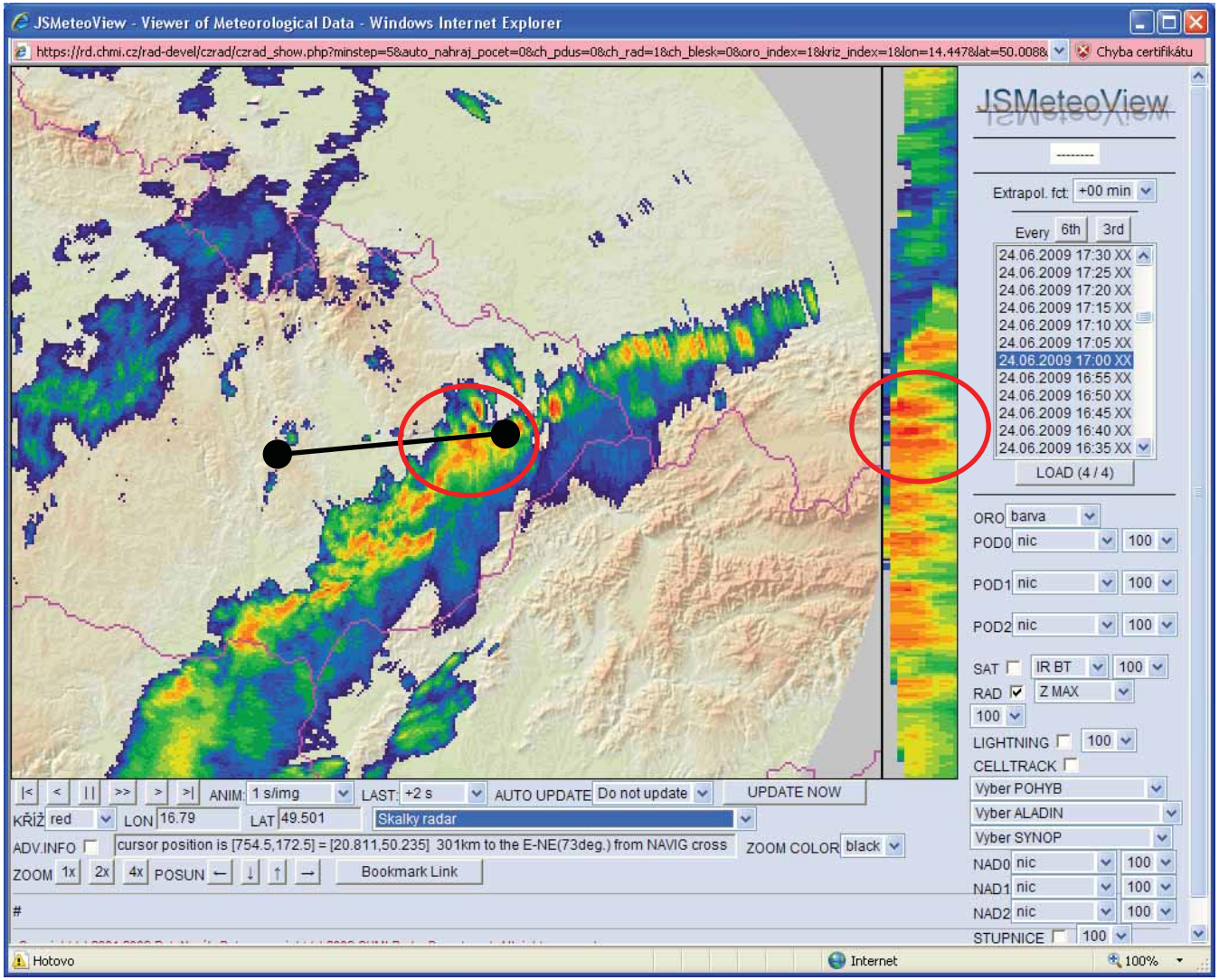
June 24th, July 2nd 2009



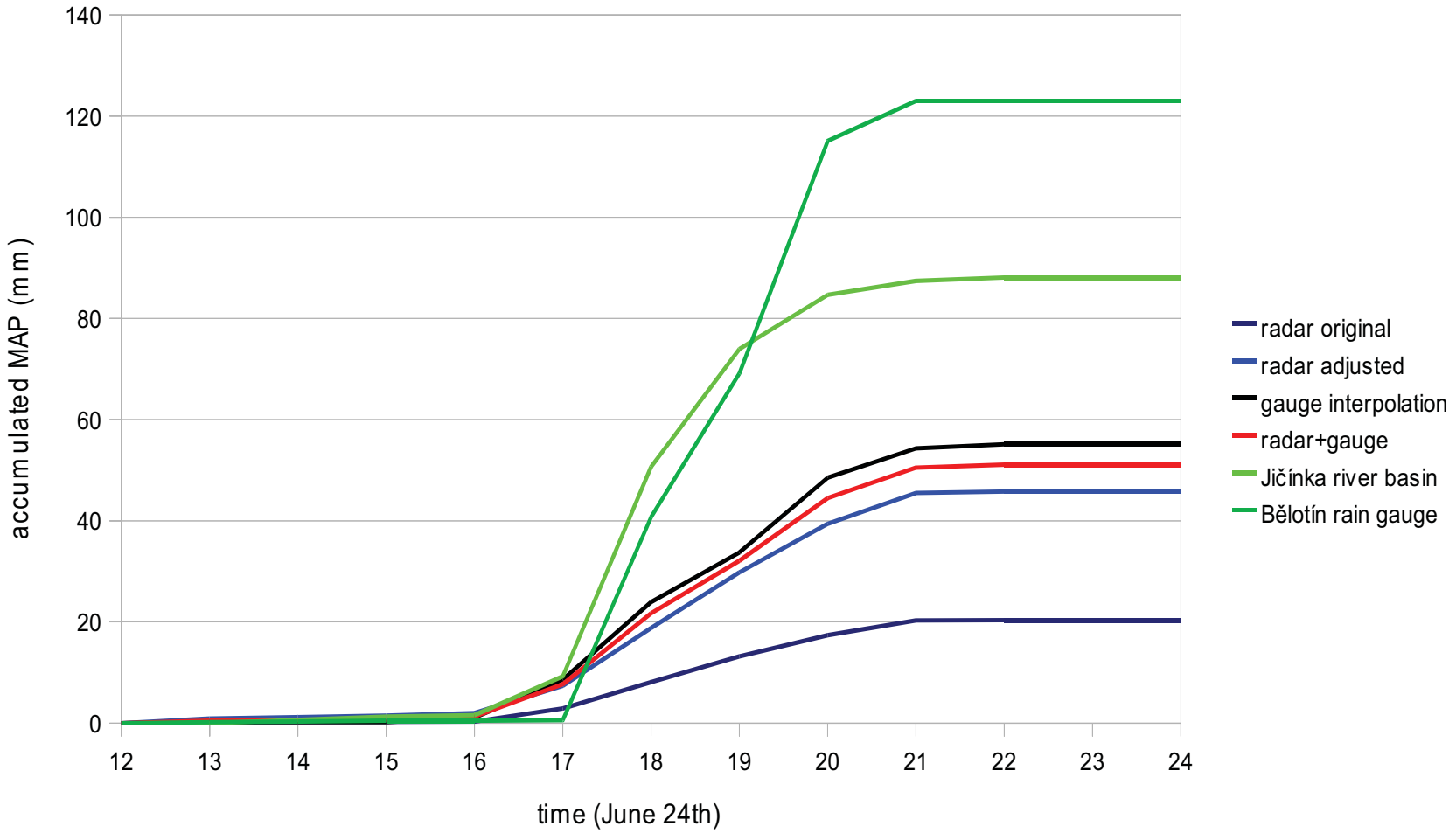
June 24th 2009



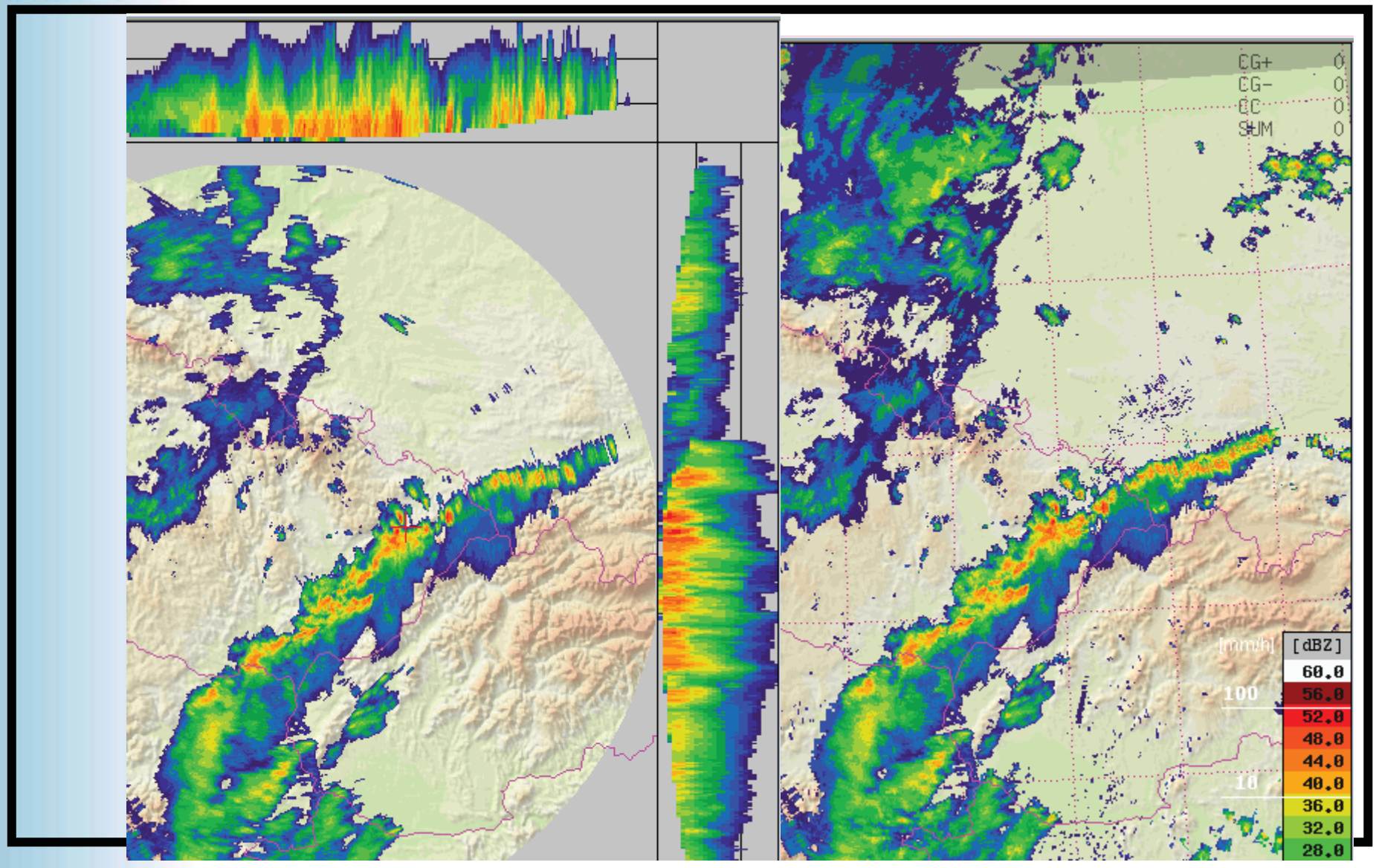
June 24th 2009



June 24th 2009



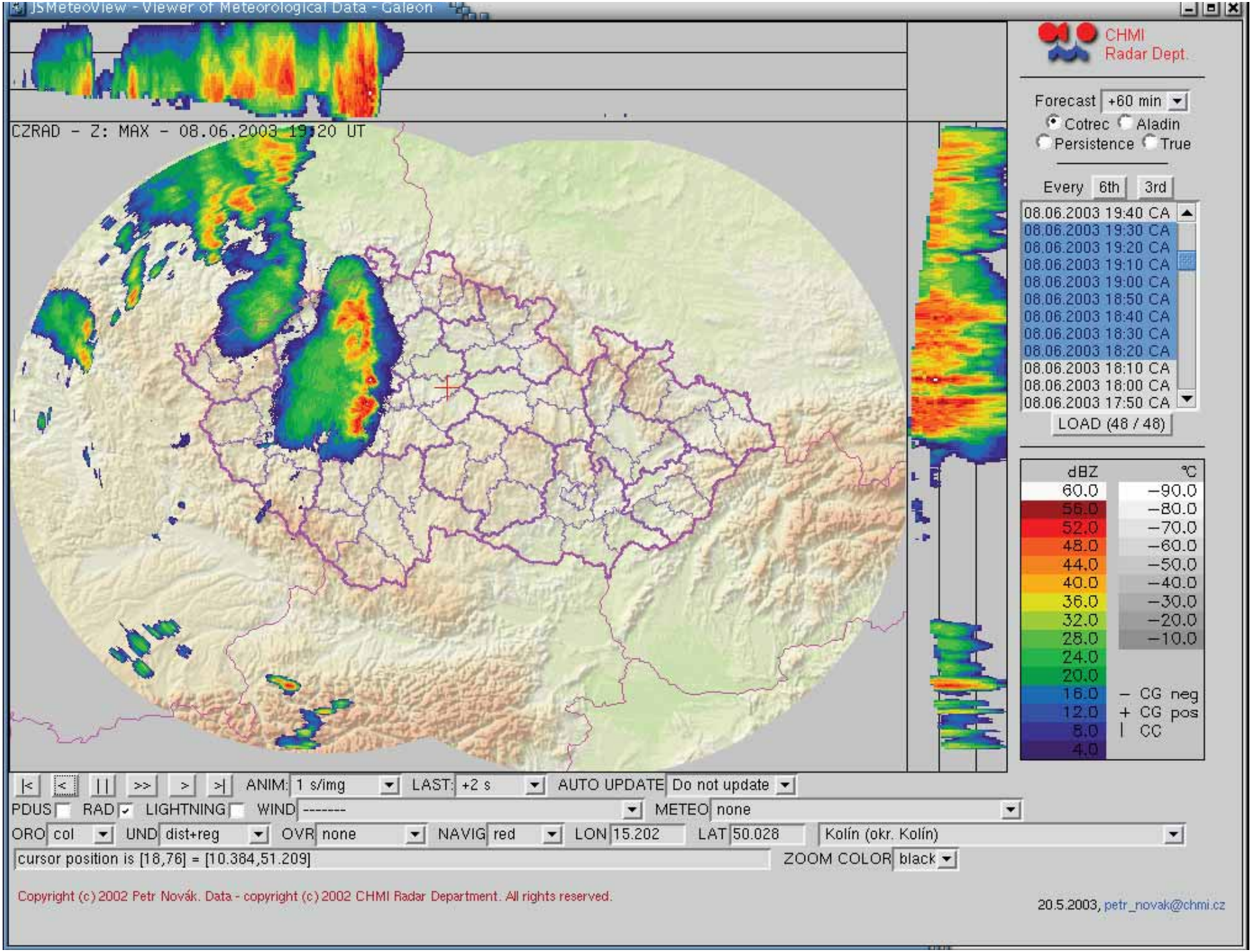
June 24th 2009



ČHMÚ

Nowcasting etc.

- Short term forecast (90 minutes in CZ)
- Radar echo extrapolation (COTREC, NWP)
- Doesn’t create new cells, does’nt change intensity


JSMeteoView - Viewer of Meteorological Data - Galeon
CZRAD - Z: MAX - 08.06.2003 19:20 UT
CHMI
Radar Dept.
Forecast +60 min
Cotrec Aladin
Persistence True
Every 6th 3rd
08.06.2003 19:40 CA
08.06.2003 19:30 CA
08.06.2003 19:20 CA
08.06.2003 19:10 CA
08.06.2003 19:00 CA
08.06.2003 18:50 CA
08.06.2003 18:40 CA
08.06.2003 18:30 CA
08.06.2003 18:20 CA
08.06.2003 18:10 CA
08.06.2003 18:00 CA
08.06.2003 17:50 CA
LOAD (48 / 48)
dBZ
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52.0
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40.0
36.0
32.0
28.0
24.0
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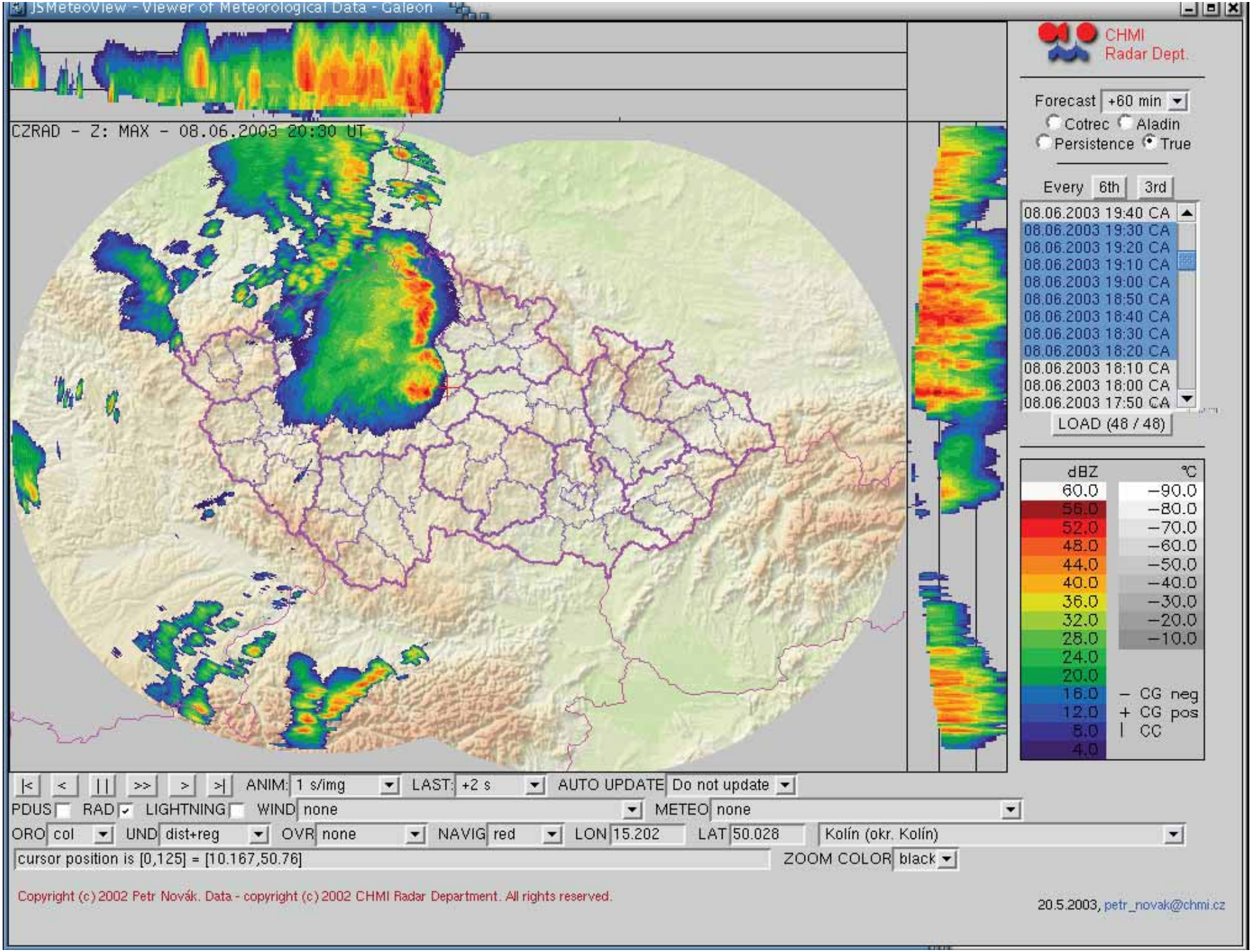
−80.0
−70.0
−60.0
−50.0
−40.0
−30.0
−20.0
−10.0
− CG neg
+ CG pos
| CC
|< < || >> > >| ANIM: 1 s/img LAST: +2 s AUTO UPDATE Do not update
PDUS RAD LIGHTNING WIND ------- METEO none
ORO col UND dist+reg OVR none NAVIG red LON 15.202 LAT 50.028 Kolín (okr. Kolín)
cursor position is [18,76] = [10.384,51.209] ZOOM COLOR black
Copyright (c) 2002 Petr Novák. Data - copyright (c) 2002 CHMI Radar Department. All rights reserved.
20.5.2003, petr_novak@chmi.cz


JSMeteoView - Viewer of Meteorological Data - Galeon
CZRAD - Z: MAX - 08.06.2003 20:30 UT
CHMI
Radar Dept.
Forecast +60 min
Cotrec Aladin
Persistence True
Every 6th 3rd
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08.06.2003 19:30 CA
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|< < || >> > >| ANIM: 1 s/img LAST: +2 s AUTO UPDATE Do not update
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ORO col UND dist+reg OVR none NAVIG red LON 15.202 LAT 50.028 Kolín (okr. Kolín)
cursor position is [0,125] = [10.167,50.76] ZOOM COLOR black
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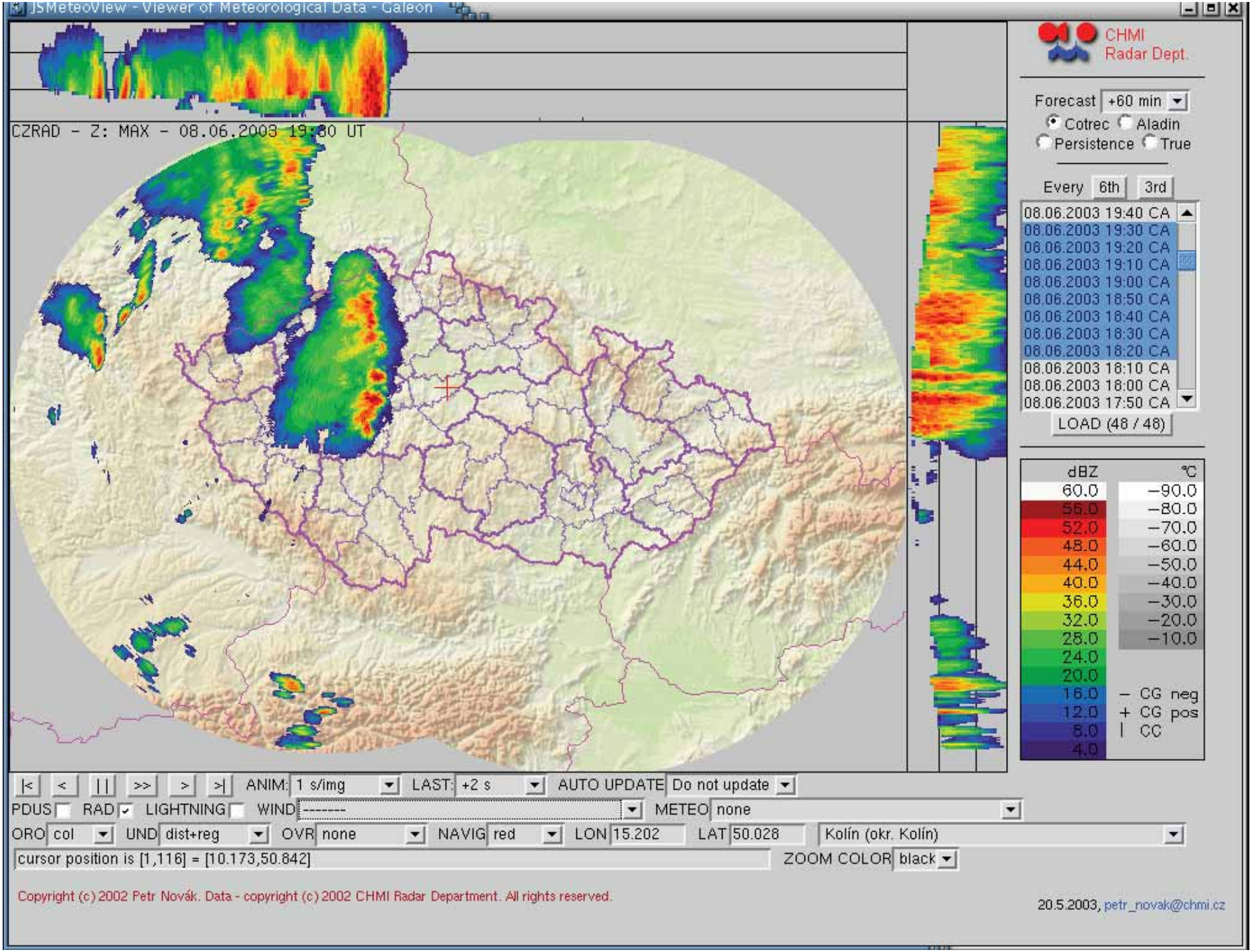
JSMeteoView - Viewer of Meteorological Data - Galeon
CZRAD - Z: MAX - 08.06.2003 19:30 UT
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Radar Dept.
Forecast +60 min
Cotrec Aladin
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|< < || >> > >| ANIM: 1 s/img LAST: +2 s AUTO UPDATE Do not update
PDUS RAD LIGHTNING WIND ------- METEO none
ORO col UND dist+reg OVR none NAVIG red LON 15.202 LAT 50.028 Kolín (okr. Kolín)
cursor position is [1,116] = [10.173,50.842] ZOOM COLOR black
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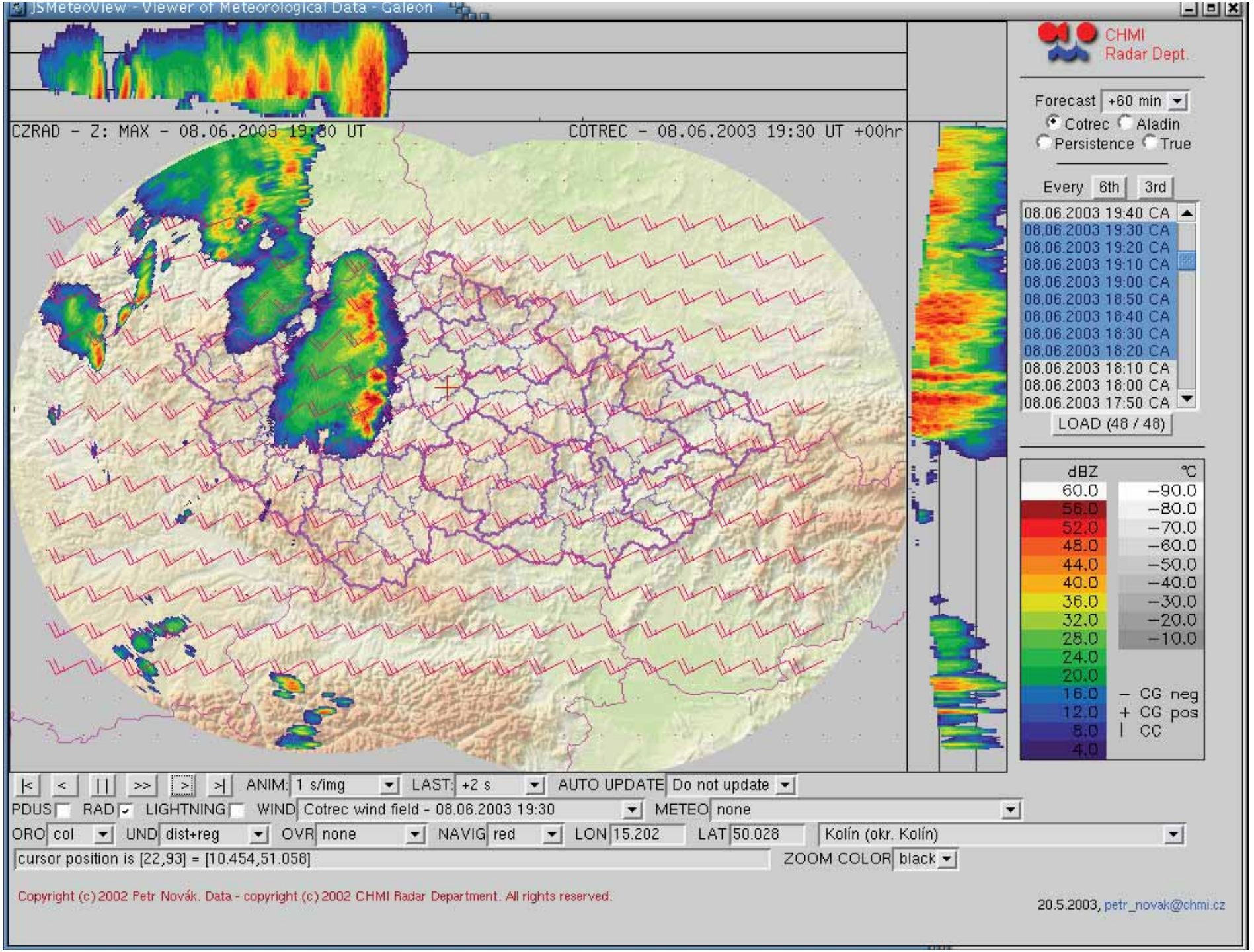
JSMeteoView - Viewer of Meteorological Data - Galeon
CZRAD - Z: MAX - 08.06.2003 19:30 UT
COTREC - 08.06.2003 19:30 UT +00hr
CHMI
Radar Dept.
Forecast +60 min
Cotrec Aladin
Persistence True
Every 6th 3rd
08.06.2003 19:40 CA
08.06.2003 19:30 CA
08.06.2003 19:20 CA
08.06.2003 19:10 CA
08.06.2003 19:00 CA
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08.06.2003 17:50 CA
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−20.0
−10.0
− CG neg
+ CG pos
| CC
ANIM: 1 s/img
LAST: +2 s
AUTO UPDATE Do not update
PDUS RAD LIGHTNING WIND Cotrec wind field - 08.06.2003 19:30
METEO none
ORO col
UND dist+reg
OVR none
NAVIG red
LON 15.202
LAT 50.028
Kolín (okr. Kolín)
cursor position is [22,93] = [10.454,51.058]
ZOOM COLOR black
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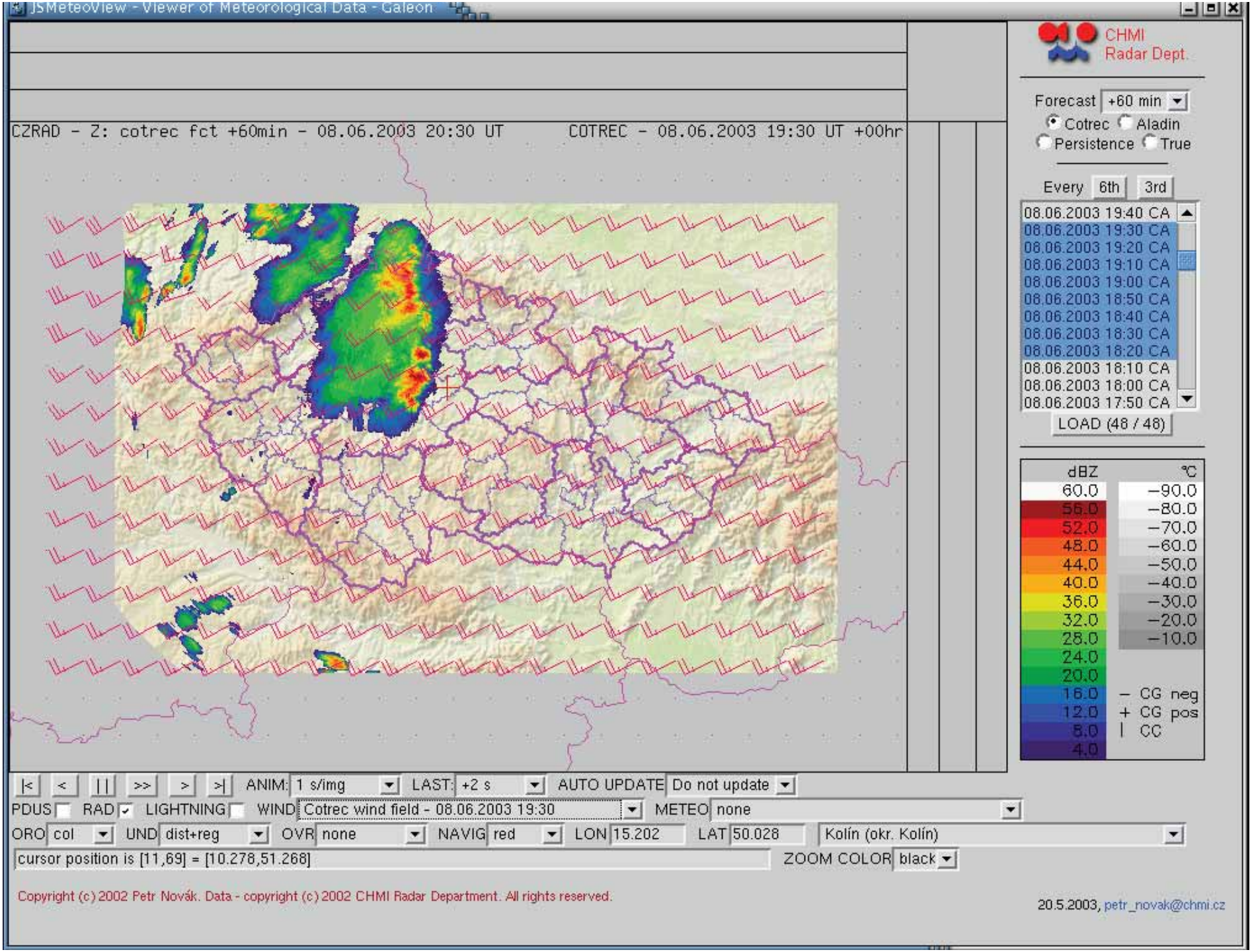
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CHMI
Radar Dept.
CZRAD - Z: cotrec fct +60min - 08.06.2003 20:30 UT
COTREC - 08.06.2003 19:30 UT +00hr
Forecast +60 min
Cotrec Aladin
Persistence True
Every 6th 3rd
08.06.2003 19:40 CA
08.06.2003 19:30 CA
08.06.2003 19:20 CA
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−30.0
−20.0
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− CG neg
+ CG pos
| CC
ANIM: 1 s/img
LAST: +2 s
AUTO UPDATE Do not update
PDUS RAD LIGHTNING WIND Cotrec wind field - 08.06.2003 19:30
METEO none
ORO col UND dist+reg OVR none NAVIG red LON 15.202 LAT 50.028
Kolín (okr. Kolín)
cursor position is [11,69] = [10.278,51.268]
ZOOM COLOR black
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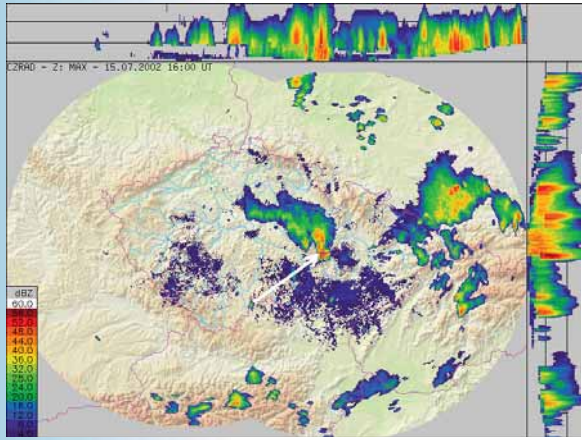
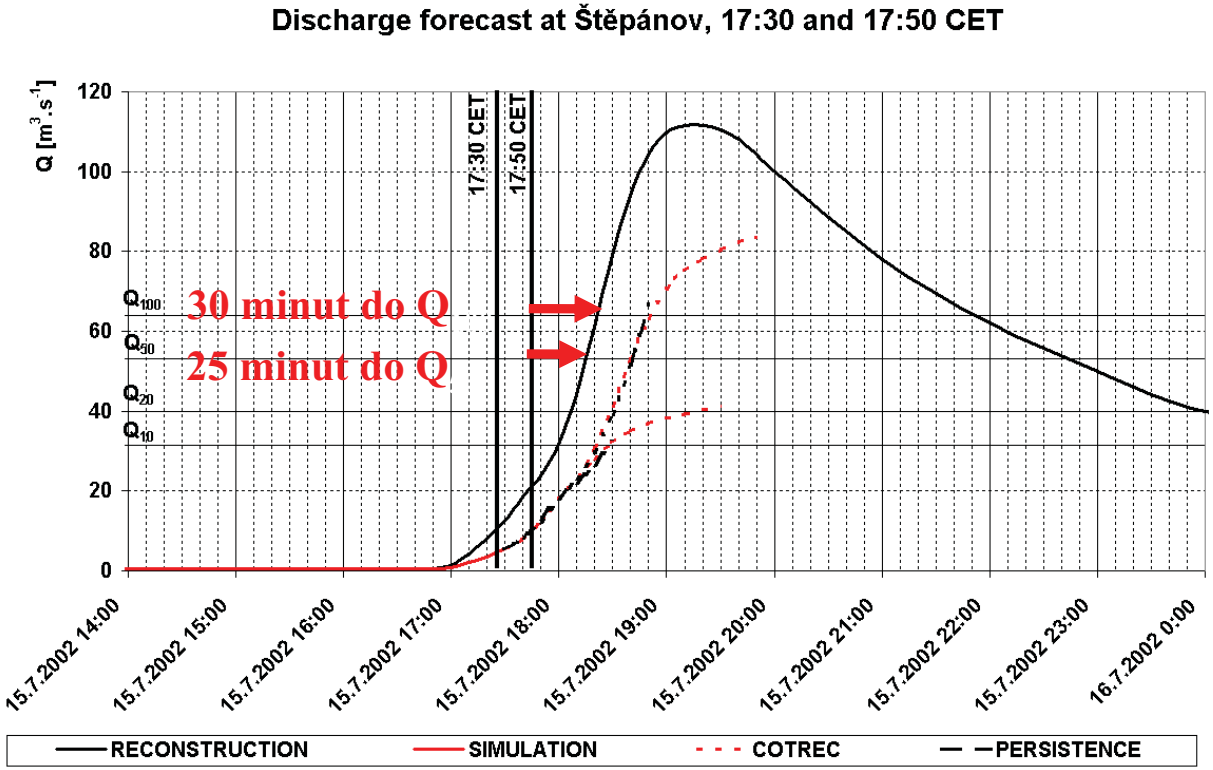
Study

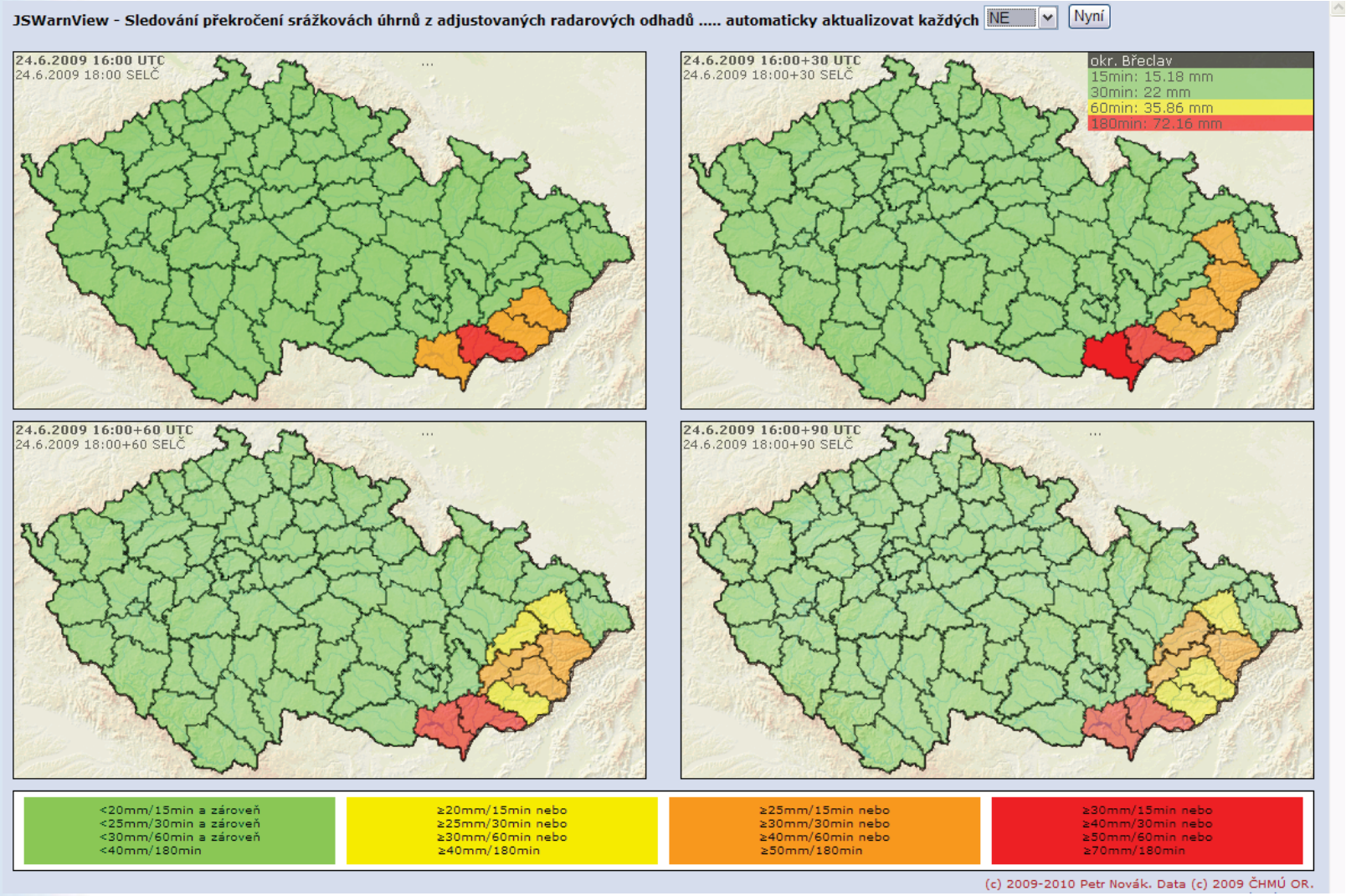
Šálek, Březková, Novák (2006) NHESS



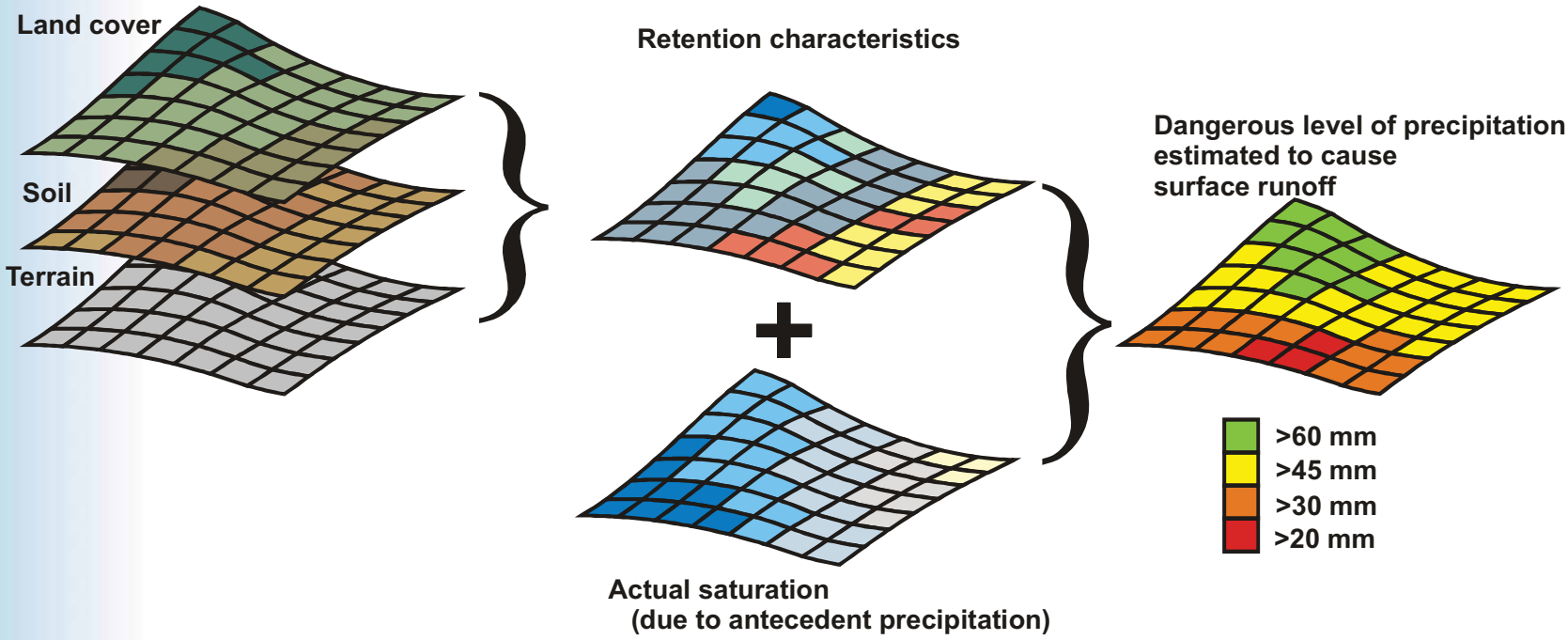
Hodonínka 2002



WarnView


JSWarnView - Sledování překročení srážkových úhrnů z adjustovaných radarových odhadů ..... automaticky aktualizovat každých
NE
Nyní
24.6.2009 16:00 UTC
24.6.2009 18:00 SELČ
24.6.2009 16:00+30 UTC
24.6.2009 18:00+30 SELČ
okr. Břeclav
15min: 15.18 mm
30min: 22 mm
60min: 35.86 mm
180min: 72.16 mm
24.6.2009 16:00+60 UTC
24.6.2009 18:00+60 SELČ
24.6.2009 16:00+90 UTC
24.6.2009 18:00+90 SELČ
<20mm/15min a zároveň
<25mm/30min a zároveň
<30mm/60min a zároveň
<40mm/180min
≥20mm/15min nebo
≥25mm/30min nebo
≥30mm/60min nebo
≥40mm/180min
≥25mm/15min nebo
≥30mm/30min nebo
≥40mm/60min nebo
≥50mm/180min
≥30mm/15min nebo
≥40mm/30min nebo
≥50mm/60min nebo
≥70mm/180min
(c) 2009-2010 Petr Novák. Data (c) 2009 ČHMÚ OR.

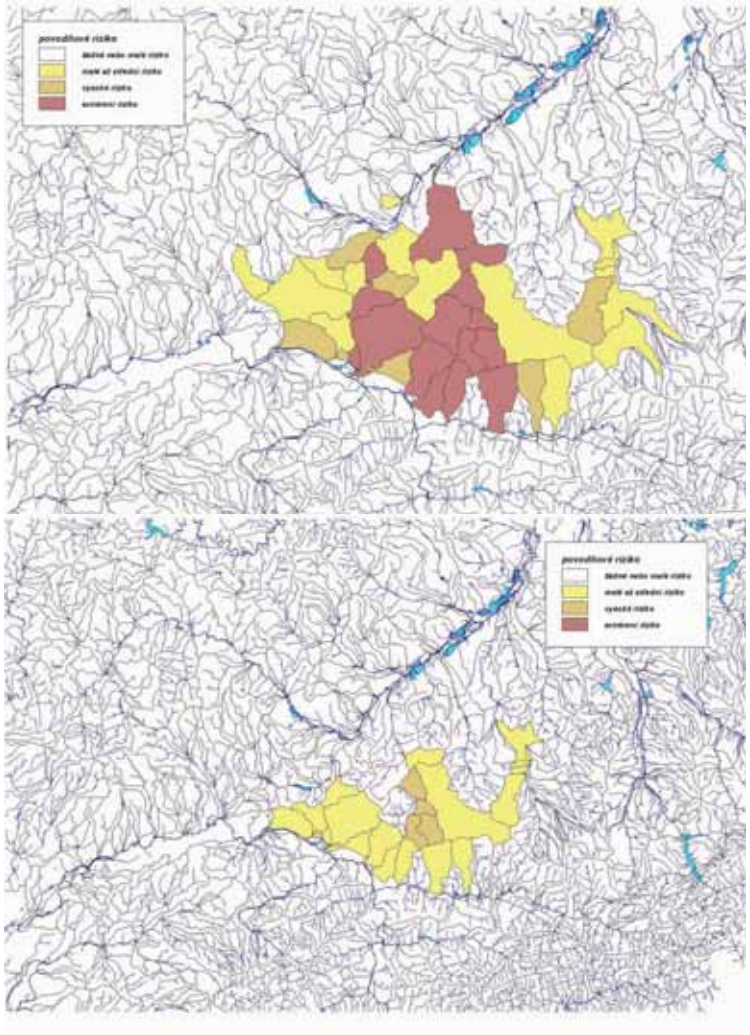
FFG



CZ
- CN and its update due to 30days precipitation.
- dangerous precipitation limit
- real time response estimate (HEC-HMS)

FFG


Flash Flood Guidance - National Weather Service
www.srh.noaa.gov
National Weather Service
Flash Flood Guidance
News
Organization
Search
Enter Search Here
Go
National Weather Service
Regional Map
3 Hour Flash Flood Guidance
Updated November 4, 2009 8:45 AM CST
Puerto Rico
Zoom in on Individual States
Zoom in on River Forecast Centers
Select the product:
3 Hour Flash Flood Guidance
Choose a location to zoom in on, or click on the image:
East and Central U.S.
View text versions of the state flash flood guidance values:
Alabama
View Text Product
Download data for GIS applications:
Download DBF File
About Flash Flood Guidance:
National Weather Service (NWS) River Forecast Centers routinely issue Flash Flood Guidance throughout the day for every county in their area. The river forecast centers determine 1- 3- and 6-hour flash flood guidance values for all counties, and 12- and 24-hour values for parts of the eastern United States. The NWS Weather Forecast Offices use this guidance when issuing flash flood watches and warnings to the public.



Conclusion

CEE is vulnerable to flash floods.
- Small basins
- Fast development

Radars and other products and tools are used to monitor and warn on flash floods.

ČHMÚ

Cagliari Workshop
May 2010

THANK YOU FOR YOUR ATTENTION

Jan Danhelka

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e-mail: danhelka@chmi.cz