BORRMA-web MDSS inside

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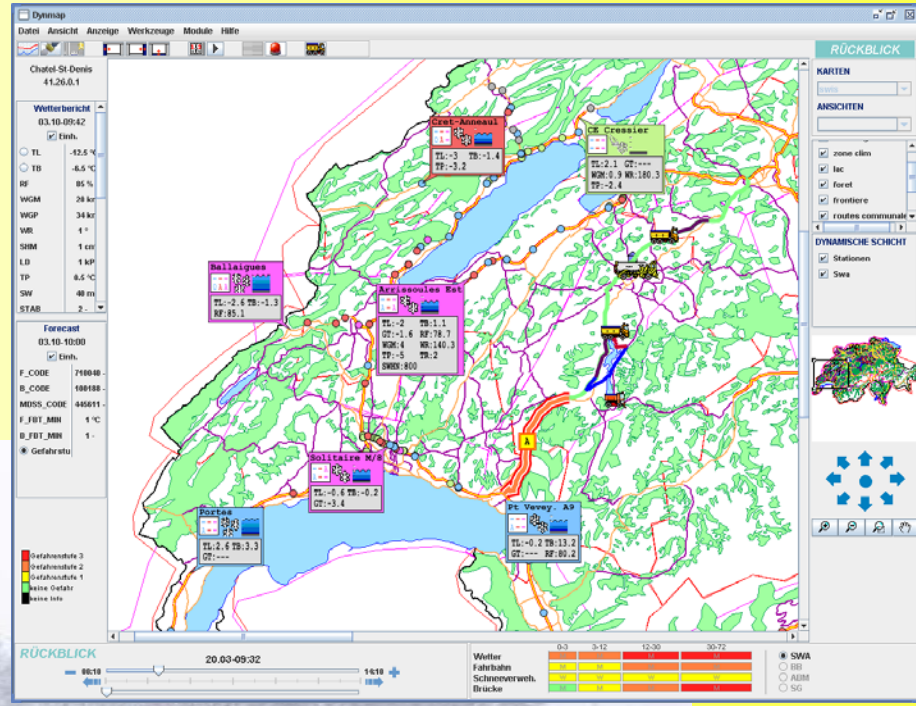
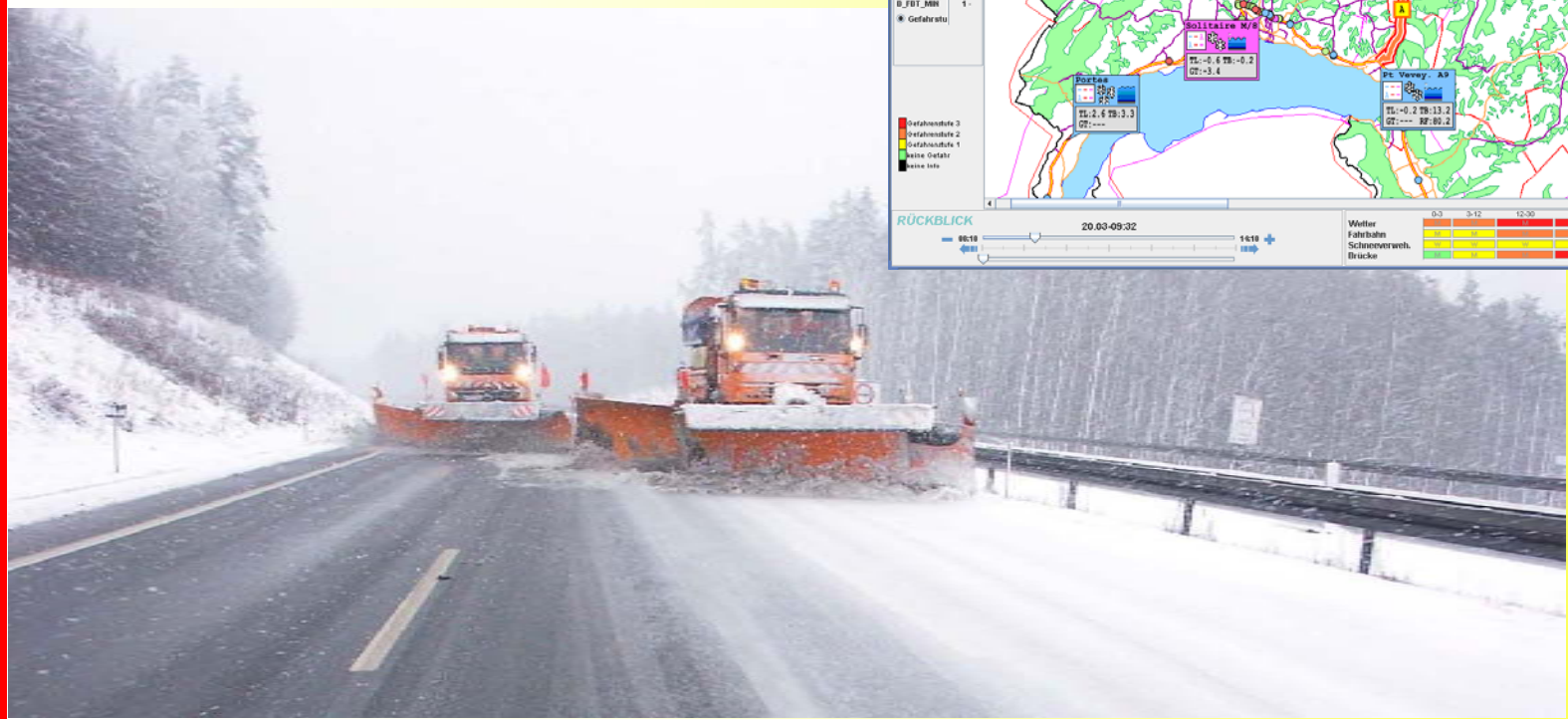
Boschung Mecatronic AG
Switzerland





Goals

- ⇨ Traffic Safety
- ⇨ Environmental Protection
- ⇨ Economy

↳ **Need of a comprehensive Winter Maintenance Management System**

Concept

Weather office

Road weather forecast

Traffic Management Systems

Weather / Traffic related data

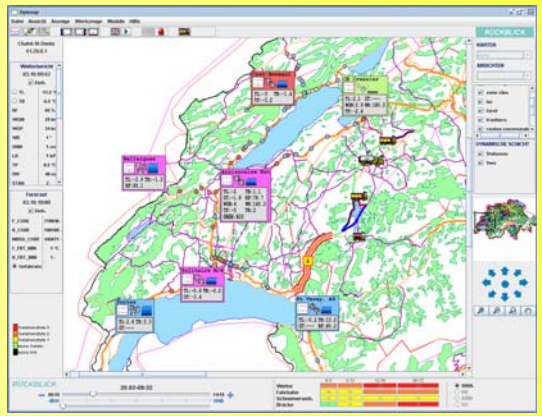
Maintenance vehicles

Vehicle data

RWIS

BORRMA-web

Measured road condition and atmospheric data



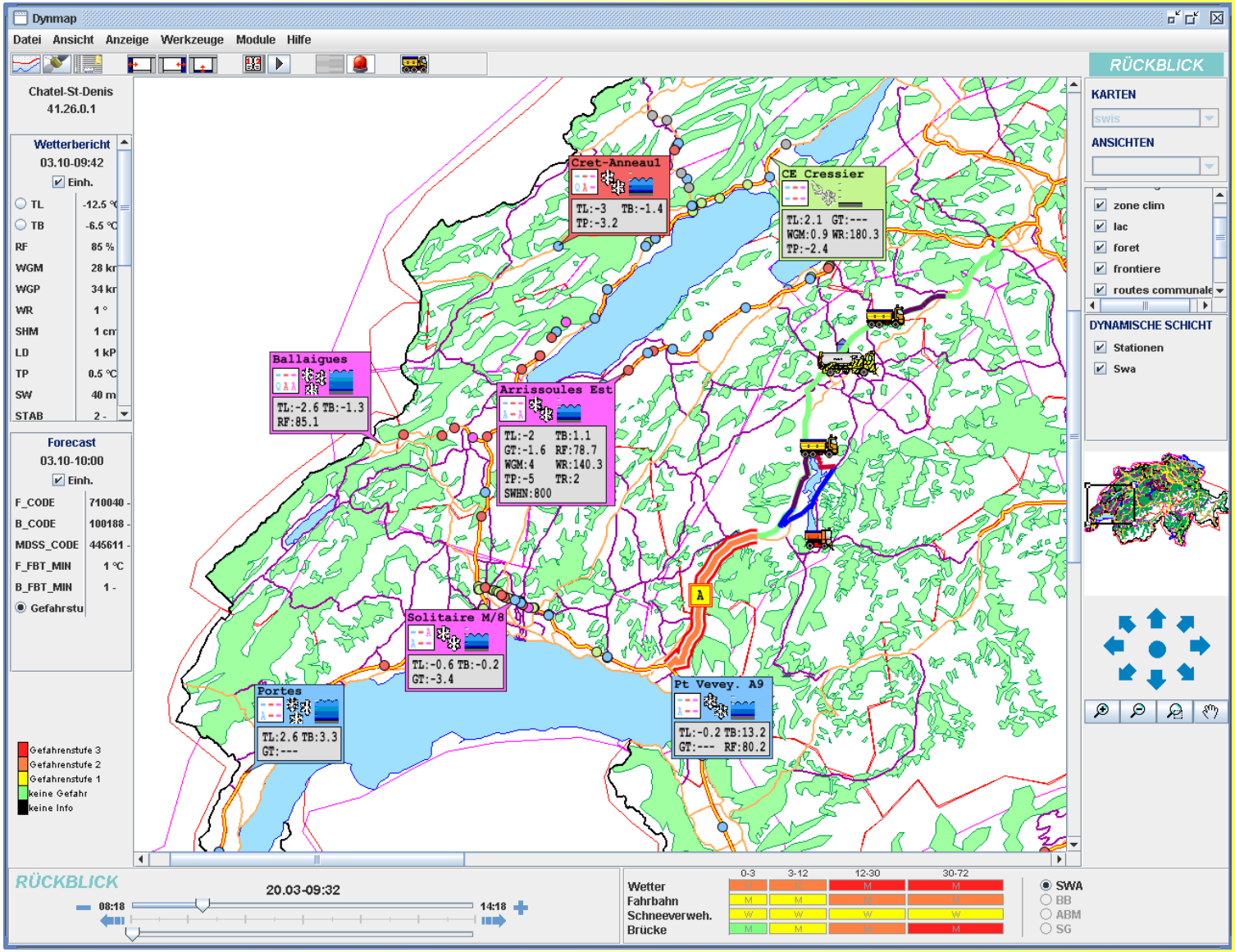
Fixed Automated Spray Technology (FAST)

Measured road condition and atmospheric data

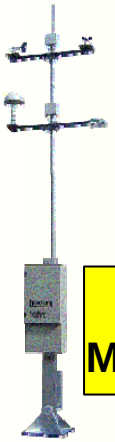
Information for educated decision making

- Centralised database
- Visualised information
- Approciate prognoses

Man-Machine-Interface



Forecasting tools



Point Measurement

Weather forecast 3h

Precipitation Forecast 2h

Nowcasting

Parameters specific to RWIS location

Point forecast

Weather forecast 72h

Thermal mapping

Forecasting

Decision tree (parameters)

Road segment forecast

Value of Nowcasting

Reminder:

- Nowcasting is computed out of the RWIS data and the short-term weather forecast
- Forecasting is essentially based on long-term weather forecast. However, the module integrates also the results of the Nowcasting (if available) as an enhancement for the short term.

Value of Nowcasting

Case study:

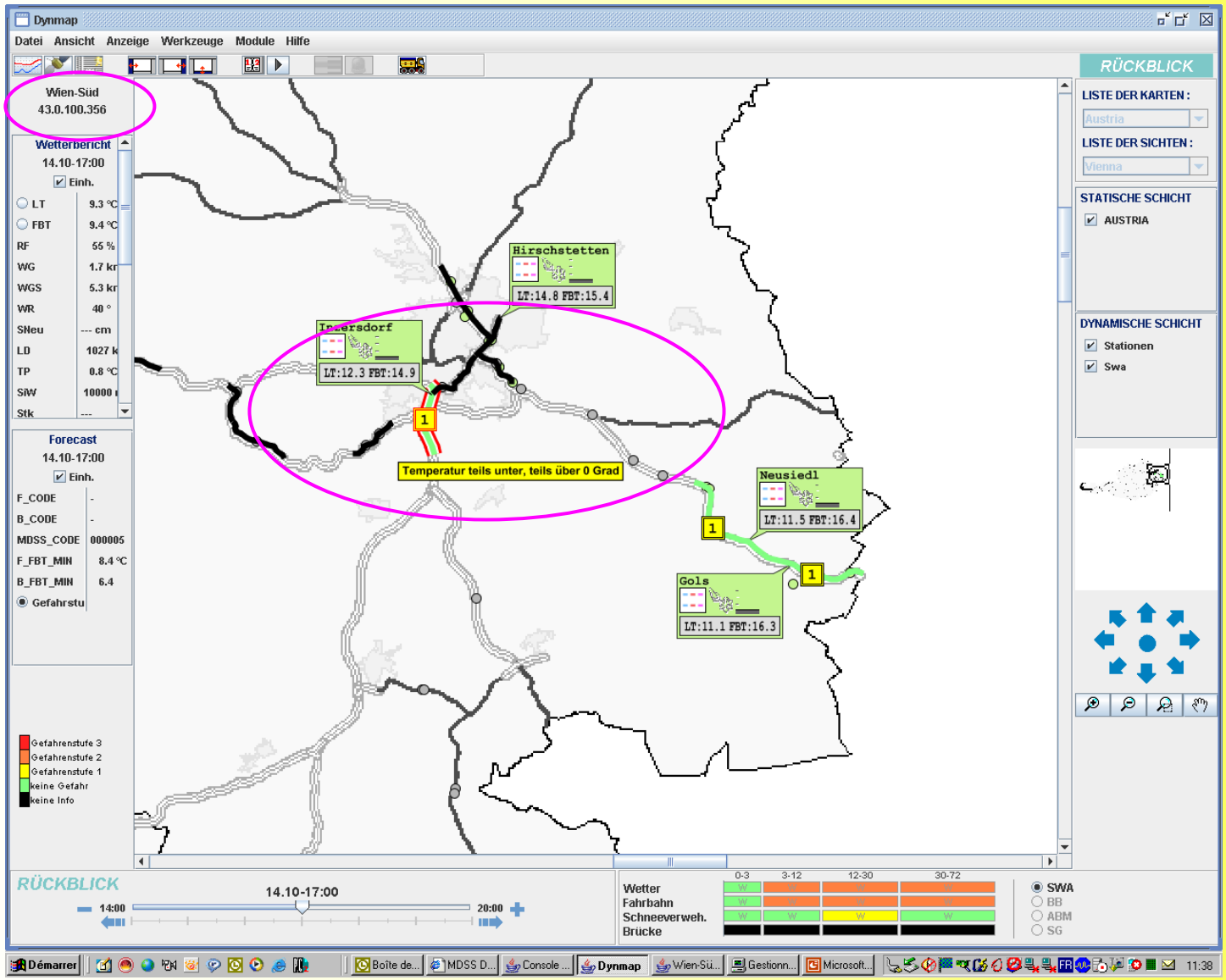
- Analysis of two Road Weather Segments (RWS):
  - RWS « Wien-Süd », the reference RWIS is « Inzersdorf »
  - RWS « Parndorf », the reference RWIS is « Neusiedl »

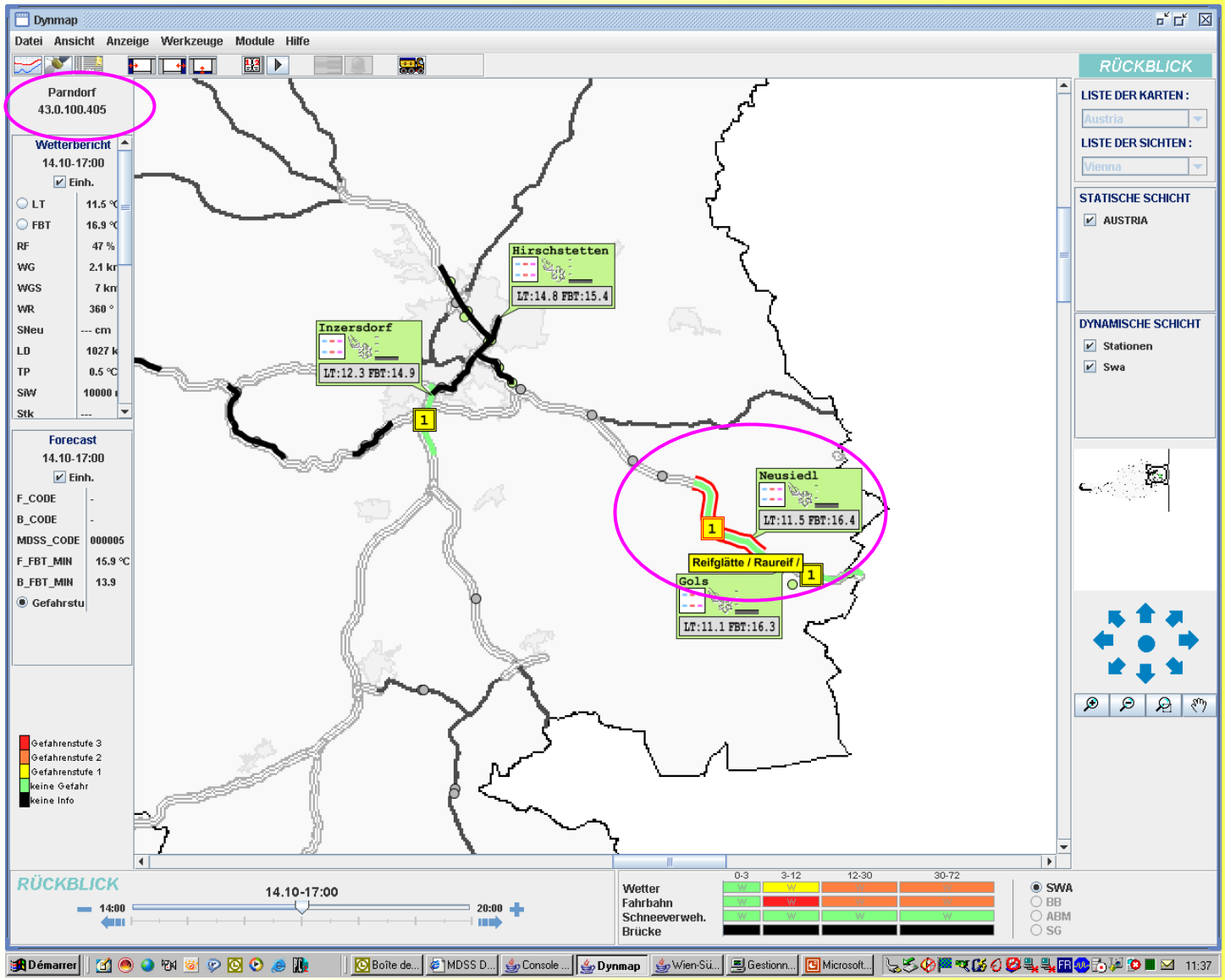
Note: There is no Nowcasting function installed on the RWIS « Inzersdorf » (Wien-Süd)

Value of Nowcasting

Step 1: October 14, 2007, 5:00 PM:

- Both Road Weather Segments show a warning level 1 (road danger forecasted in the next 12 – 6 hours)
  - « Wien-Süd »: pavement temperature temporarily below 0°C
  - « Parndorf »: hoarfrost

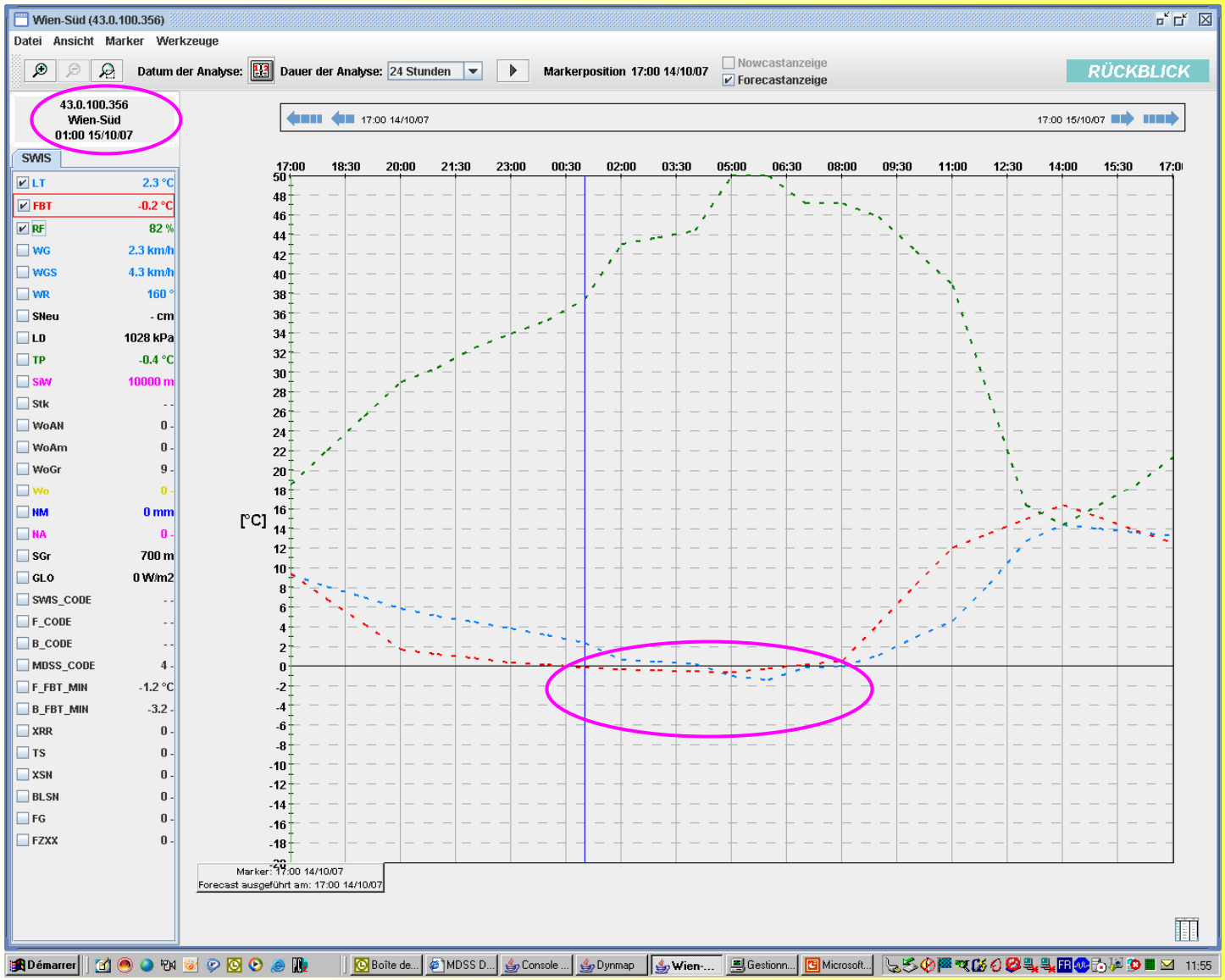

Dynmap
Datei Ansicht Anzeige Werkzeuge Module Hilfe
Wien-Süd
43.0.100.356
Wetterbericht
14.10-17:00
Einh.
LT 9.3 °C
FBT 9.4 °C
RF 55 %
WG 1.7 kn
WGS 5.3 kn
WR 40 °
SNeu --- cm
LD 1027 h
TP 0.8 °C
SiW 10000 m
Stk ---
Forecast
14.10-17:00
Einh.
F_CODE -
B_CODE -
MDSS_CODE 000005
F_FBT_MIN 8.4 °C
B_FBT_MIN 6.4
Gefahrstu
Gefahrenstufe 3
Gefahrenstufe 2
Gefahrenstufe 1
keine Gefahr
keine Info
Hirschstetten
LT:14.8 FBT:15.4
Inzersdorf
LT:12.3 FBT:14.9
1
Temperatur teils unter, teils über 0 Grad
Neusiedl
LT:11.5 FBT:16.4
Gols
LT:11.1 FBT:16.3
RÜCKBLICK
LISTE DER KARTEN :
Austria
LISTE DER SICHTEN :
Vienna
STATISCHE SCHICHT
AUSTRIA
DYNAMISCHE SCHICHT
Stationen
Swa
RÜCKBLICK
14.10-17:00
14:00
20:00
0-3 3-12 12-30 30-72
Wetter
Fahrbahn
Schneeverweh.
Brücke
SWA
BB
ABM
SG
Démarrer
Boîte de...
MDSS D...
Console ...
Dynmap
Wien-Sü...
Gestionn...
Microsoft...
11:38

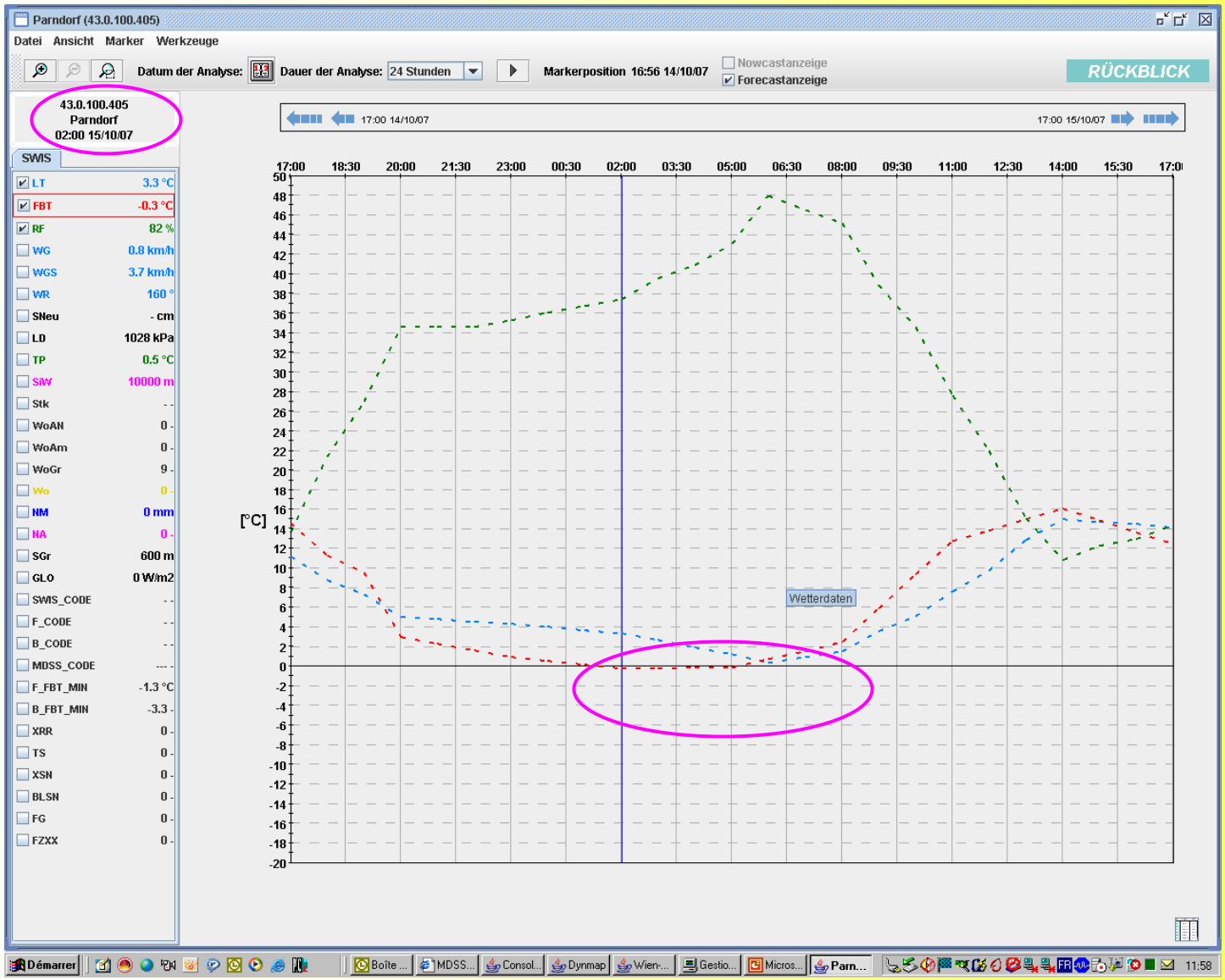

Dynmap
Datei Ansicht Anzeige Werkzeuge Module Hilfe
Parndorf
43.0.100.405
Wetterbericht
14.10-17:00
Einh.
LT 11.5 °C
FBT 16.9 °C
RF 47 %
WG 2.1 kn
WGS 7 kn
WR 360 °
SNeu --- cm
LD 1027 h
TP 0.5 °C
SiW 10000 m
Stk ---
Forecast
14.10-17:00
Einh.
F_CODE -
B_CODE -
MDSS_CODE 000005
F_FBT_MIN 15.9 °C
B_FBT_MIN 13.9
Gefahrstu
Gefahrenstufe 3
Gefahrenstufe 2
Gefahrenstufe 1
keine Gefahr
keine Info
Hirschstetten
LT:14.8 FBT:15.4
Inzersdorf
LT:12.3 FBT:14.9
Neusiedl
LT:11.5 FBT:16.4
Reifglätte / Raureif /
Gols
LT:11.1 FBT:16.3
1
RÜCKBLICK
LISTE DER KARTEN :
Austria
LISTE DER SICHTEN :
Vienna
STATISCHE SCHICHT
AUSTRIA
DYNAMISCHE SCHICHT
Stationen
Swa
RÜCKBLICK
14.10-17:00
14:00
20:00
0-3 3-12 12-30 30-72
Wetter
Fahrbahn
Schneeverweh.
Brücke
SWA
BB
ABM
SG
Démarrer
Boîte de...
MDSS D...
Console ...
Dynmap
Wien-Sü...
Gestionn...
Microsoft...
11:37

Value of Nowcasting

Step 2:

5:00 PM: forecasting curves for both Road Weather Segments show the danger in a time window between 1:00 and 2:00 AM


Wien-Süd (43.0.100.356)
Datei Ansicht Marker Werkzeuge
Datum der Analyse:
Dauer der Analyse: 24 Stunden
Markerposition 17:00 14/10/07
Nowcastanzeige
Forecastanzeige
RÜCKBLICK
43.0.100.356
Wien-Süd
01:00 15/10/07
SWIS
LT 2.3 °C
FBT -0.2 °C
RF 82 %
WG 2.3 km/h
WGS 4.3 km/h
WR 160 °
SNeu - cm
LD 1028 kPa
TP -0.4 °C
SiW 10000 m
Stk - -
WoAN 0
WoAm 0
WoGr 9
Wo 0
NM 0 mm
NA 0
SGr 700 m
GLO 0 W/m2
SWIS_CODE - -
F_CODE - -
B_CODE - -
MDSS_CODE 4
F_FBT_MIN -1.2 °C
B_FBT_MIN -3.2
XRR 0
TS 0
XSN 0
BLSN 0
FG 0
FZXX 0
17:00 14/10/07
17:00 15/10/07
[°C]
Marker: 17:00 14/10/07
Forecast ausgeführt am: 17:00 14/10/07
Démarrer
11:55


Parndorf (43.0.100.405)
Datei Ansicht Marker Werkzeuge
Datum der Analyse:
Dauer der Analyse: 24 Stunden
Markerposition 16:56 14/10/07
Nowcastanzeige
Forecastanzeige
RÜCKBLICK
43.0.100.405
Parndorf
02:00 15/10/07
SWIS
LT 3.3 °C
FBT -0.3 °C
RF 82 %
WG 0.8 km/h
WGS 3.7 km/h
WR 160 °
SNeu - cm
LD 1028 kPa
TP 0.5 °C
SiW 10000 m
Stk - -
WoAN 0
WoAm 0
WoGr 9
Wo 0
NM 0 mm
NA 0
SGr 600 m
GLO 0 W/m2
SWIS_CODE - -
F_CODE - -
B_CODE - -
MDSS_CODE --- -
F_FBT_MIN -1.3 °C
B_FBT_MIN -3.3
XRR 0
TS 0
XSN 0
BLSN 0
FG 0
FZXX 0
17:00 14/10/07
17:00 15/10/07
[°C]
Wetterdaten
Démarrer
11:58

Value of Nowcasting

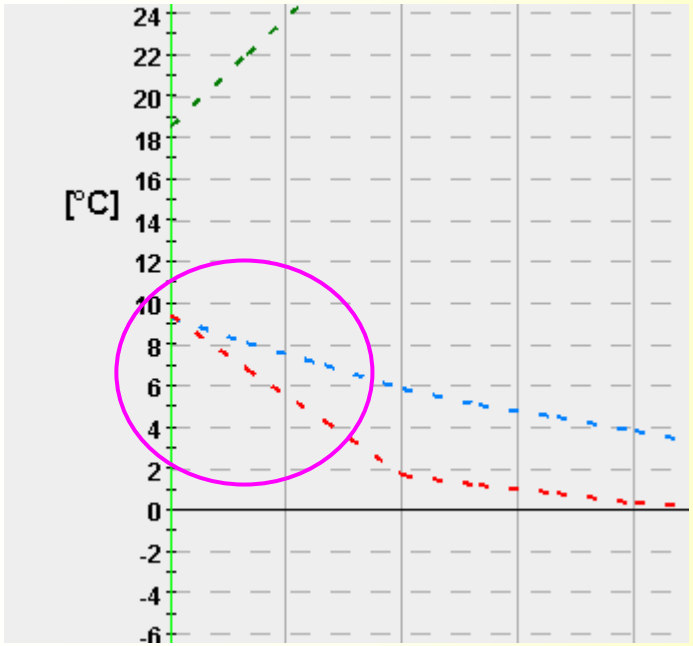
- Remark :

  The curve of the « Parndorf » Road Weather Segment shows a different slope between 5:00 and 7:00 PM:

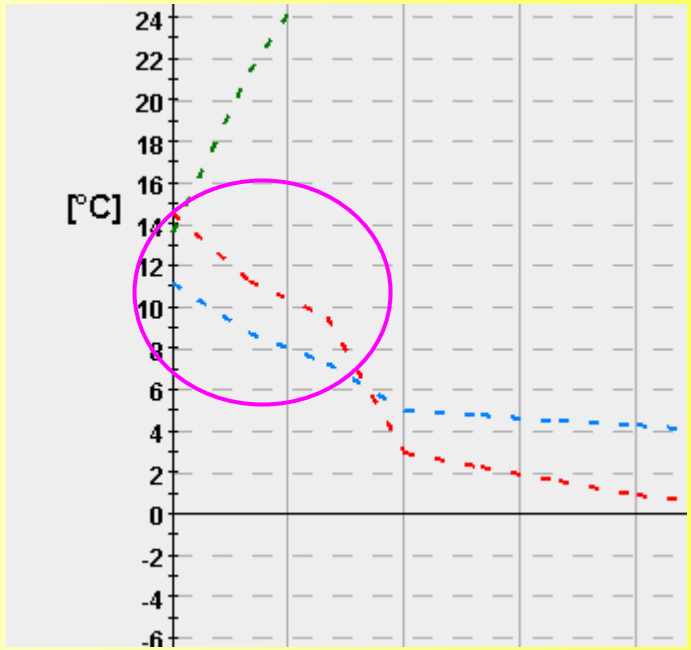
  This is the influence of the Nowcasting (calculation is made for the next two hours), which enhances the weather forecast.

Value of Nowcasting

- « Wien-Süd »



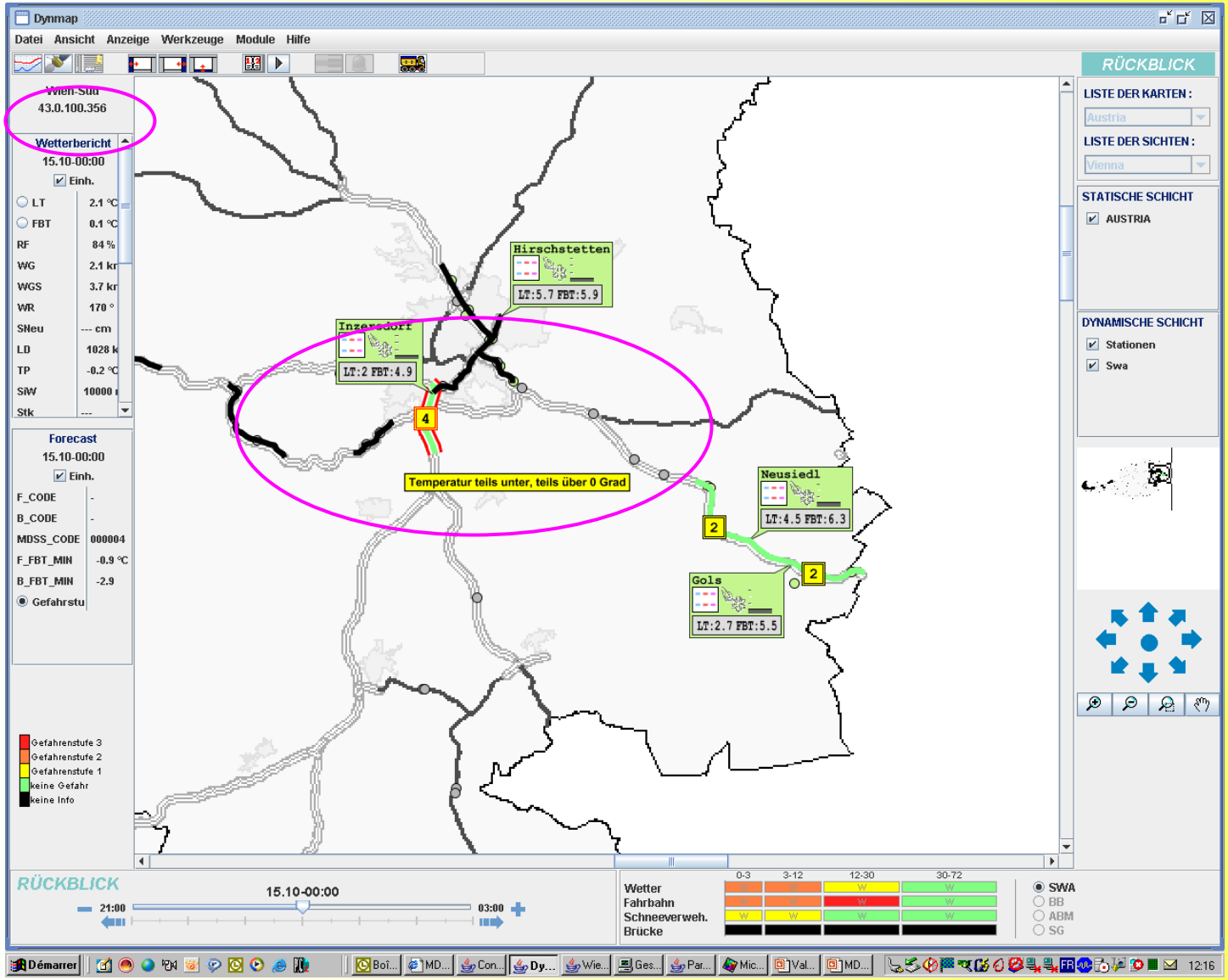
- « Parndorf »

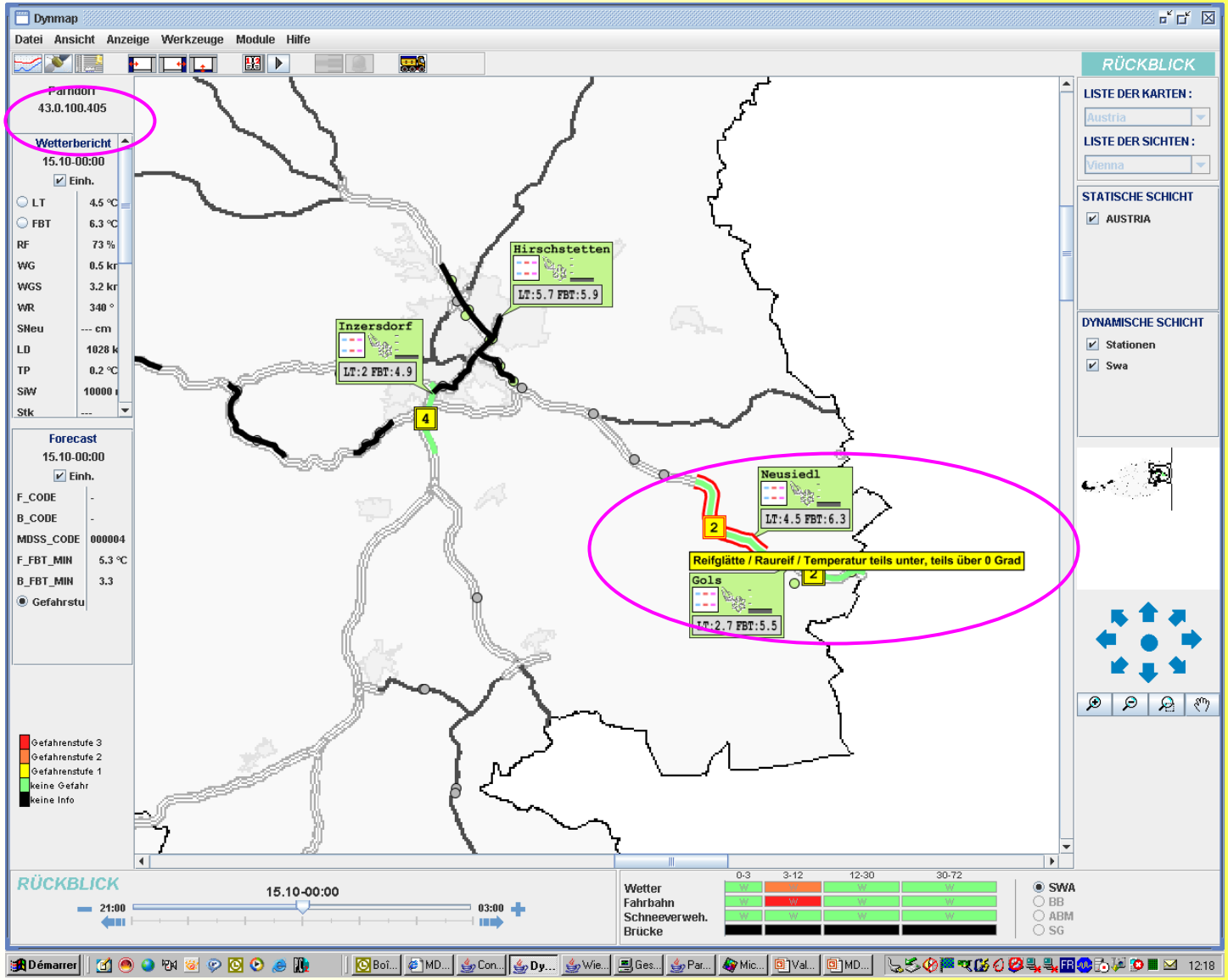


Value of Nowcasting

Step 3: October 15, 2007, 0:00 AM

- « Wien-Süd » : The level of warning has constantly increased to reach level 4 (road danger within one hour of occurrence). It will even reach the « A » level (Alarm - danger is already existing) at 0:10 AM
- « Parndorf » : The level of the warning is still at level 2 (road danger within the next 6 - 2 hours): the nowcasting (based on RWIS measured values) keeps « pushing » the forecasted danger back.

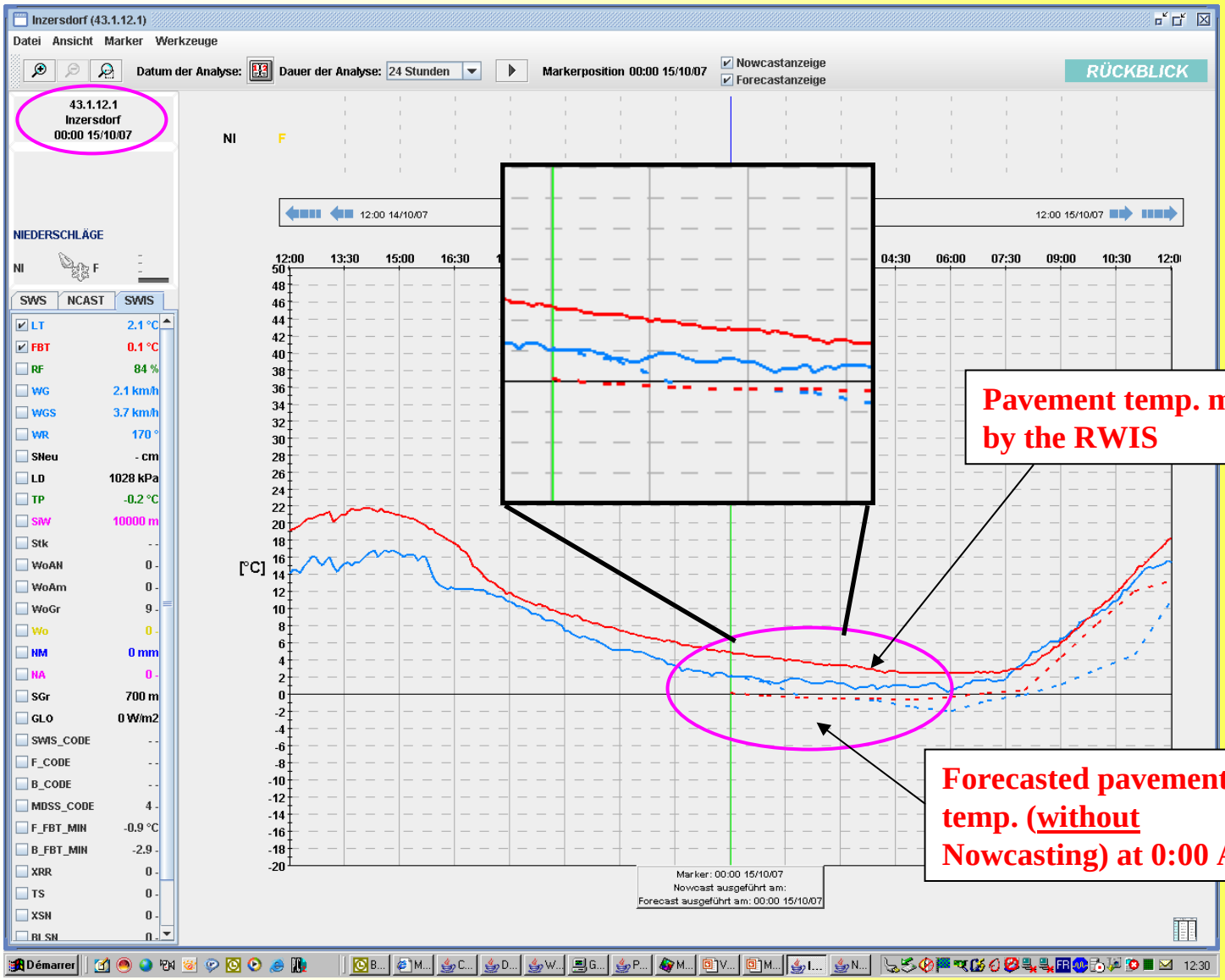

Dynmap
Datei Ansicht Anzeige Werkzeuge Module Hilfe
RÜCKBLICK
LISTE DER KARTEN :
Austria
LISTE DER SICHTEN :
Vienna
STATISCHE SCHICHT
AUSTRIA
DYNAMISCHE SCHICHT
Stationen
Swa
Wien-Süd
43.0.100.356
Wetterbericht
15.10-00:00
Einh.
LT 2.1 °C
FBT 0.1 °C
RF 84 %
WG 2.1 kn
WGS 3.7 kn
WR 170 °
SNeu --- cm
LD 1028 k
TP -0.2 °C
SiW 10000 m
Stk ---
Forecast
15.10-00:00
Einh.
F_CODE -
B_CODE -
MDSS_CODE 000004
F_FBT_MIN -0.9 °C
B_FBT_MIN -2.9
Gefahrstu
Hirschstetten
LT:5.7 FBT:5.9
Inzersdorf
LT:2 FBT:4.9
4
Temperatur teils unter, teils über 0 Grad
Neusiedl
LT:4.5 FBT:6.3
2
Gols
LT:2.7 FBT:5.5
2
Gefahrenstufe 3
Gefahrenstufe 2
Gefahrenstufe 1
keine Gefahr
keine Info
RÜCKBLICK
15.10-00:00
21:00
03:00
0-3
3-12
12-30
30-72
Wetter
Fahrbahn
Schneeverweh.
Brücke
SWA
BB
ABM
SG
Démarrer
12:16

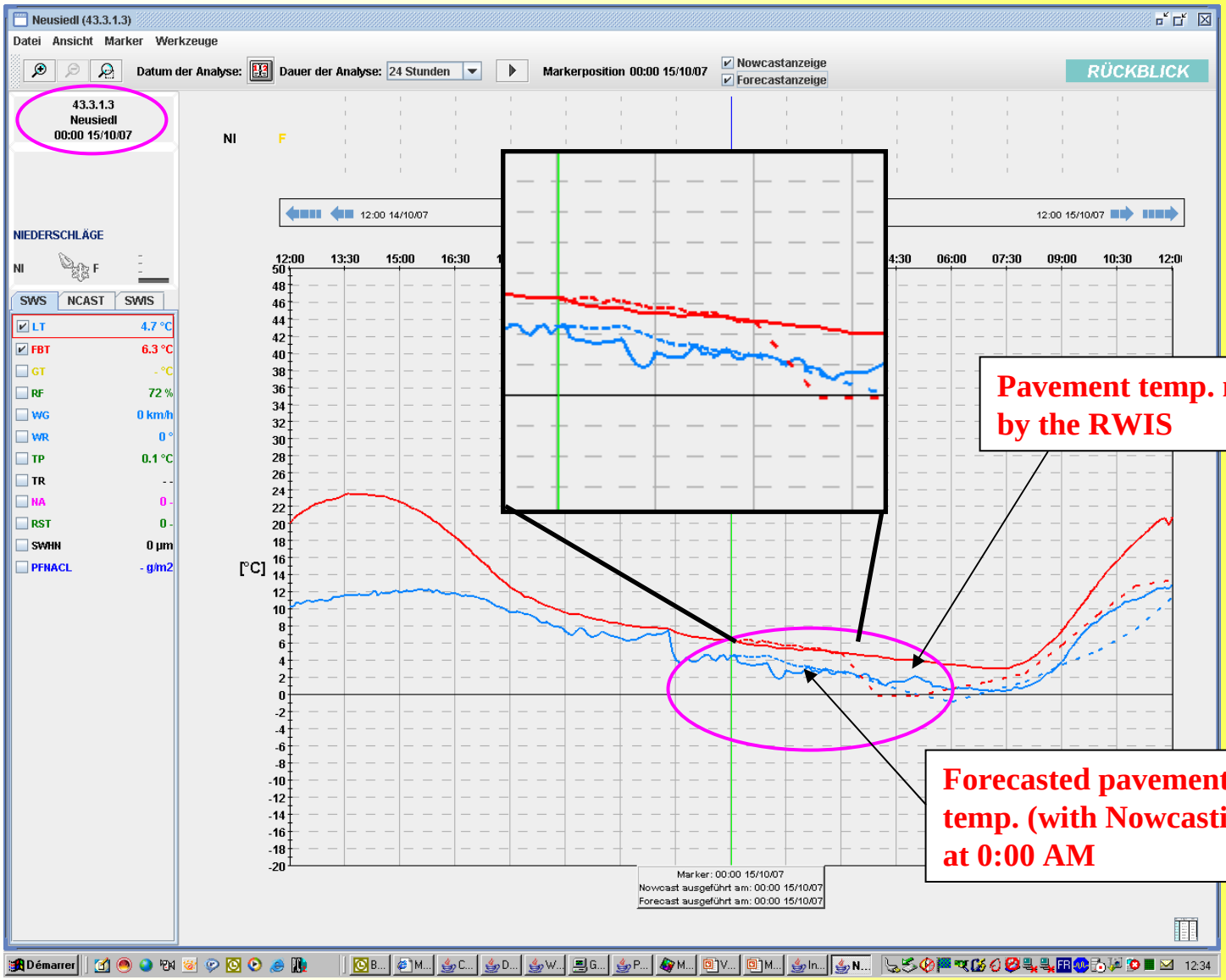

Dynmap
Datei Ansicht Anzeige Werkzeuge Module Hilfe
RÜCKBLICK
LISTE DER KARTEN :
Austria
LISTE DER SICHTEN :
Vienna
STATISCHE SCHICHT
AUSTRIA
DYNAMISCHE SCHICHT
Stationen
Swa
Parndorf
43.0.100.405
Wetterbericht
15.10-00:00
Einh.
LT 4.5 °C
FBT 6.3 °C
RF 73 %
WG 0.5 kn
WGS 3.2 kn
WR 340 °
SNeu --- cm
LD 1028 k
TP 0.2 °C
SiW 10000 r
Stk ---
Forecast
15.10-00:00
Einh.
F_CODE -
B_CODE -
MDSS_CODE 000004
F_FBT_MIN 5.3 °C
B_FBT_MIN 3.3
Gefahrstu
Hirschstetten
LT:5.7 FBT:5.9
Inzersdorf
LT:2 FBT:4.9
4
Neusiedl
LT:4.5 FBT:6.3
2
Reifglätte / Raureif / Temperatur teils unter, teils über 0 Grad
Gols
LT:2.7 FBT:5.5
2
Gefahrenstufe 3
Gefahrenstufe 2
Gefahrenstufe 1
keine Gefahr
keine Info
RÜCKBLICK
15.10-00:00
21:00
03:00
0-3
3-12
12-30
30-72
Wetter
Fahrbahn
Schneeverweh.
Brücke
SWA
BB
ABM
SG
Démarrer
12:18

Value of Nowcasting

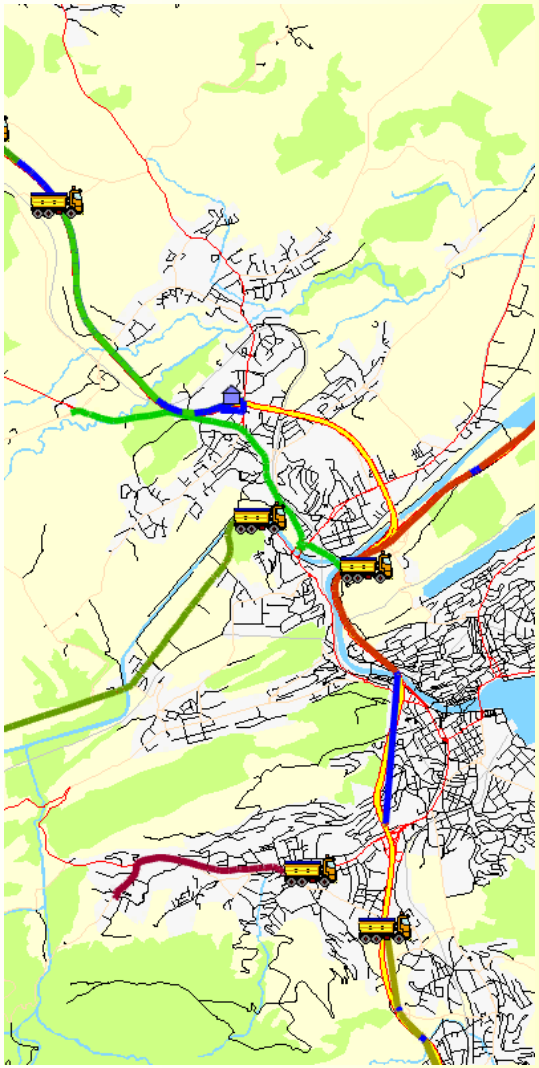
- Step 4:

  Comparision with measured values from both reference RWIS-sites shows the influence of the Nowcasting in enhancing the quality of Weather Forecast.


Inzersdorf (43.1.12.1)
Datei Ansicht Marker Werkzeuge
Datum der Analyse:
Dauer der Analyse: 24 Stunden
Markerposition 00:00 15/10/07
Nowcastanzeige
Forecastanzeige
RÜCKBLICK
43.1.12.1
Inzersdorf
00:00 15/10/07
NIEDERSCHLÄGE
NI F
SWS NCAST SWIS
LT 2.1 °C
FBT 0.1 °C
RF 84 %
WG 2.1 km/h
WGS 3.7 km/h
WR 170 °
SNeu - cm
LD 1028 kPa
TP -0.2 °C
SiW 10000 m
Stk
WoAN 0
WoAm 0
WoGr 9
Wo 0
NM 0 mm
NA 0
SGr 700 m
GLO 0 W/m2
SWIS_CODE
F_CODE
B_CODE
MDSS_CODE 4
F_FBT_MIN -0.9 °C
B_FBT_MIN -2.9
XRR 0
TS 0
XSN 0
BL SN 0
NI F
12:00 14/10/07
12:00 15/10/07
12:00 13:30 15:00 16:30 04:30 06:00 07:30 09:00 10:30
[°C]
Marker: 00:00 15/10/07
Nowcast ausgeführt am:
Forecast ausgeführt am: 00:00 15/10/07
Pavement temp. measured by the RWIS
Forecasted pavement temp. (without Nowcasting) at 0:00 AM
Démarrer
12:30


Neusiedl (43.3.1.3)
Datei Ansicht Marker Werkzeuge
Datum der Analyse:
Dauer der Analyse: 24 Stunden
Markerposition 00:00 15/10/07
Nowcastanzeige
Forecastanzeige
RÜCKBLICK
43.3.1.3
Neusiedl
00:00 15/10/07
NIEDERSCHLÄGE
NI
F
SWS NCAST SWIS
LT 4.7 °C
FBT 6.3 °C
GT - °C
RF 72 %
WG 0 km/h
WR 0 °
TP 0.1 °C
TR - -
NA 0 -
RST 0 -
SWHN 0 µm
PFNACL - g/m2
12:00 14/10/07
12:00 15/10/07
[°C]
Marker: 00:00 15/10/07
Nowcast ausgeführt am: 00:00 15/10/07
Forecast ausgeführt am: 00:00 15/10/07
Pavement temp. measured by the RWIS
Forecasted pavement temp. (with Nowcasting) at 0:00 AM

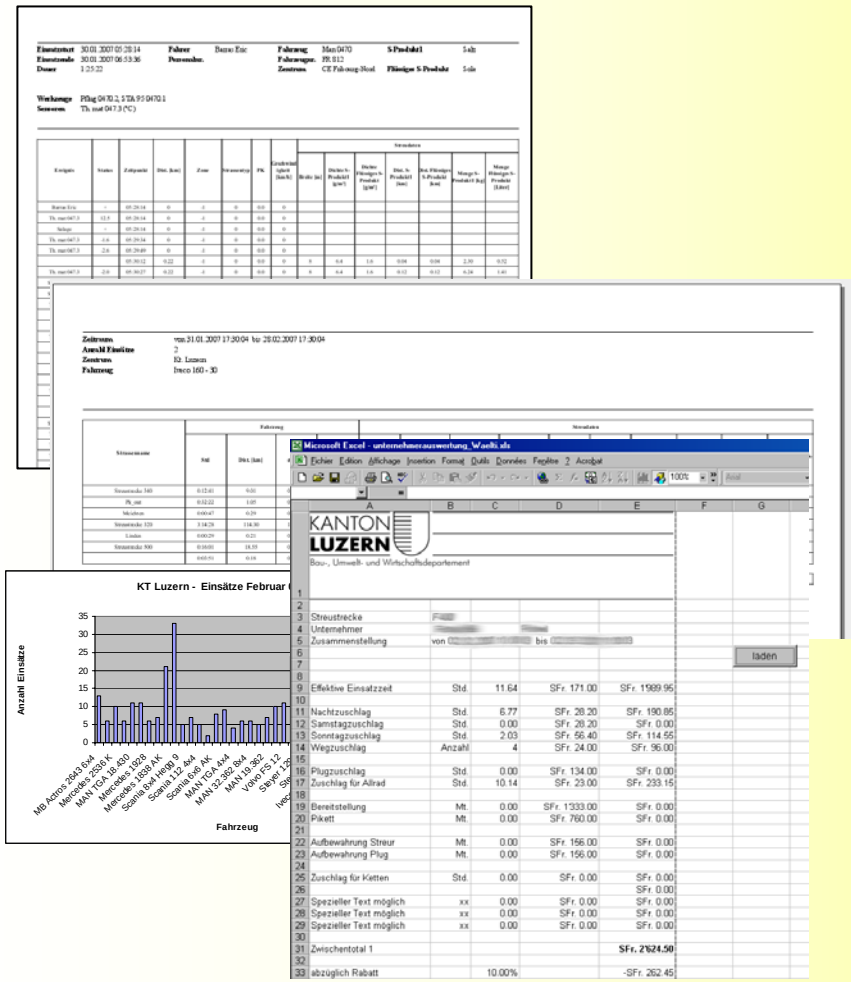
Maintenance vehicles



Source : BORRMA-web Lucerne (Switzerland)

- Data acquisition and transmission (real-time)
  - Current status of tools
  - Colored trail showing used tools
  - Current position of vehicles (GPS-based)
  - ➔ Dynamic management of operations
  - ➔ Knowledge base for further recommendations
- Measurement of operations (off-line)
  - Operation reports, statistics, etc.

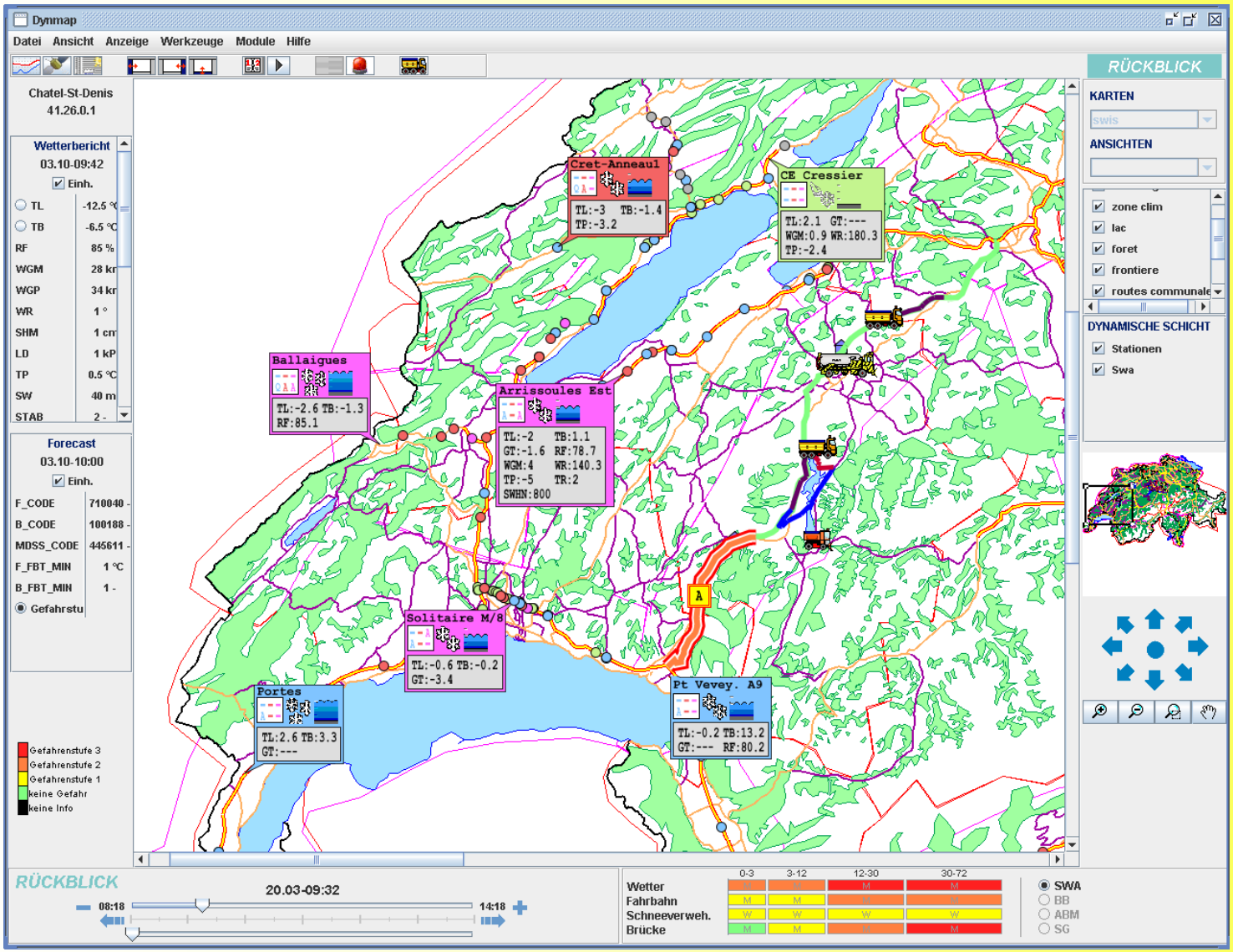
Centralization of vehicle data



- List of events in one operation
- List of operations in a period of time
- Detailed breakdown of carried-out services per road category, road name, area
- Export capability for further data treatment

BORRMA-web MDSS inside

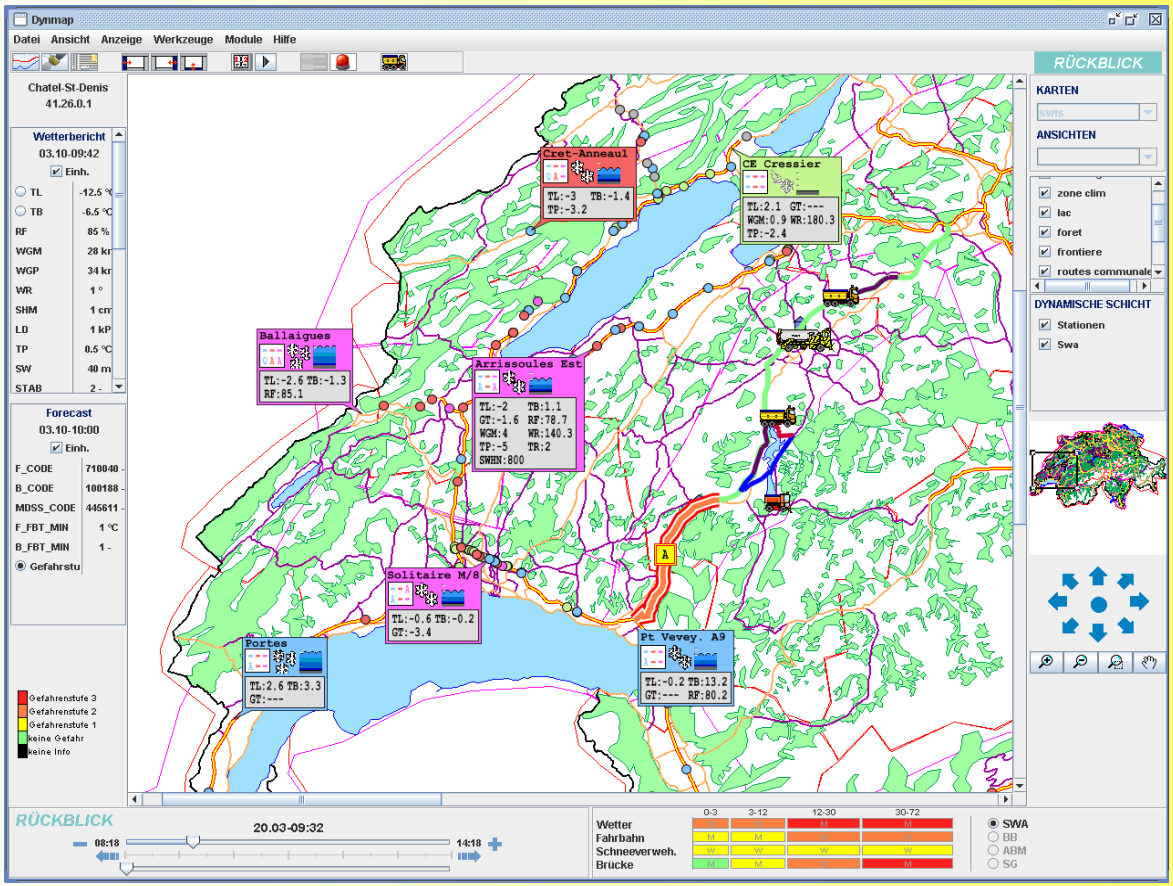
BORRMA-web MDSS inside



BORRMA-web MDSS inside

Thank you for your attention!

boschung



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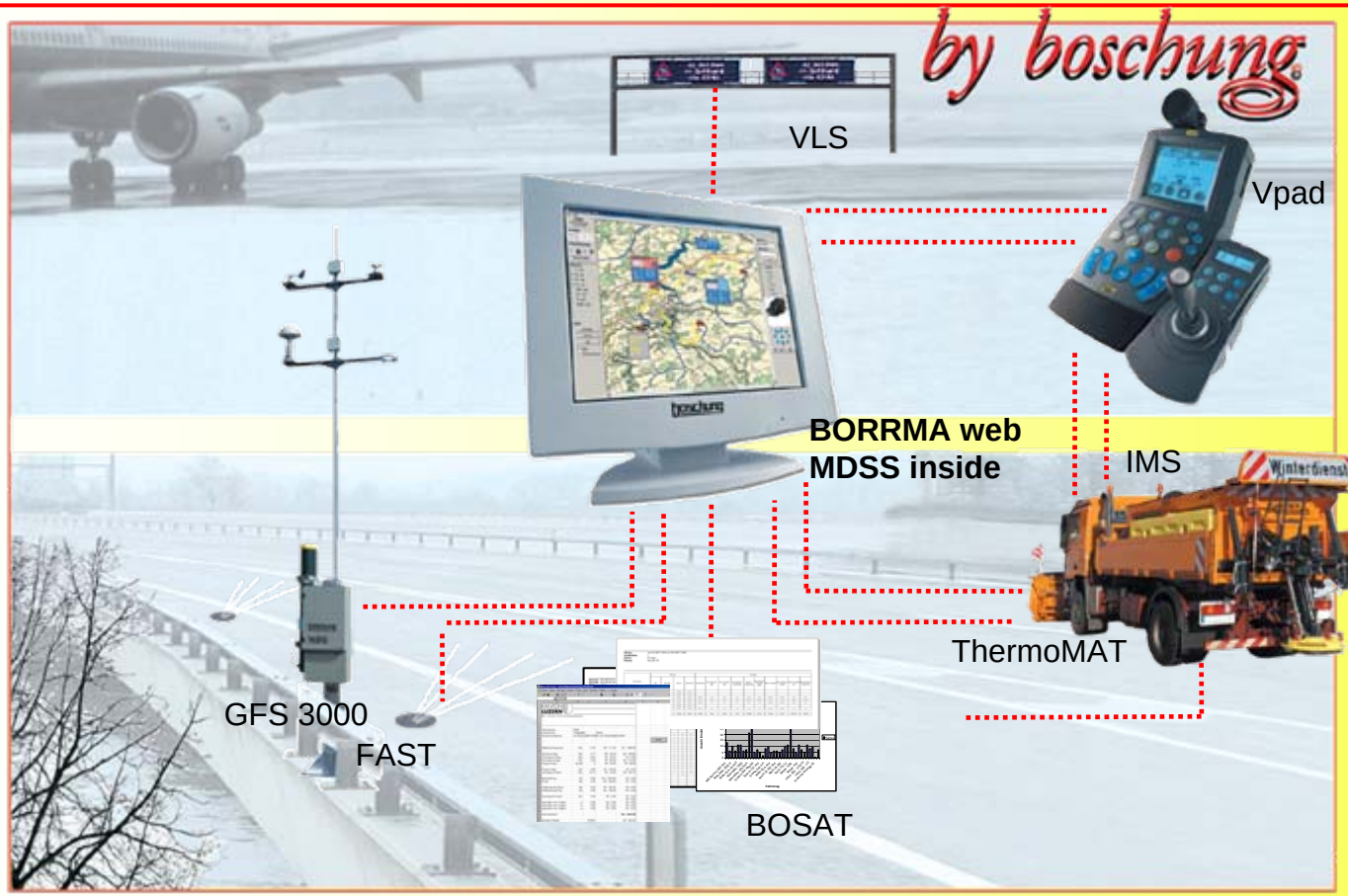
BORRMA-web MDSS inside

Surface Condition Management

boschung



RWIS - GFS 3000	Surface Condition Assessment	**On-board-sensors**
FAST	Surface Treatment Devices	**Vehicles**
BORRMA web MDSS inside	Surface Data Management	**Vpad**