

A road map towards implementing a probabilistic road weather information system

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ID: 47



- The current system

- Development plans
 - Information on spatial variability

 - Information on uncertainties

- User feedback



SWIS at DWD provides...



→ General information on weather conditions

- Synop-observations, radar products
- Weather forecast charts

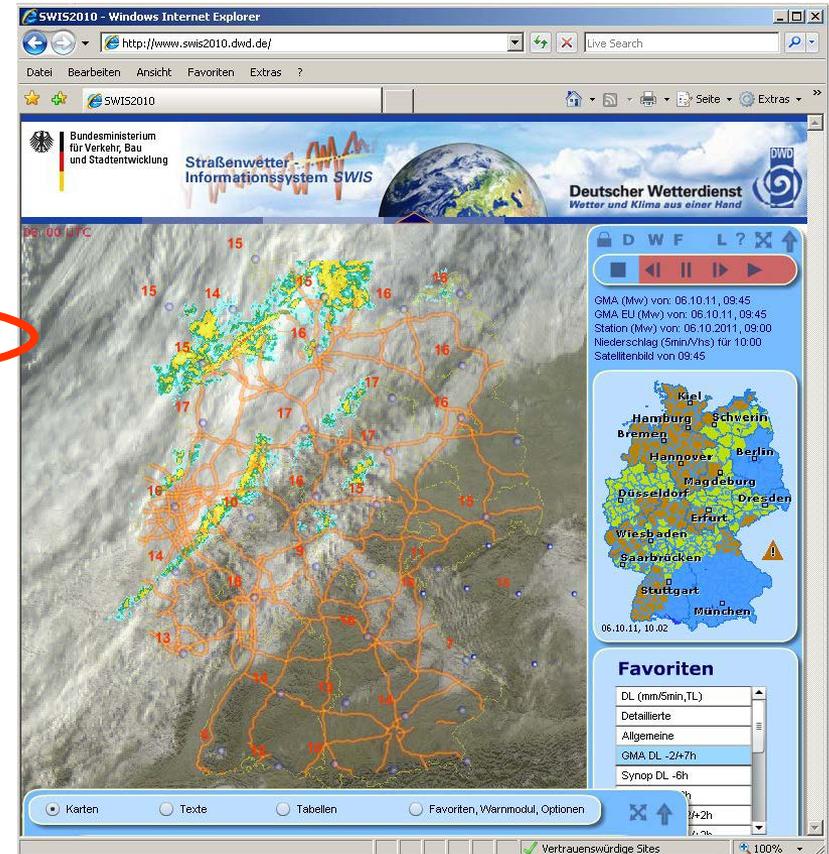
→ Dedicated road weather forecasts

- General road weather forecast (as text)
- Detailed road weather forecast
- SWIS city weather, point forecasts

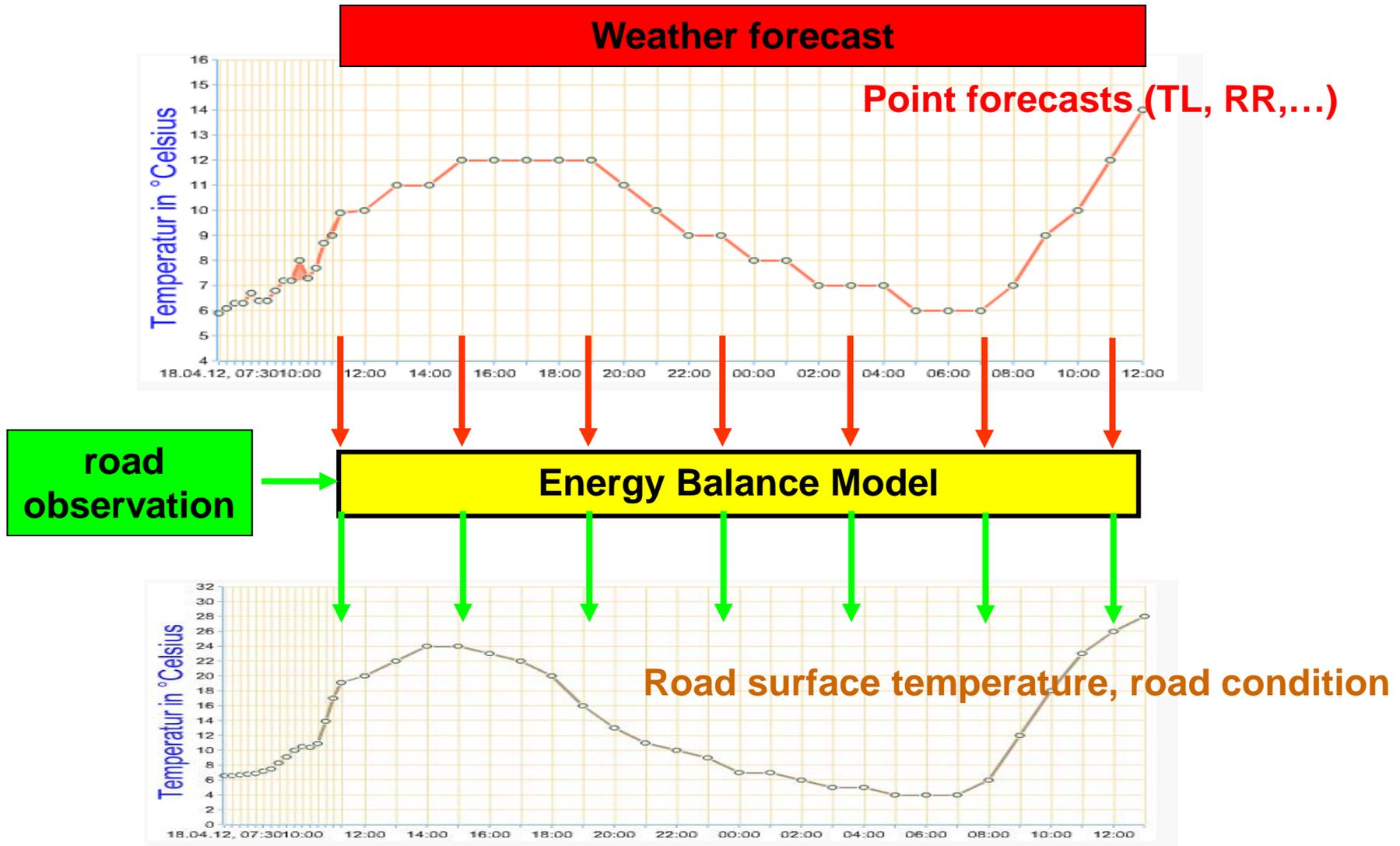
→ Data archiving and exchange

→ Information-system GBG SWIS

→ training and user advice



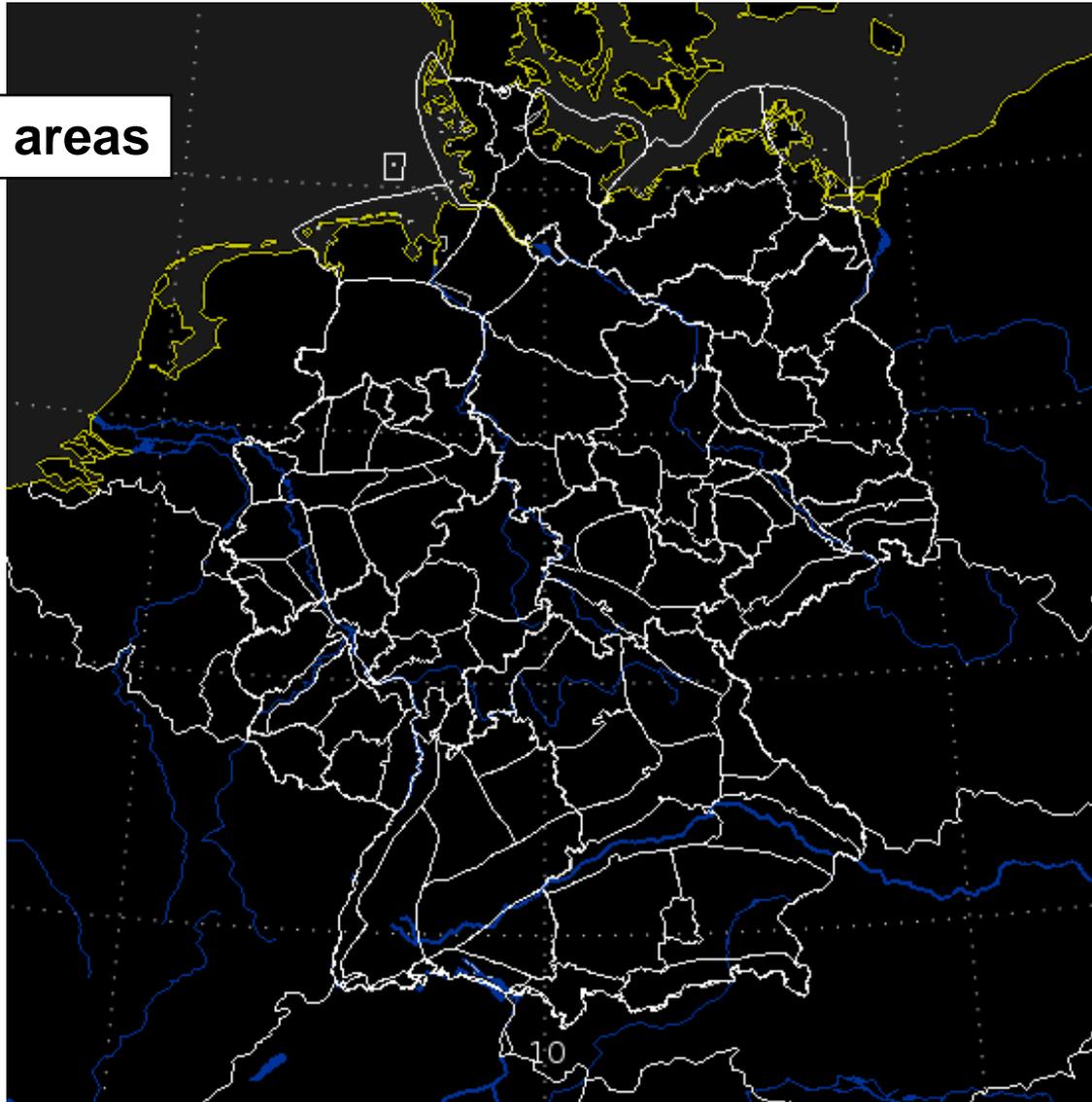
Production of a SWIS forecast



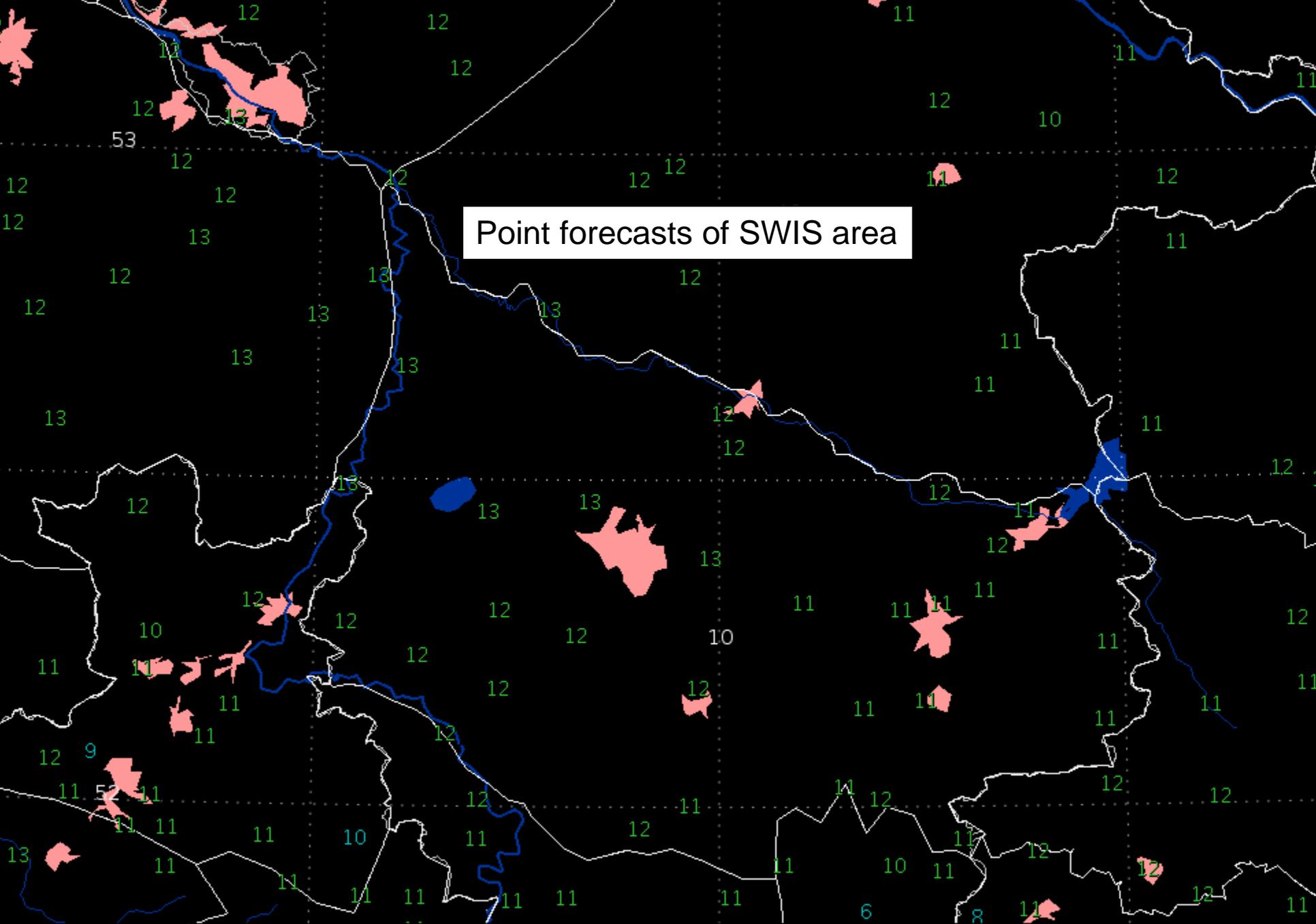
Production of a SWIS Table



237 SWIS areas



Point forecasts of SWIS area



Mi 18.04.12 17:00 UTC

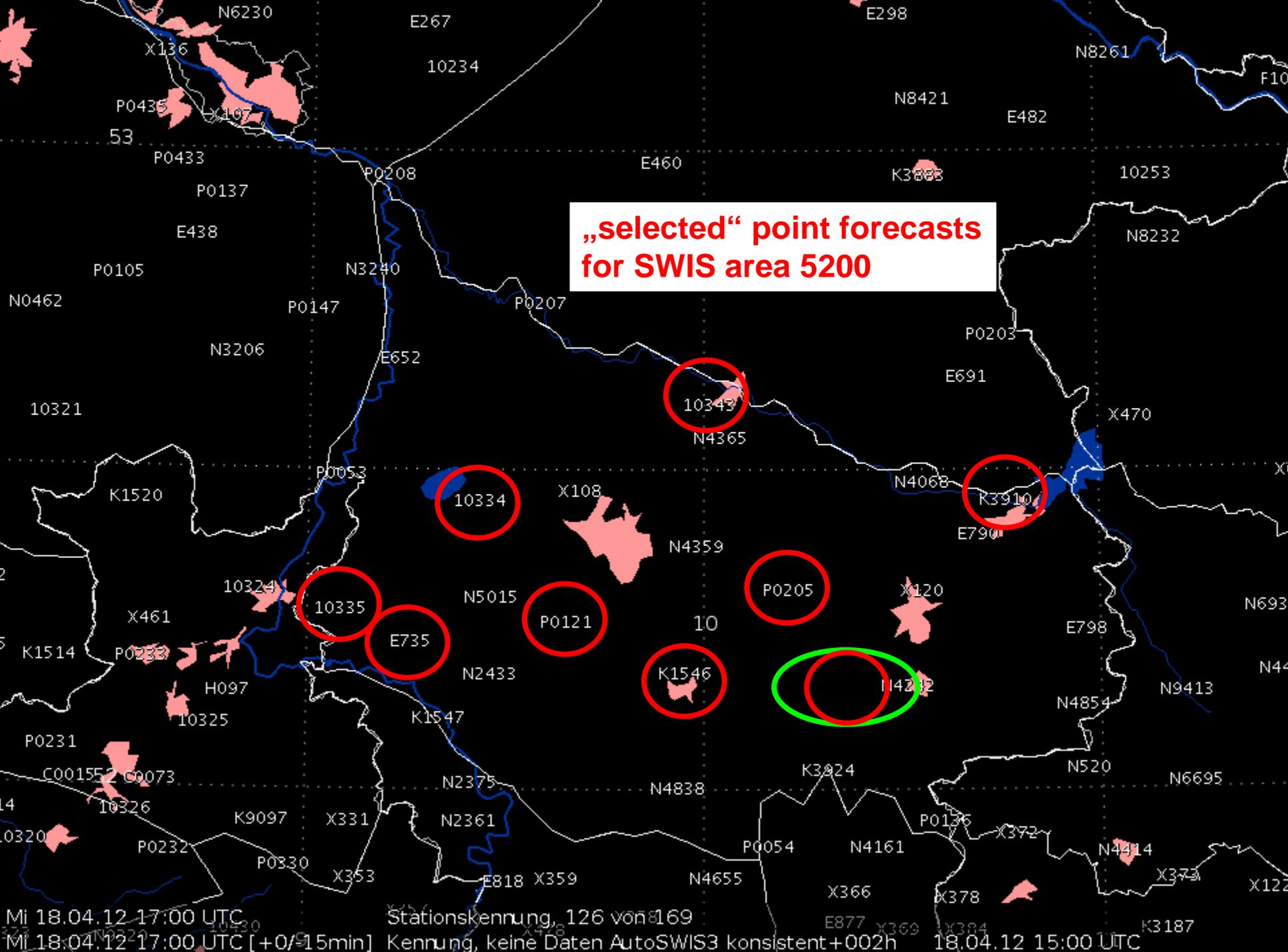
Mi 18.04.12 17:00 UTC [+0/-15min]

Temperatur in 2m in °C, 1147 von 170

AutoSWIS: Stationsname/Beschreibung, keine Daten AutoSWIS3 konsistent +002h

18.0

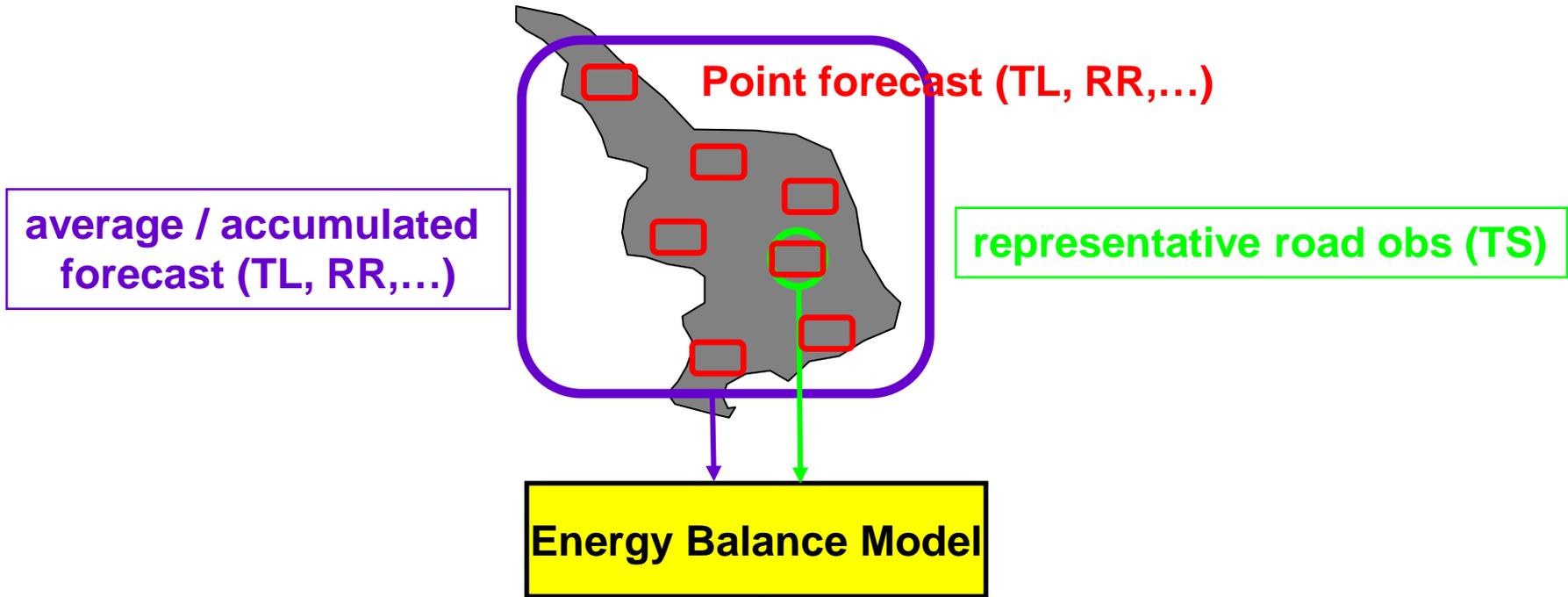
**„selected“ point forecasts
for SWIS area 5200**



Mi 18.04.12 17:00 UTC
Mi 18.04.12 17:00 UTC [+0/-15min]

Stationskennung, 126 von 169
Kennung, keine Daten AutoSWIS3 konsistent+002h

18.04.12 15:00 UTC



SWIS Table

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0
FDAT37 JJA 130800
detaillierte Strassengebietswettervorhersage
Klimagebiet : Weser-Leine-Bergland      Höhenstufe: 0 - 200 Meter
ausgegeben am: Freitag, den 13.08.2011 um 10:45 Uhr
von : Deutscher Wetterdienst, Regionalsentrale Hamburg

Uhrzeit      13      16      19      22      01      04      07      10      13
Bevoelkung   3       4       4       3       4       5       6       5
Niederschlag  0       0       0       0       0       0       0       0       0
N-Signal     0       0       0       0       0       0       0       0       0
Lufttemp.   16      18      17      13      11      9       10      16      18
Wind (km/h)  W10    W10    W10    C 0    010    S010   S10    S10    W10
Boeen       -       -       -       -       -       -       -       -       -

Streckentyp: Standard
Belagtemp.   34      34      27      17      13      11      11      24      33
Zustand:     -       -       -       -       -       -       -       -       -
Streckentyp: wenig befahrene Strecke
Belagtemp.   34      34      27      17      13      11      11      24      33
Zustand:     -       -       -       -       -       -       -       -       -
Streckentyp: Strecke im Schatten
Belagtemp.   21      22      19      14      11      9       10      17      23
Zustand:     -       -       -       -       -       -       -       -       -
Streckentyp: innerstaedische Strecke
Belagtemp.   32      33      26      17      14      12      12      24      32
Zustand:     -       -       -       -       -       -       -       -       -
Streckentyp: Bruecke
Belagtemp.   33      34      25      15      11      9       9       23      33
Zustand:     -       -       -       -       -       -       -       -       -
    
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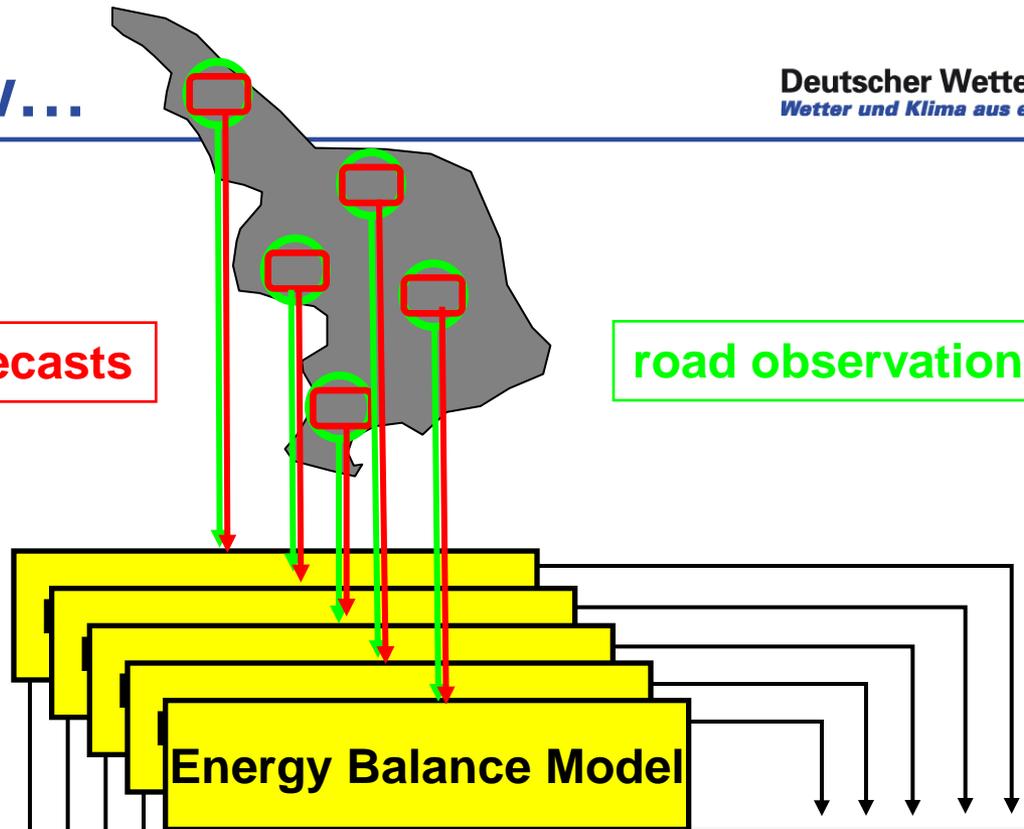


SWIS tomorrow...



point forecasts

road observations

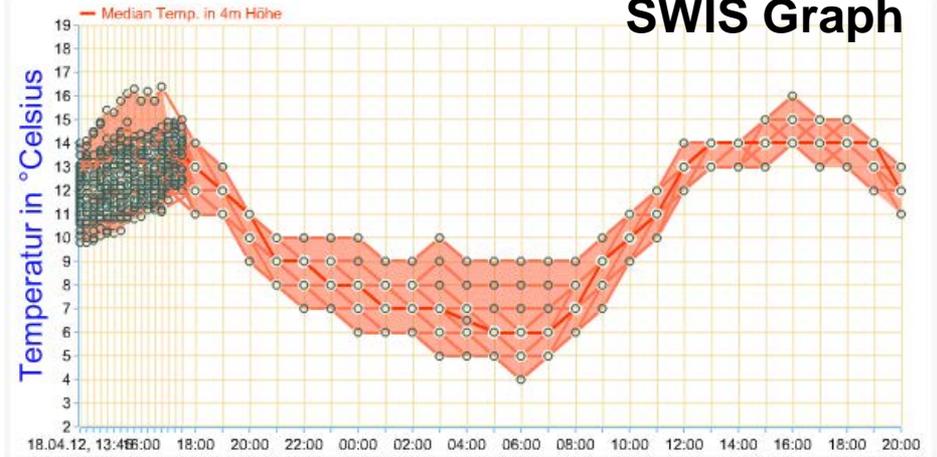


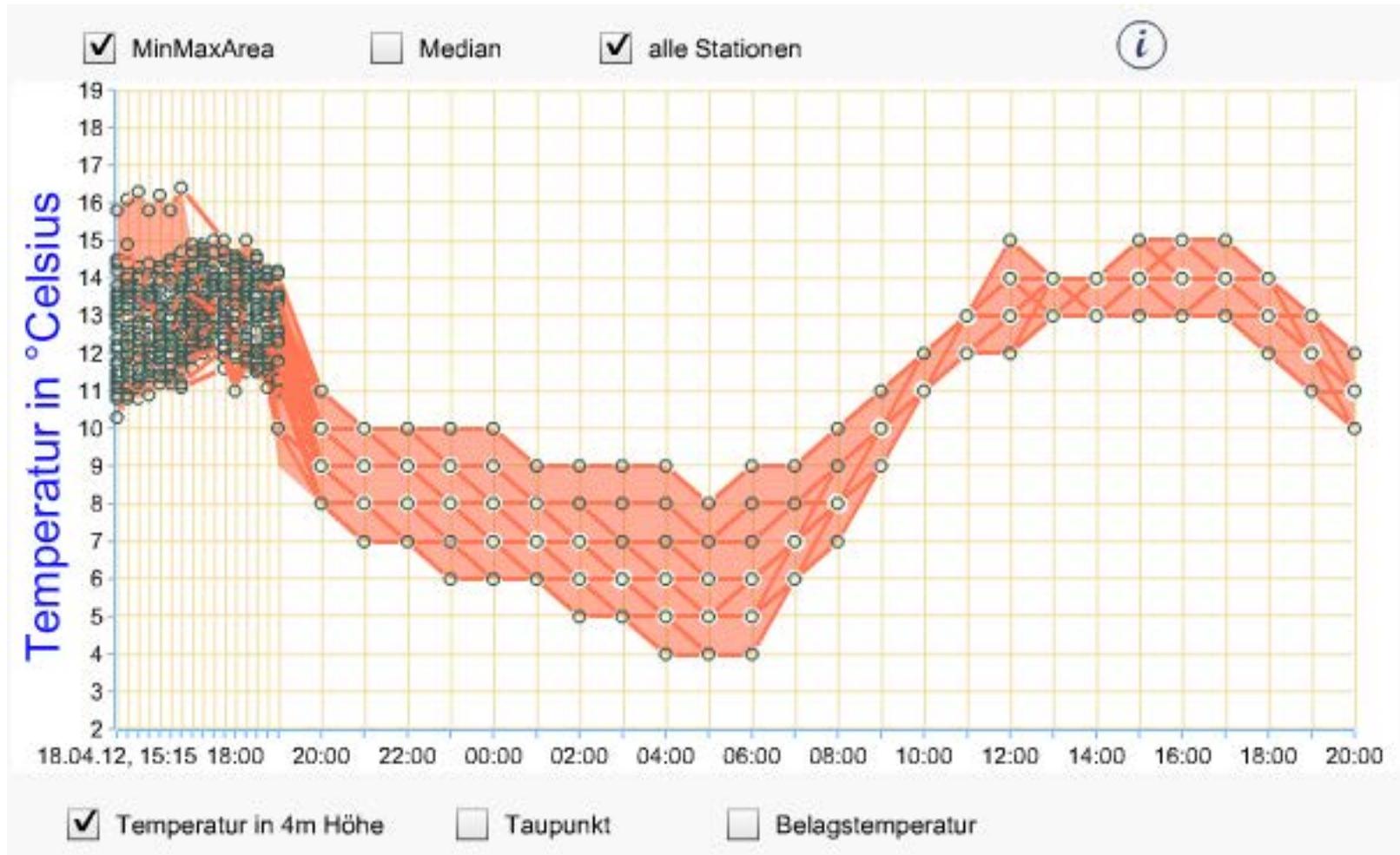
SWIS Table

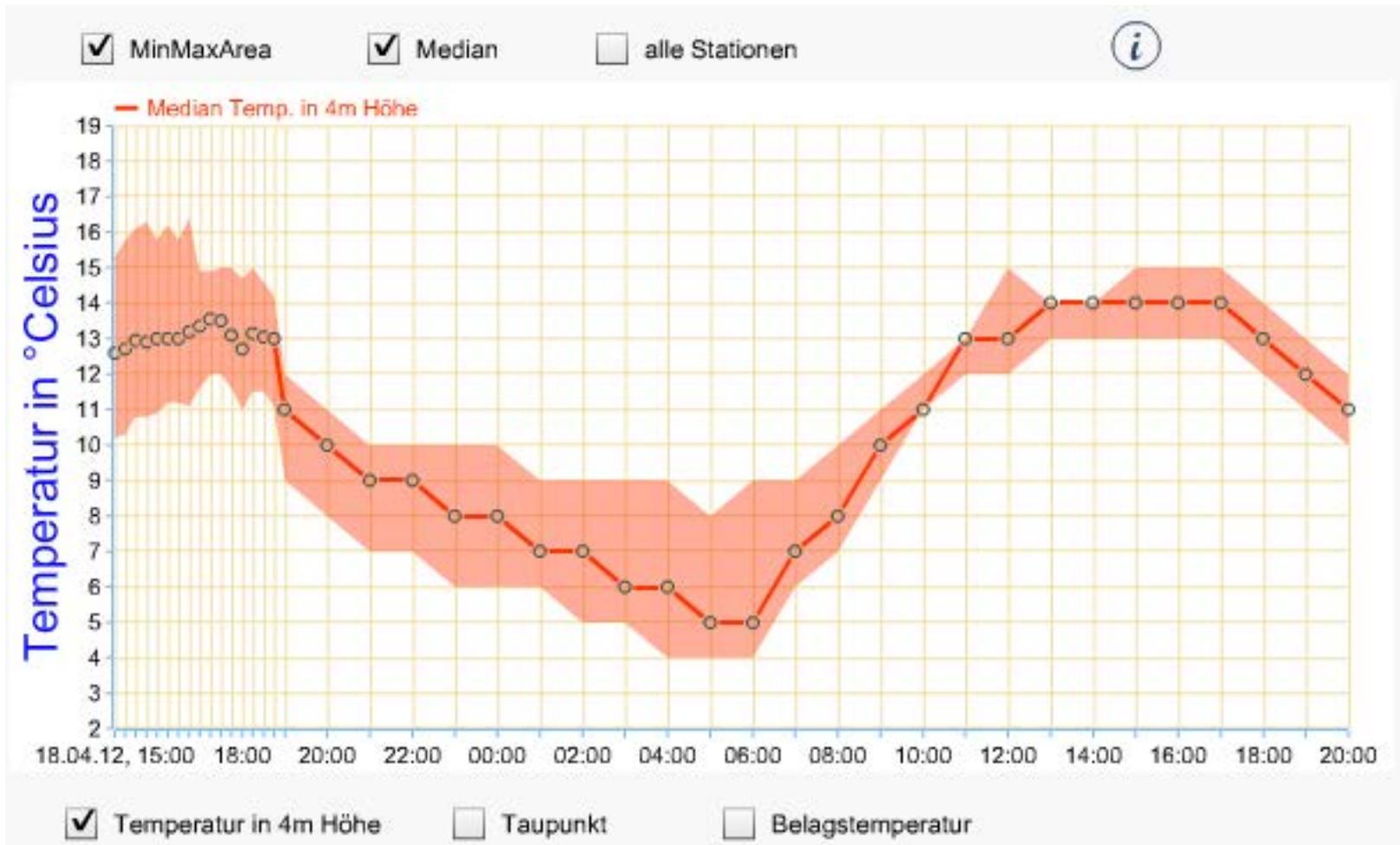
Uhrzeit	13	16	19	22	01	04	07	10	13
Bewölkung	3	4	4	3	4	4	5	6	5
Niederschlag	0	0	0	0	0	0	0	0	0
N-Signal	0	0	0	0	0	0	0	0	0
Lufttemperatur	16	18	17	13	11	9	10	16	16
Wind (km/h)	W10	W10	W10	C 0	010	S010	S10	S10	W10
Been	-	-	-	-	-	-	-	-	-
Streckentyp: Standard									
Belagtemp.	34	34	27	17	13	11	11	24	33
Zustand:	-	-	-	-	-	-	-	-	-
Streckentyp: wenig befahrene Strecke									
Belagtemp.	34	34	27	17	13	11	11	24	33
Zustand:	-	-	-	-	-	-	-	-	-
Streckentyp: Strecke im Schatten									
Belagtemp.	21	22	19	14	11	9	10	17	23
Zustand:	-	-	-	-	-	-	-	-	-
Streckentyp: innerstädtische Strecke									
Belagtemp.	32	33	26	17	14	12	12	24	32
Zustand:	-	-	-	-	-	-	-	-	-
Streckentyp: Brücke									
Belagtemp.	33	34	25	15	11	9	9	23	33
Zustand:	-	-	-	-	-	-	-	-	-

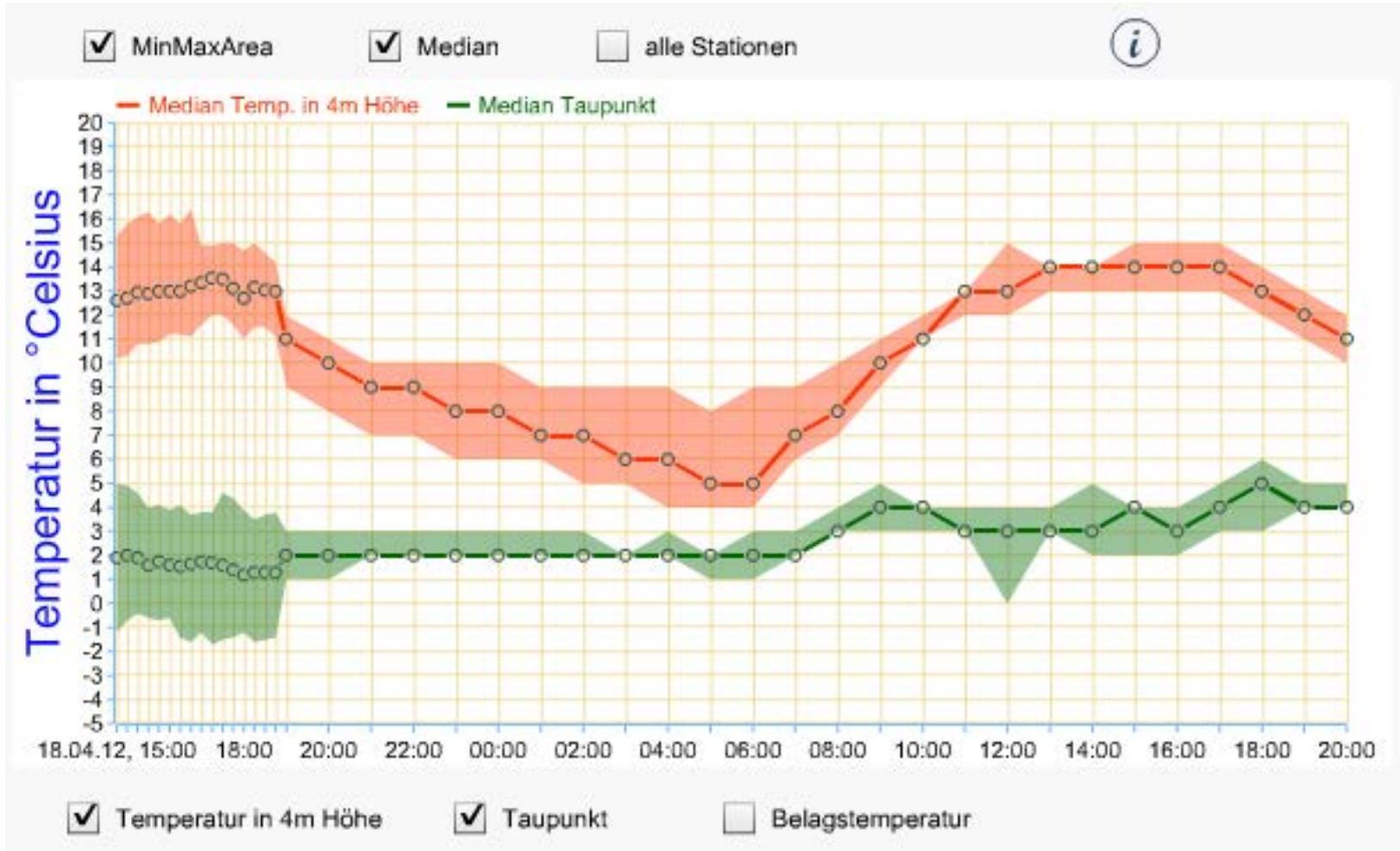
average / accumulation

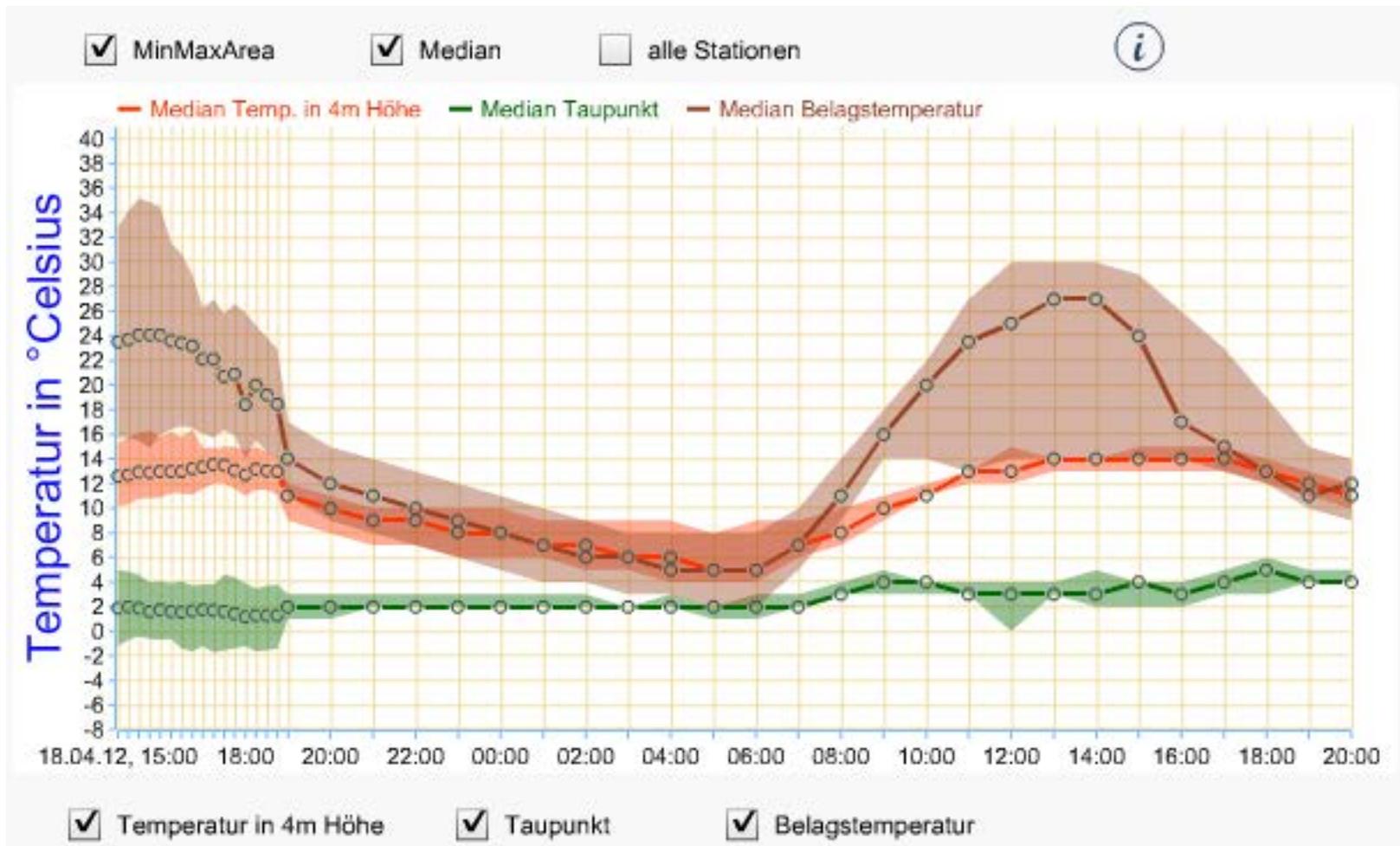
SWIS Graph













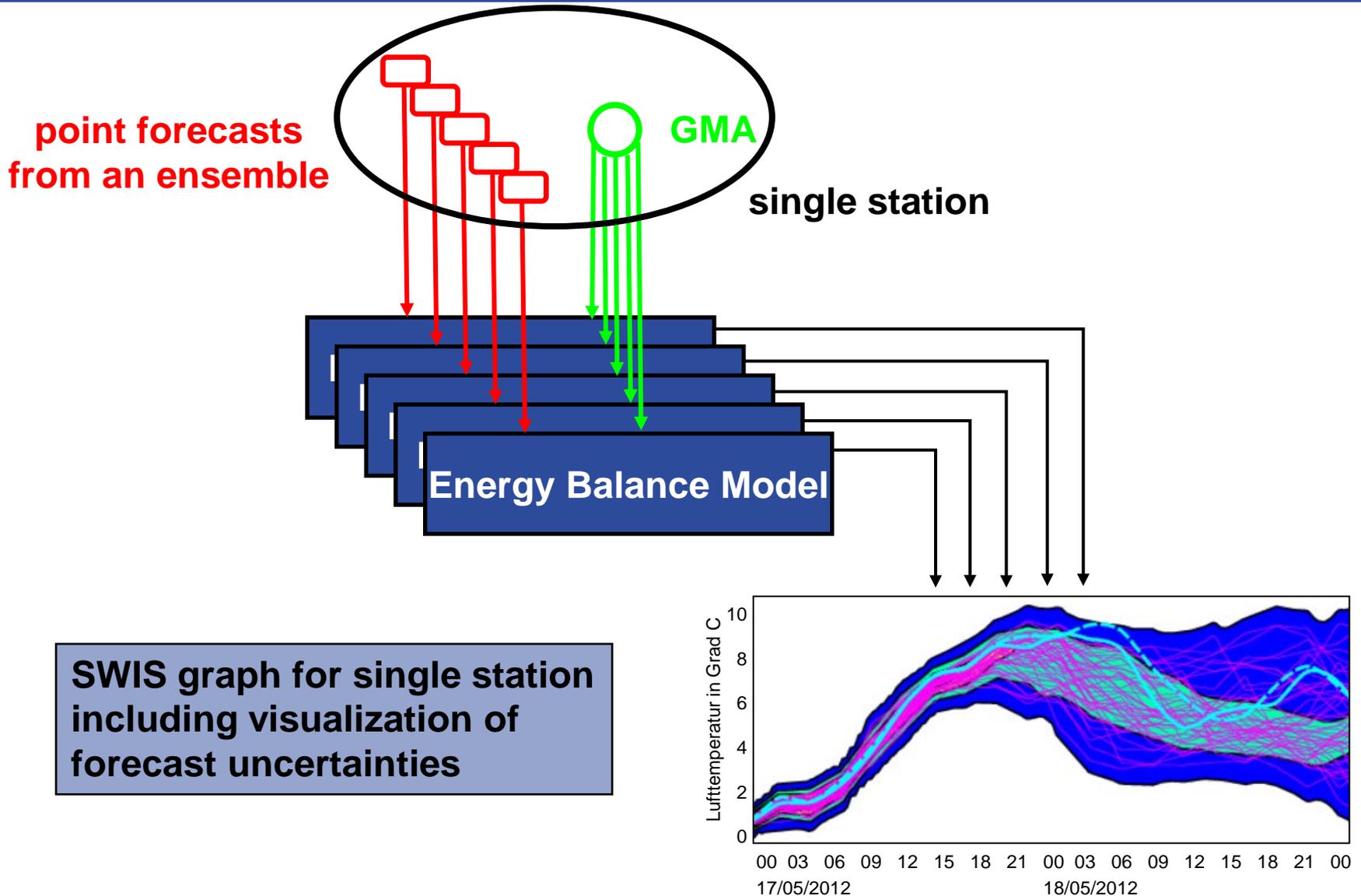
Transition to probabilistic forecasts:

- ➔ Until now only deterministic point or area forecasts
 - Users had to interpret – and add subjective uncertainties!!

- ➔ Extending the forecast system to include:
 - Explicit information on spatial variability
 - Objective information on uncertainties of forecasts



Probabilistic SWIS forecasts



Decision processes are deterministic...



...how can probabilistic forecasts be of use for this decision?



- Numerical weather forecasts can never be perfect
- A deterministic forecast is just one (random) realization of all possible forecasts in the actual range of uncertainties
- Decisions, exclusively based on deterministic forecast information cause:
 - Less protective action (lower costs related to protection)
 - More missed events (potentially strongly increased cost of damage)
- Decisions, based on probabilistic forecast information cause:
 - More protective action (higher costs related to protection)
 - Fewer missed events (potentially strongly reduced cost of damage)





- Different user groups
 - Users know their cost-loss ratio and ask for uncertainty information
 - Users know of uncertainties and appreciate objective information on uncertainties
 - Users are less vulnerable to wrong forecasts and prefer simple information
- Time ranges of decision-making:
 - 1-2 days for organizing work schedule
 - 1-2 hours for deciding to grit the roads
- The new generation of road agents entering the service is happy to work with new technologies including new (probabilistic) forecast products
- Established products should not be withdrawn, or only if they are replaced by other products giving comparable information
- Information overload has to be avoided
- The forecast product range should facilitate both a quick overview of the situation and the possibility for a more detailed assessment
- The development of new system components and forecast products should incorporate feedback from (test) user groups





- ➔ Current concept of area averaged forecasts is suboptimal in terms of interpretation and application of the forecasts for decision making
- ➔ New concept will improve on this situation
- ➔ Development work is under way:
 - 1. step: explicit modelling and visualization of spatial variability
 - 2. step: Taking into account the uncertainties SWIS forecasts are based on, i.e. explicit modelling and visualization of uncertainties
- ➔ Information on uncertainty of forecasts can be of great value for users in their decision-making processes



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