

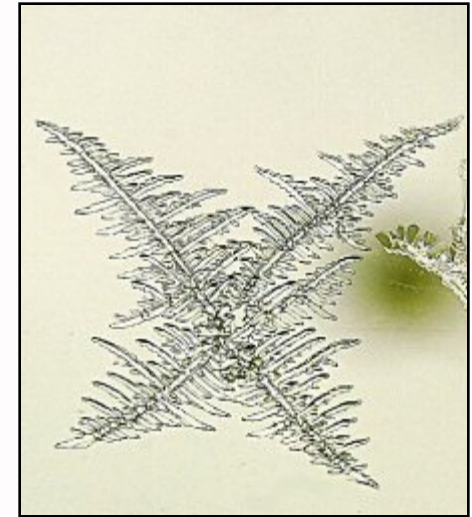
# The Relevance of Measuring Dewpoint Immediately Above The Road

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Hoar frost formation on the road is depending on a many parameters.

- Dewpoint and road temperature.
- Difference of the above mentioned
- Dewpoint value (available moisture)
- Durance of the event
- Initial road temp. at onset of event
- Windconditions
- Moist advection +/-
- ...more



*We need to estimate the onset of frost formation and the amount of rime forming during a certain period.*

*Is the residual salt amount enough ?*

At a certain road station in the Copenhagen area, we saw numerous false alarms.

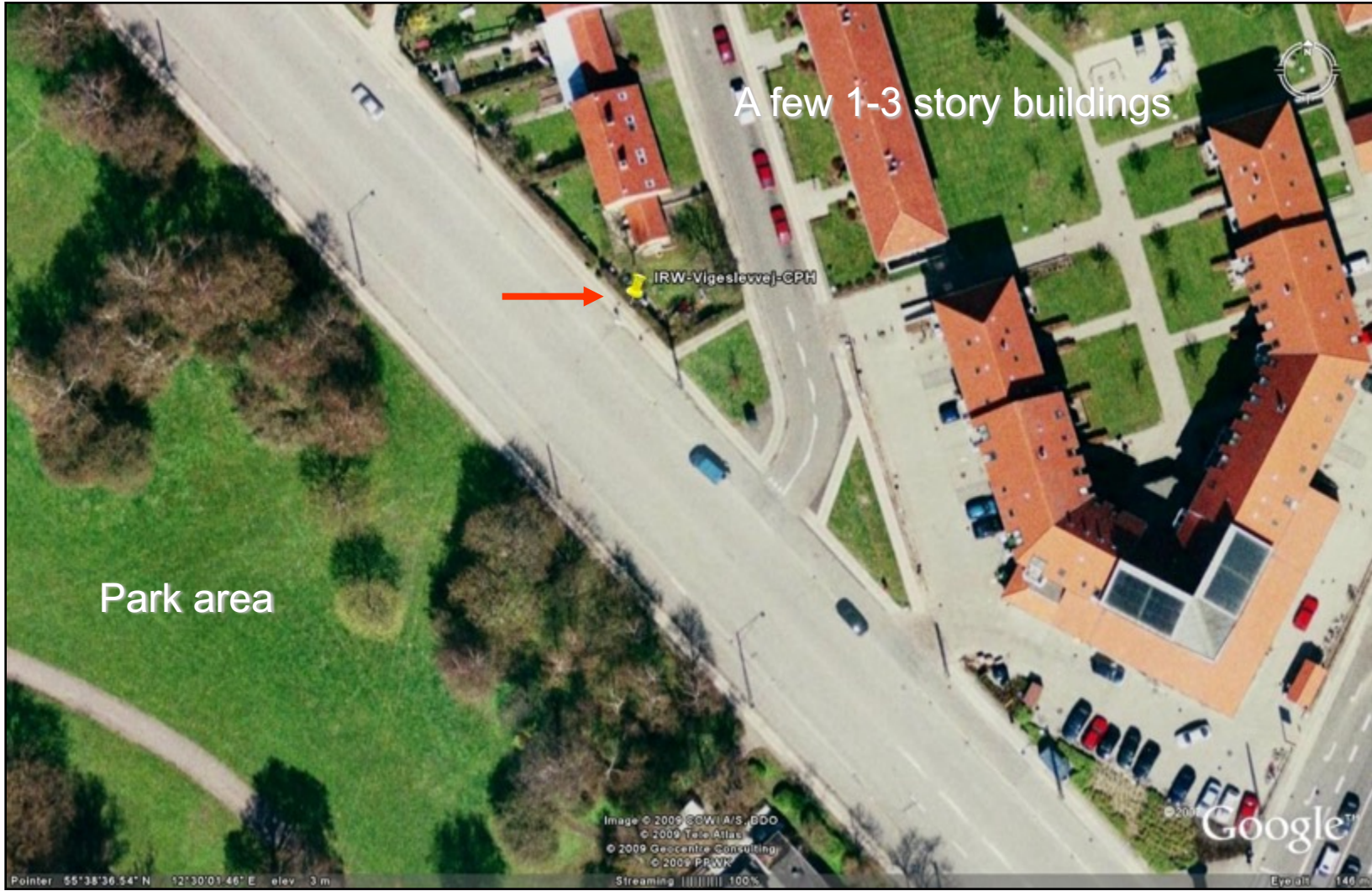
No rime formation though  $T_d > T_{road}$ .

We initiated experiments to find out if the near-road climate is so much different than the 2-meter climate.

# Position of the road station



SIRWEC Quebec Canada 2010









Positioning instruments near the surface can of course give you strange results...





RWIS with dew point in  
2,3 meter and 0,2 meter

Match of two td/hmp45

Compare control of two hmp45 sensors

We use Vaisala hm70 as reference

Delta td < 0,2° celsius for all tree sensors





# RWIS




Dew point  
td – 2 meter



Dew point  
td – 0,2 meter

# The near road climate in clear, cold and calm weather



Strong temperature inversion forms at/near the surface.

Dewpoint falls near the surface, as the water vapour changes phase to crystals.

Rime formation near the surface stops, until new moisture from higher levels is brought down by wind or traffic.

Clear, calm & cold...

The dewpoint measured at higher levels (2m) is higher than near the surface and the hoar frost formation is overestimated.

3m

2m

1m

10cm

-5

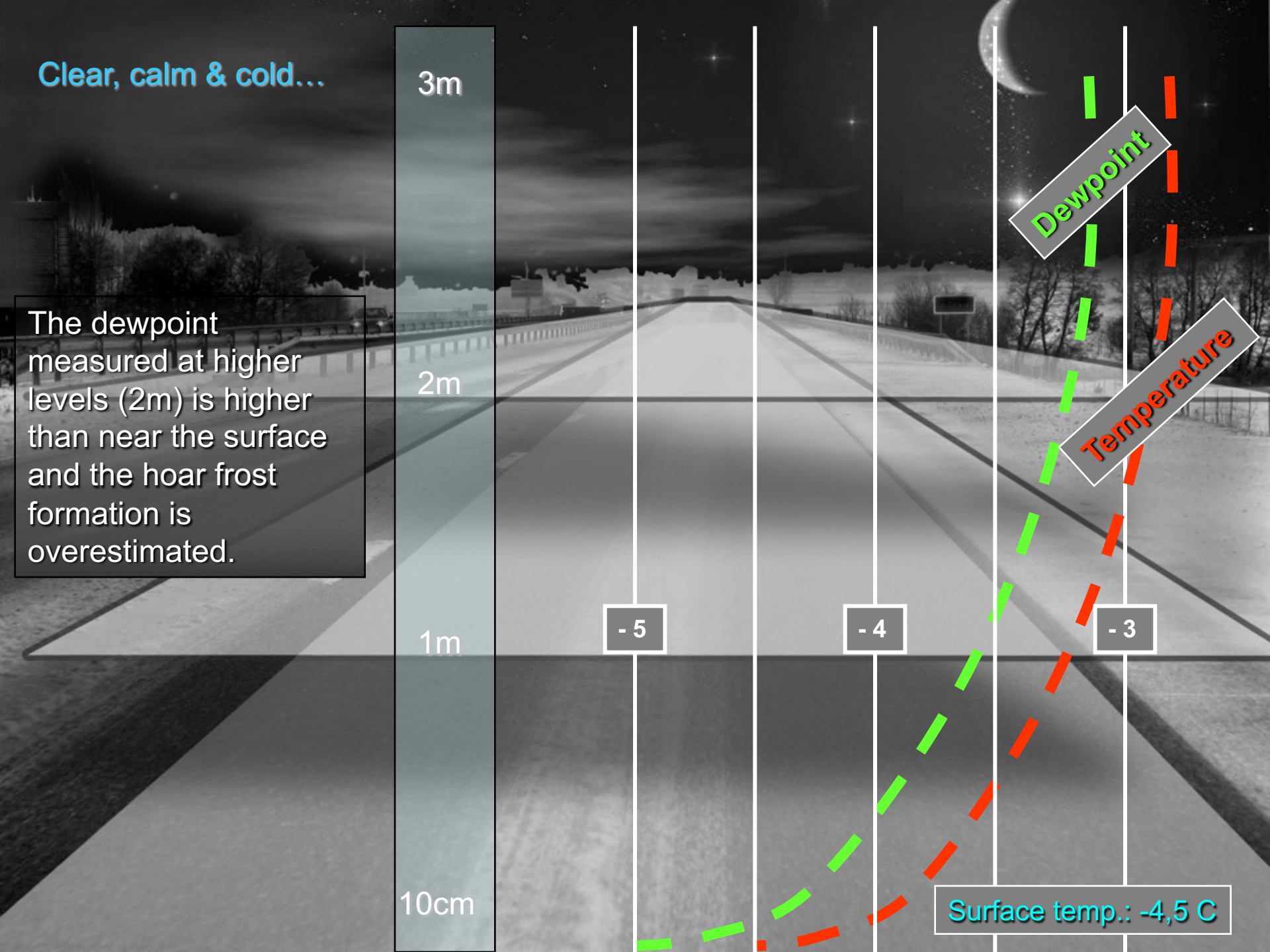
-4

-3

Surface temp.: -4,5 C

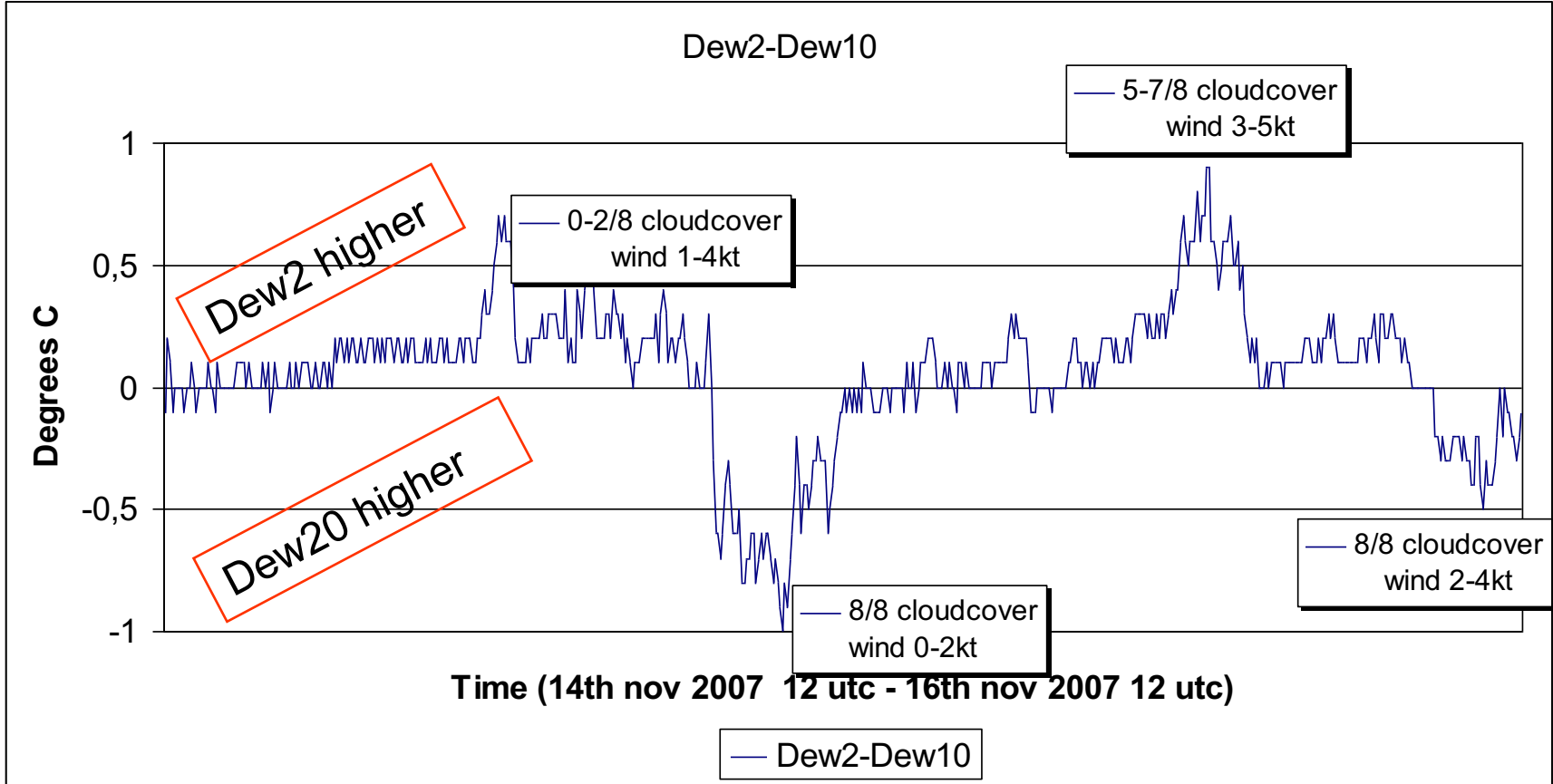
Dewpoint

Temperature





Random weather situation –  
Shows the difference between Td2m and Td20cm



Dataset:

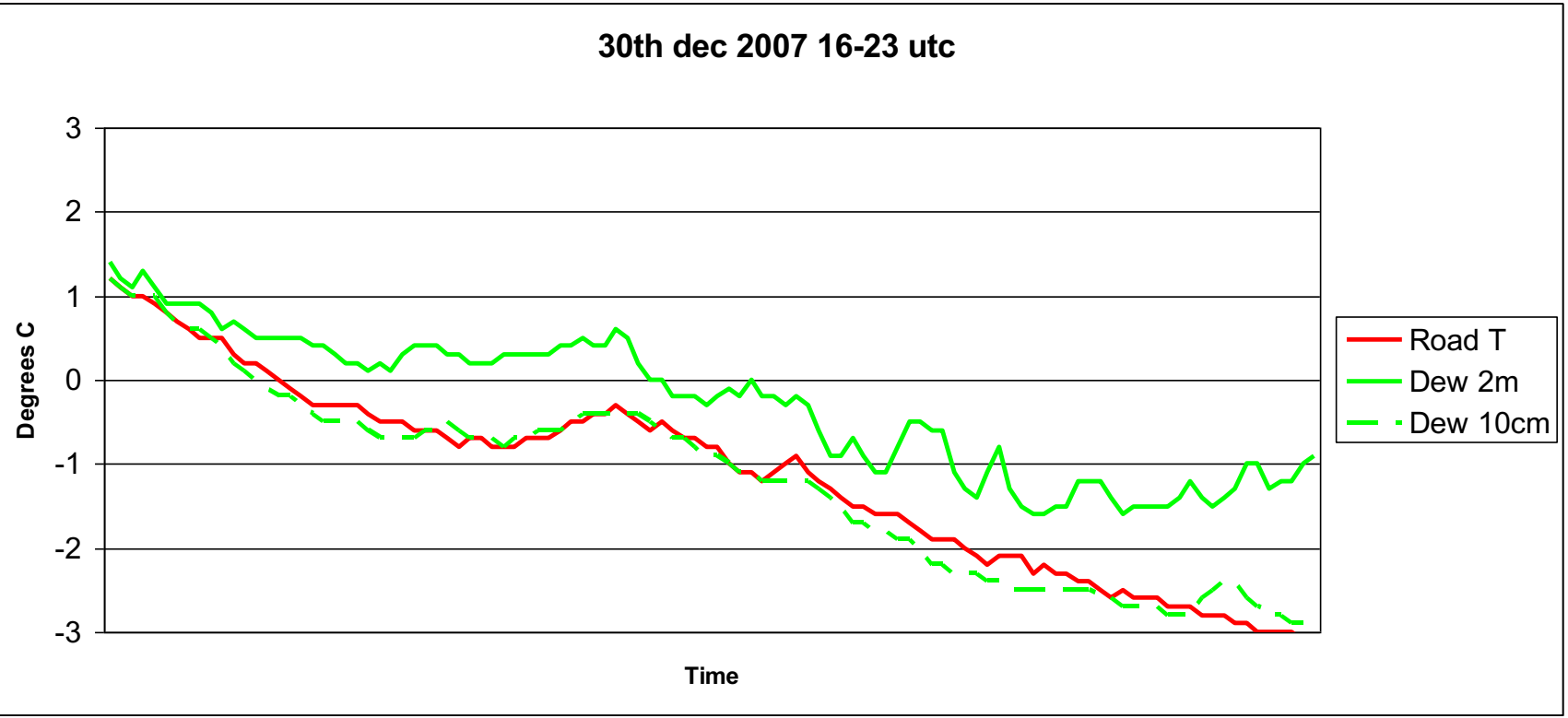
Look for "false alarm" situations,

$TD2m > Troad$  and  $TD20cm < Troad$  ( $Troad < 0$ )

March 2006 – feb 2008.

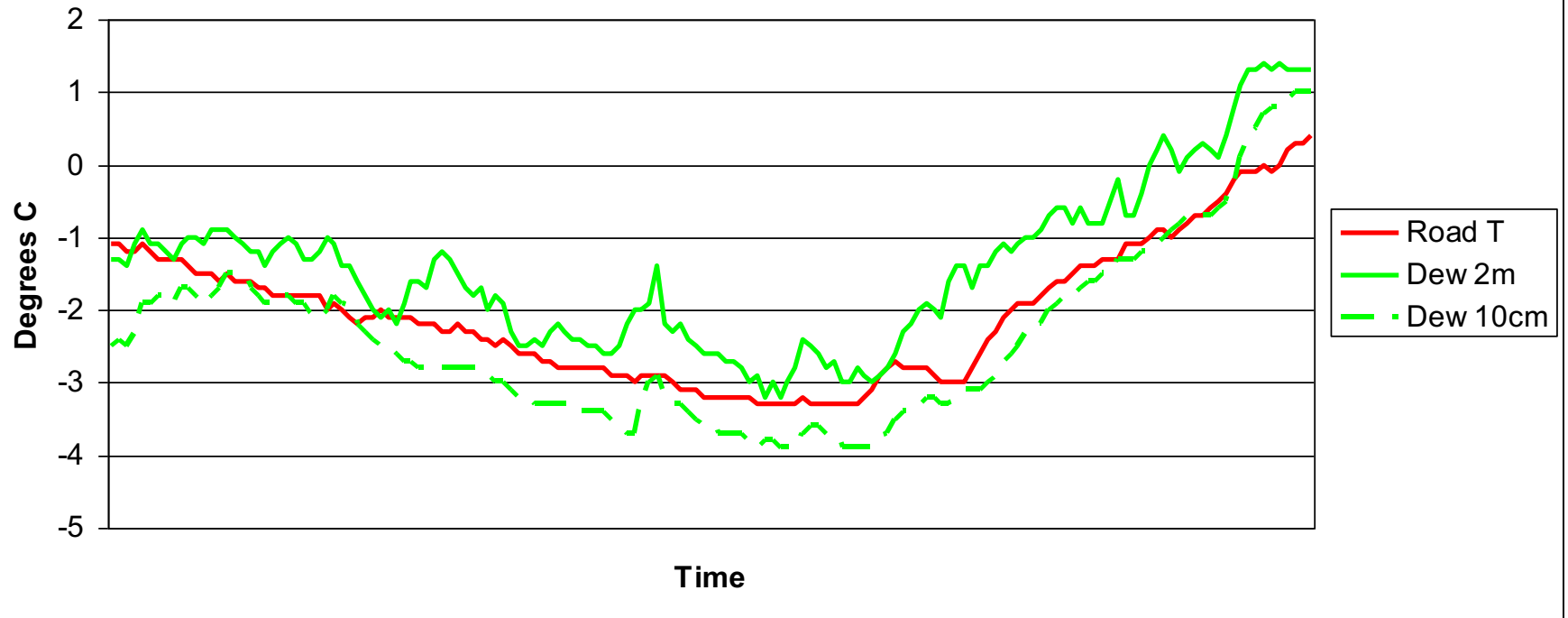
Begins	Ends	Cloudcover / 8	Windspeed kt
20-03-2006 22:18	21-03-2006 02:08	0	0-5
22-03-2006 02:30	22-03-2006 06:50	0	0-5
23-03-2006 02:20	23-03-2006 06:20	0	2-5
24-03-2006 02:50	24-03-2006 05:40	0	1-4
27-01-2007 01:30	27-01-2007 07:50	0-7 (snowshowers)	2-5
27-01-2007 18:40	27-01-2007 21:40	0-3	2-5
18-02-2007 01:50	18-02-2007 07:30	0-4	0-3
11-11-2007 04:05	11-11-2007 07:45	0-2	1-3
11-11-2007 17:30	11-11-2007 21:50	0-4	2-5
15-11-2007 00:00	15-11-2007 04:55	0-2	1-4
16-12-2007 03:30	16-12-2007 09:05	1-7 (increasing)	2-4
30-12-2007 16:15 XX	30-12-2007 23:00	0-2	1-4
22-01-2008 18:30 XX	23-01-2008 01:30	0-2	1-4
27-01-2008 18:15 XX	28-01-2008 06:10	0-1 (late becmg 8/8)	1-4

30th dec 2007 16-23 utc

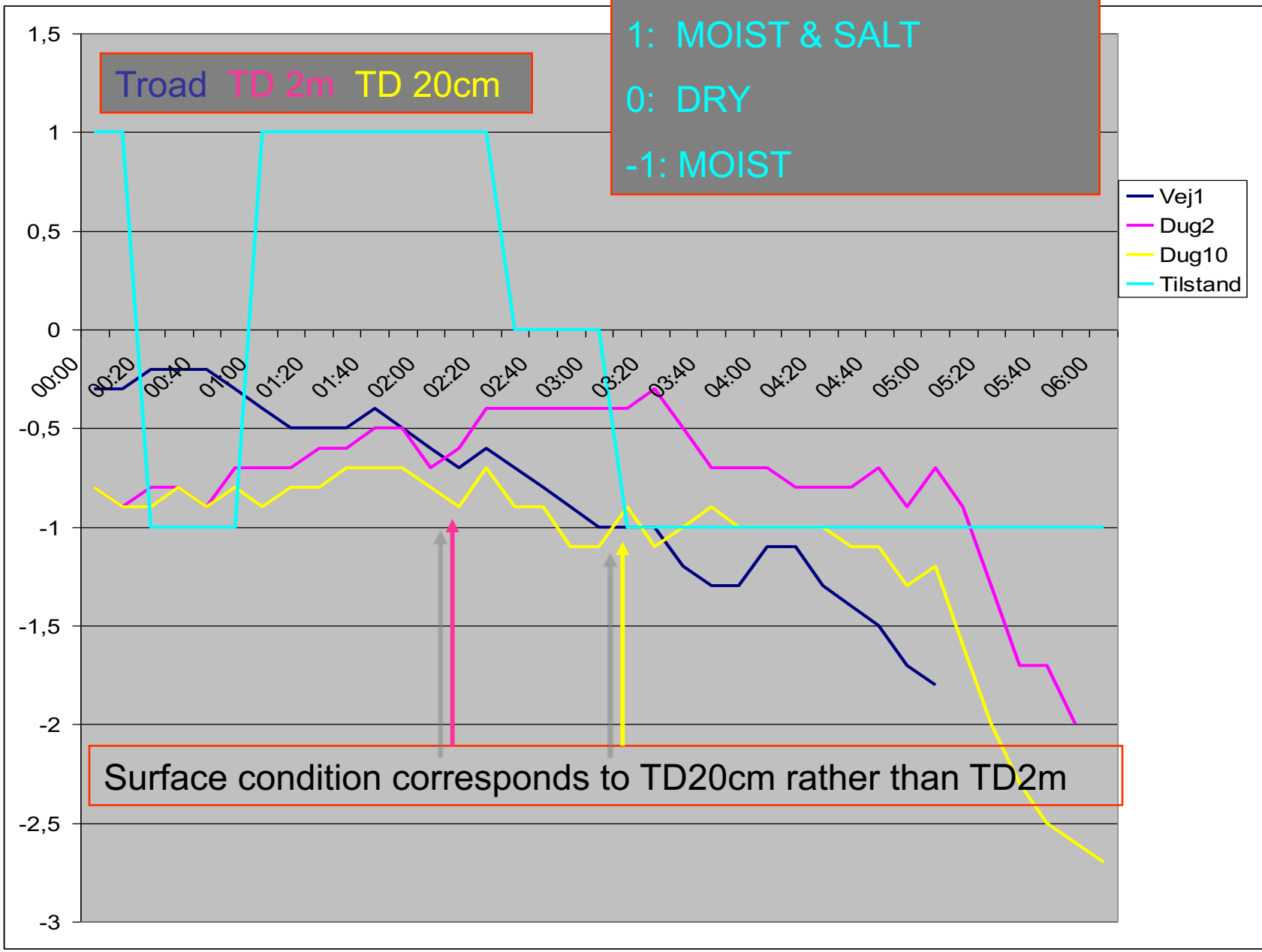




27th jan 2008 18 utc - 28th jan 2008 07 utc



Surface condition censor  
1: MOIST & SALT  
0: DRY  
-1: MOIST



## Conclusions:

In cold, clear and calm (nights) the dewpoint measured at 2 meters (or higher) will most likely overestimate the frost formation on the surface.

The onset and duration of frost formation will probably not be well forecasted, when based on dewpoint measurements i 2 meters or higher.

Measuring dewpoint near the road surface will in some places and in some weather scenarios make good sence.





*Questions are welcome...*

Thank you for your attention !

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