HIRLAM
Surface developments 2009/2010

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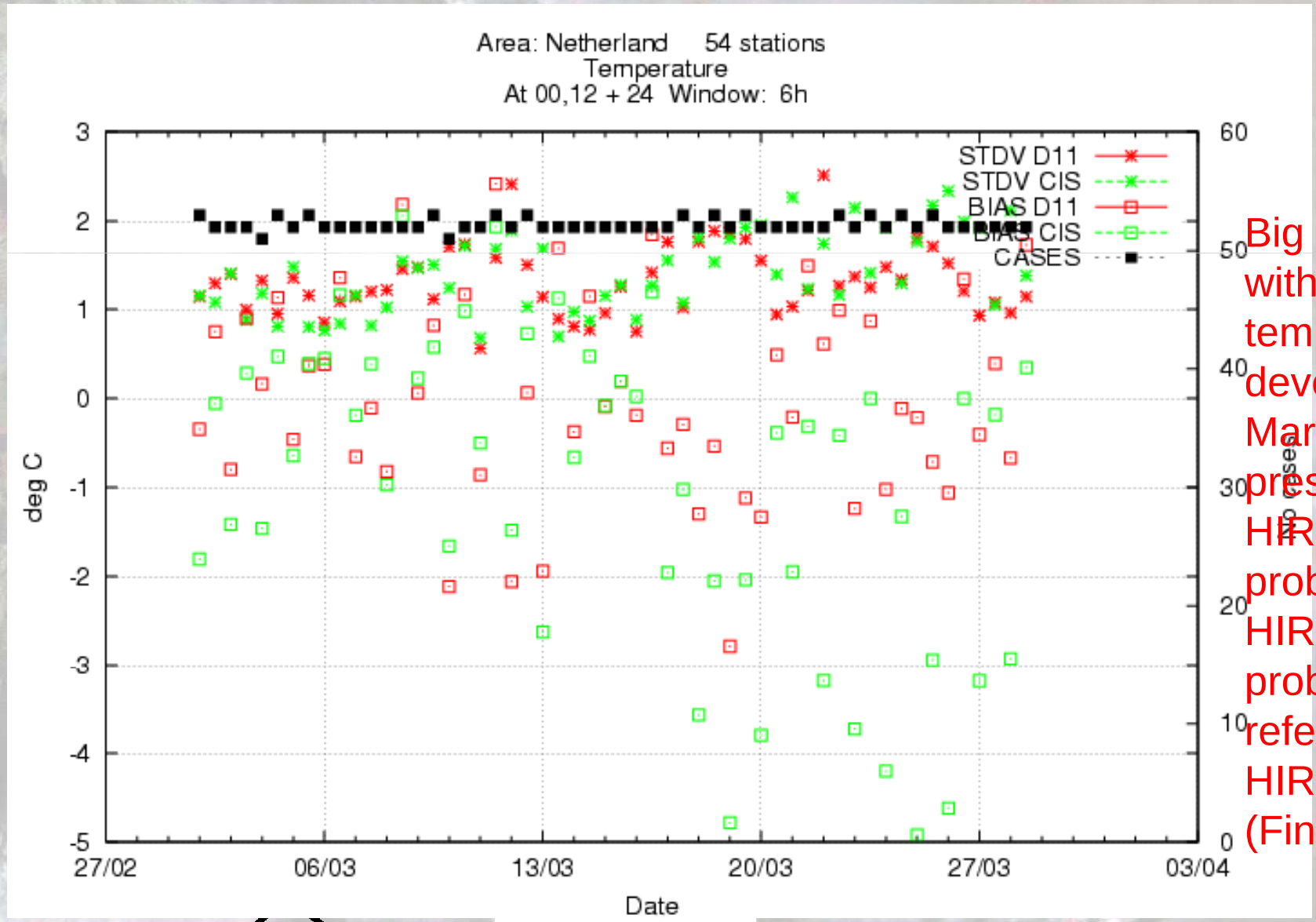
Thanks: Niels Zweers, Tido Semmler

Overview

- Soil ice problems
- Where has the winter fog gone?
- Impact of sea surface drag relation on hurricanes
- Snow on lake ice
- Validation of TEB in the Netherlands

HIRLAM, soil ice problem



Big problems with nighttime temperatures develop in March. Not present in HIRLAM 7.0, problematic in HIRLAM 7.2, problem also in reference HIRLAM (Finland)

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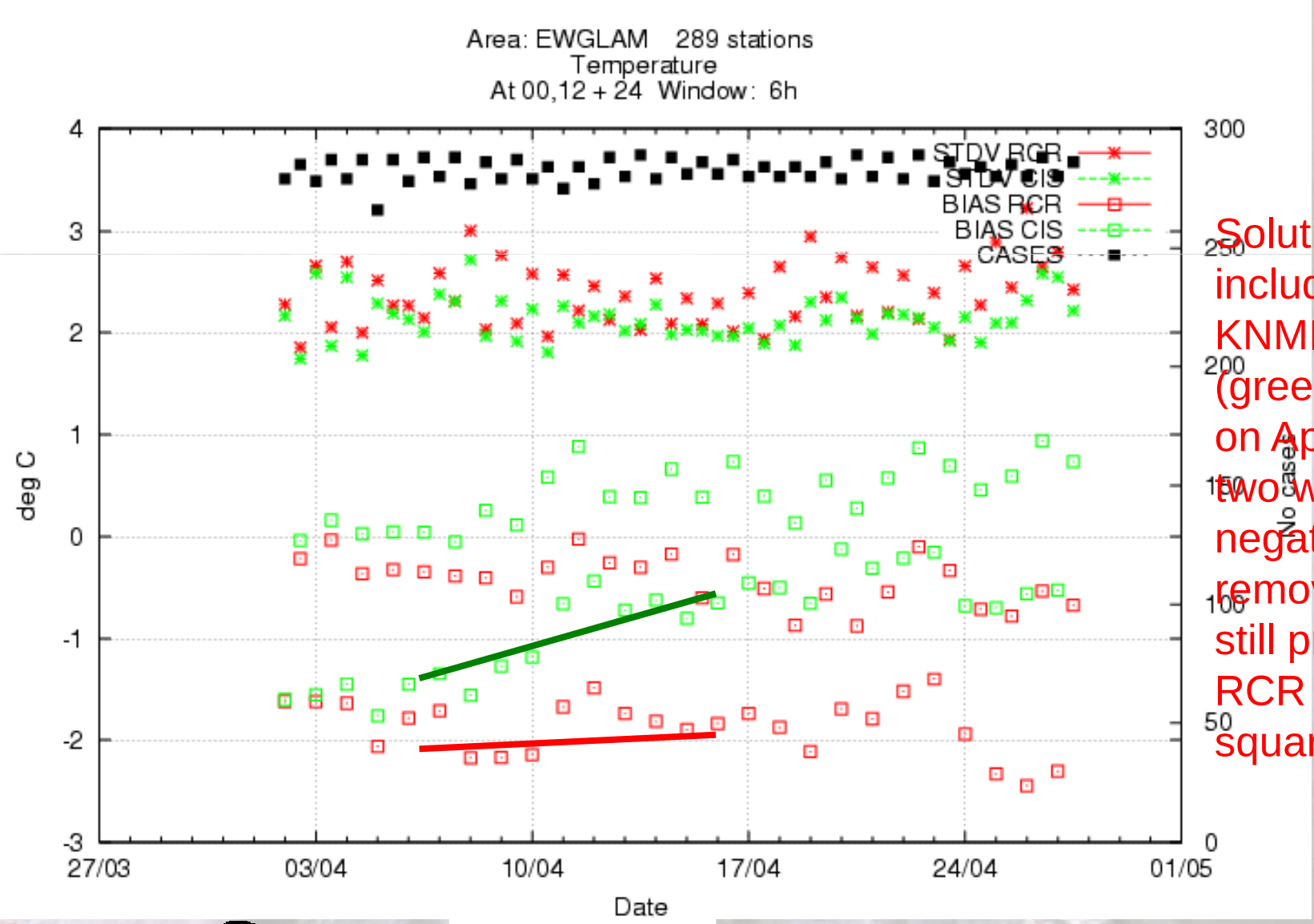
HIRLAM, soil ice problem



Solution included in KNMI-HIRLAM (green squares) on April 1st, after two weeks negative bias removed while still present in RCR (red squares)

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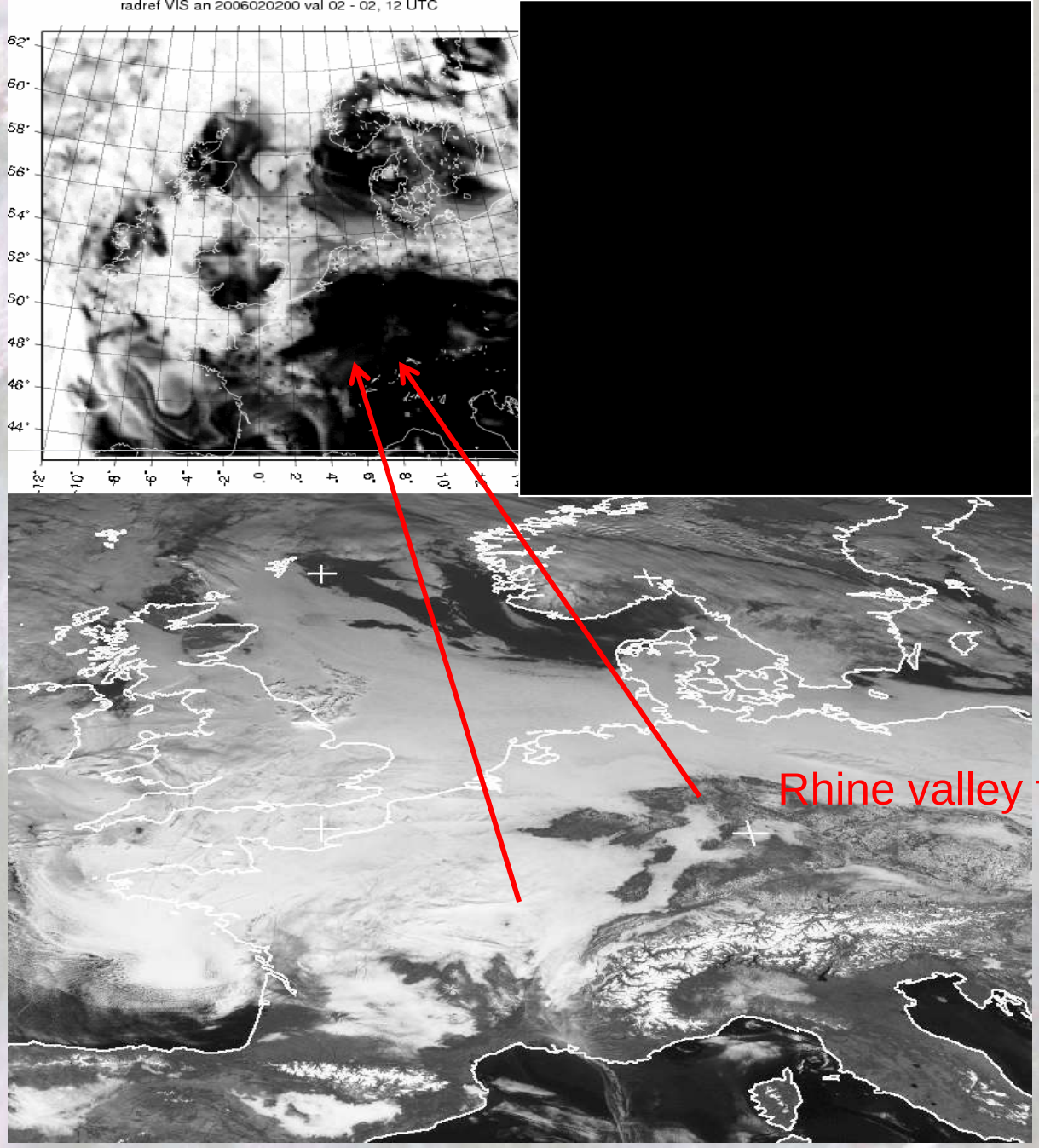
Where has the fog gone?

- HIRLAM has tendency to underestimate low clouds and fog and dissolve them during the day
- Especially in Winter in Central and Western Europe
- Usually during cold conditions, temperatures around or just below 0° C



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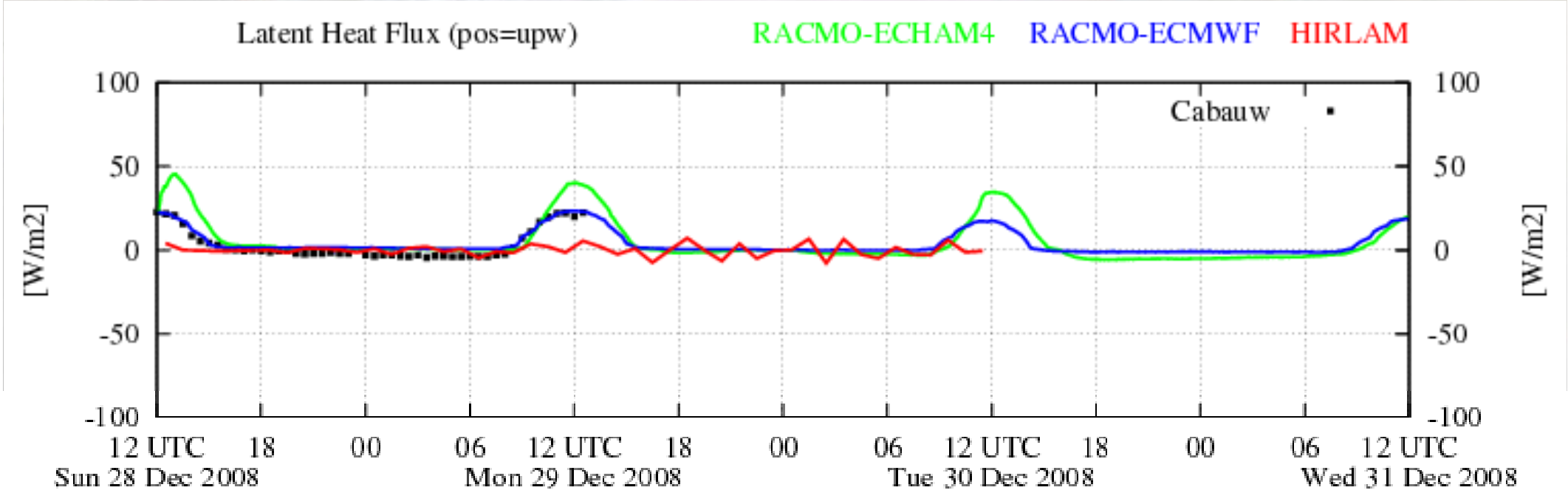
Where has the fog gone?



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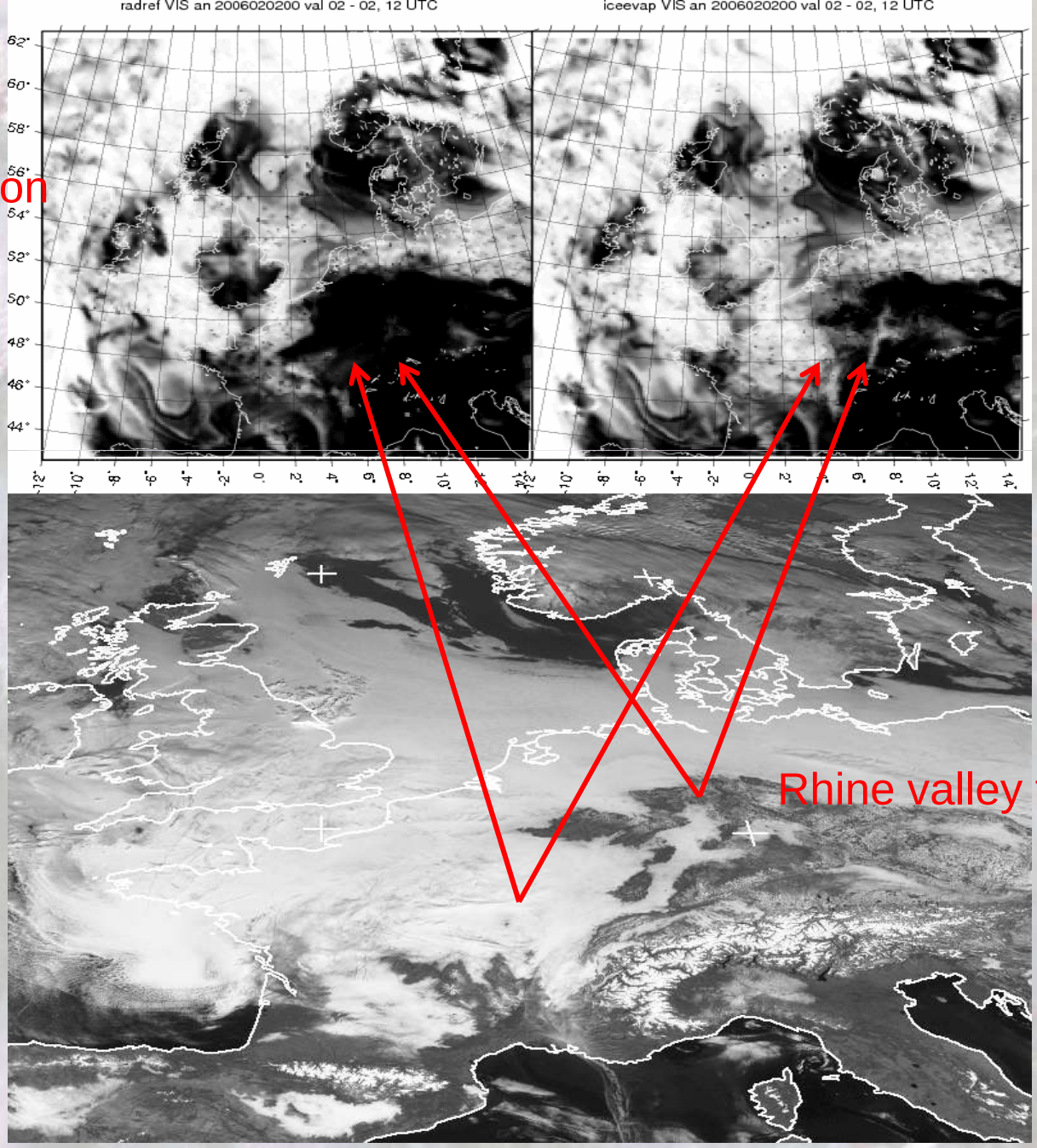
Where has the fog gone?

- Evaporation from bare soil in HIRLAM only from liquid water in soil, ice does not count in RH in soil
- No evaporation from frozen soil
- Experiment where ice is included in RH of bare soil
- Effect is already included in ALADIN ISBA (sublimation term in evaporation)

Without evaporation from frozen soil



With evaporation from frozen soil

Found it!

Rhine valley filled with fog

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HIRLAM: drag relation

- In HIRLAM constant Charnock parameter, value 0.025
- Tuned to give correct average behaviour
- Parameterization of Makin: Charnock parameter dependent on wind speed
- Lower roughness for high wind speed
- Large impact on hurricanes
- More information: zweers@knmi.nl

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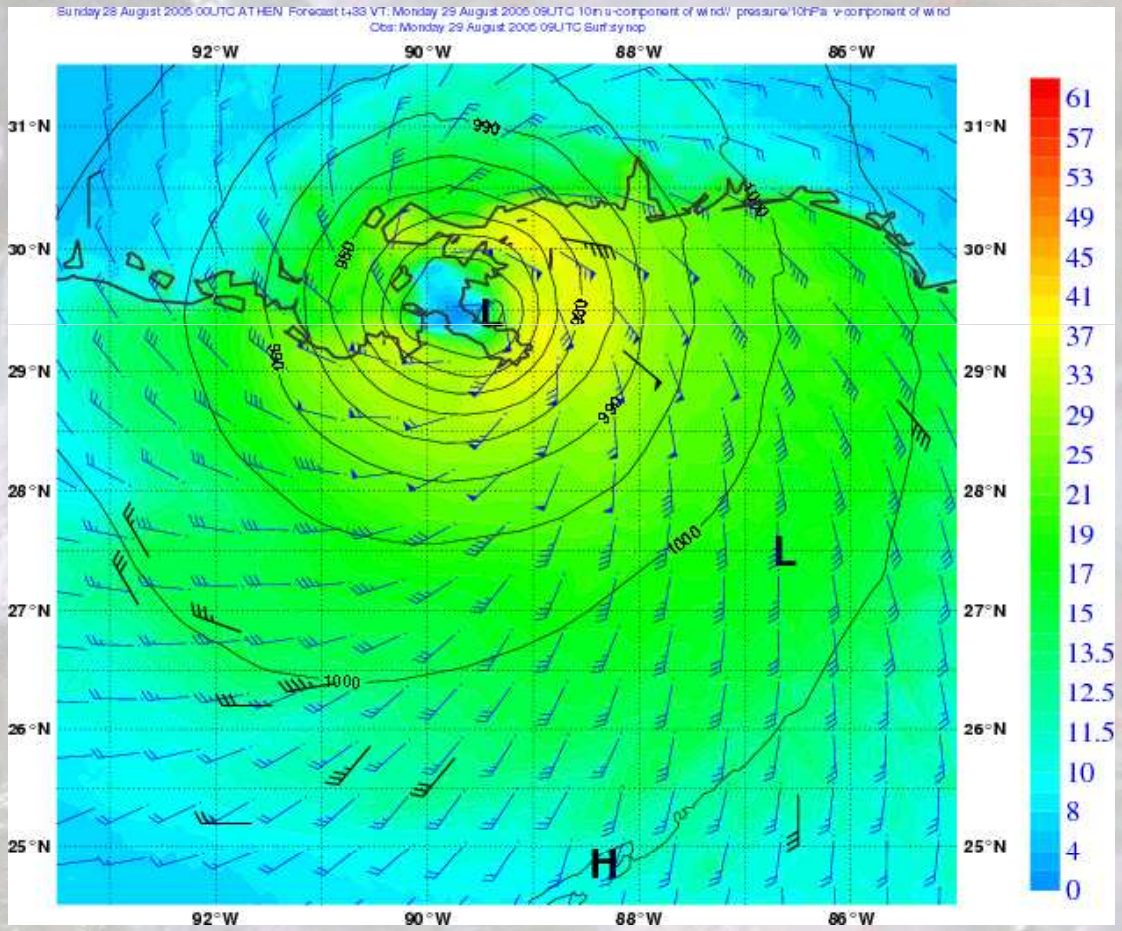
HIRLAM: original relation



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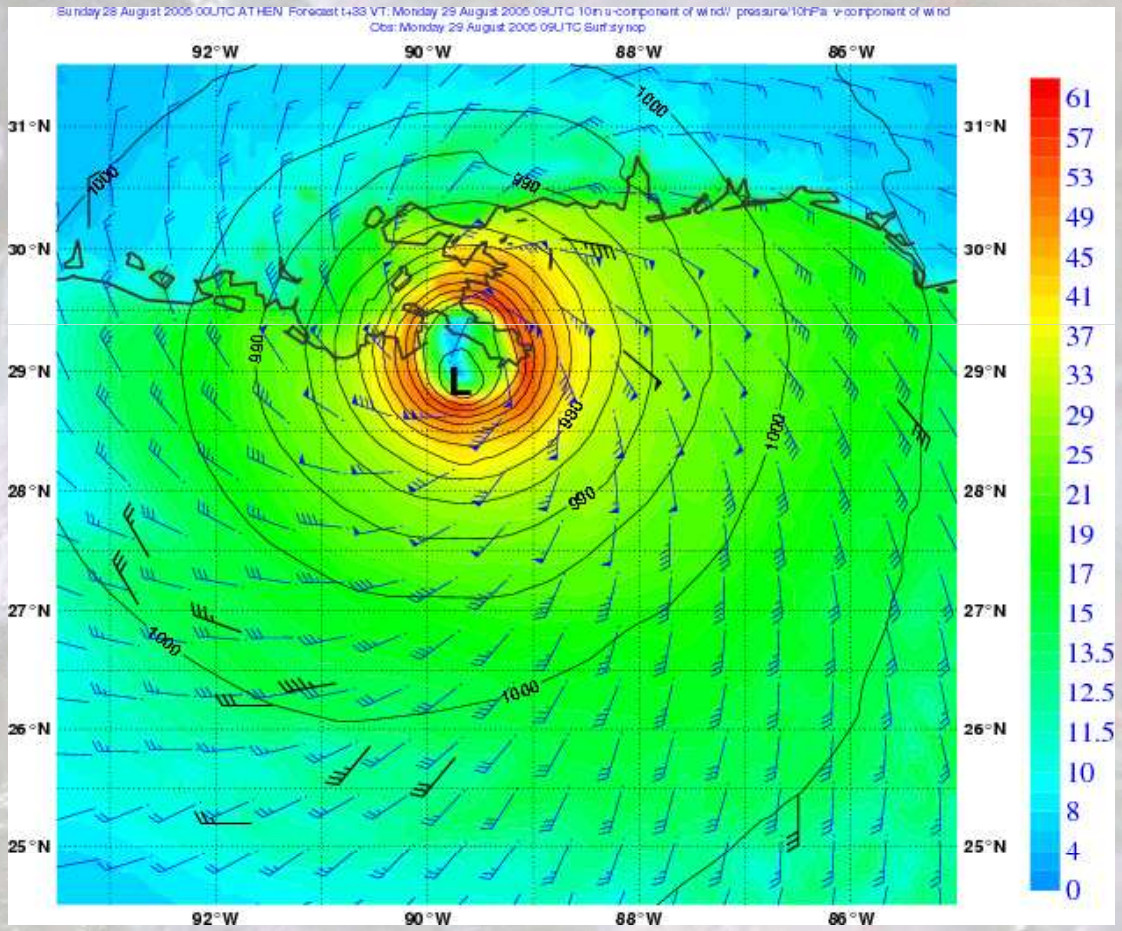
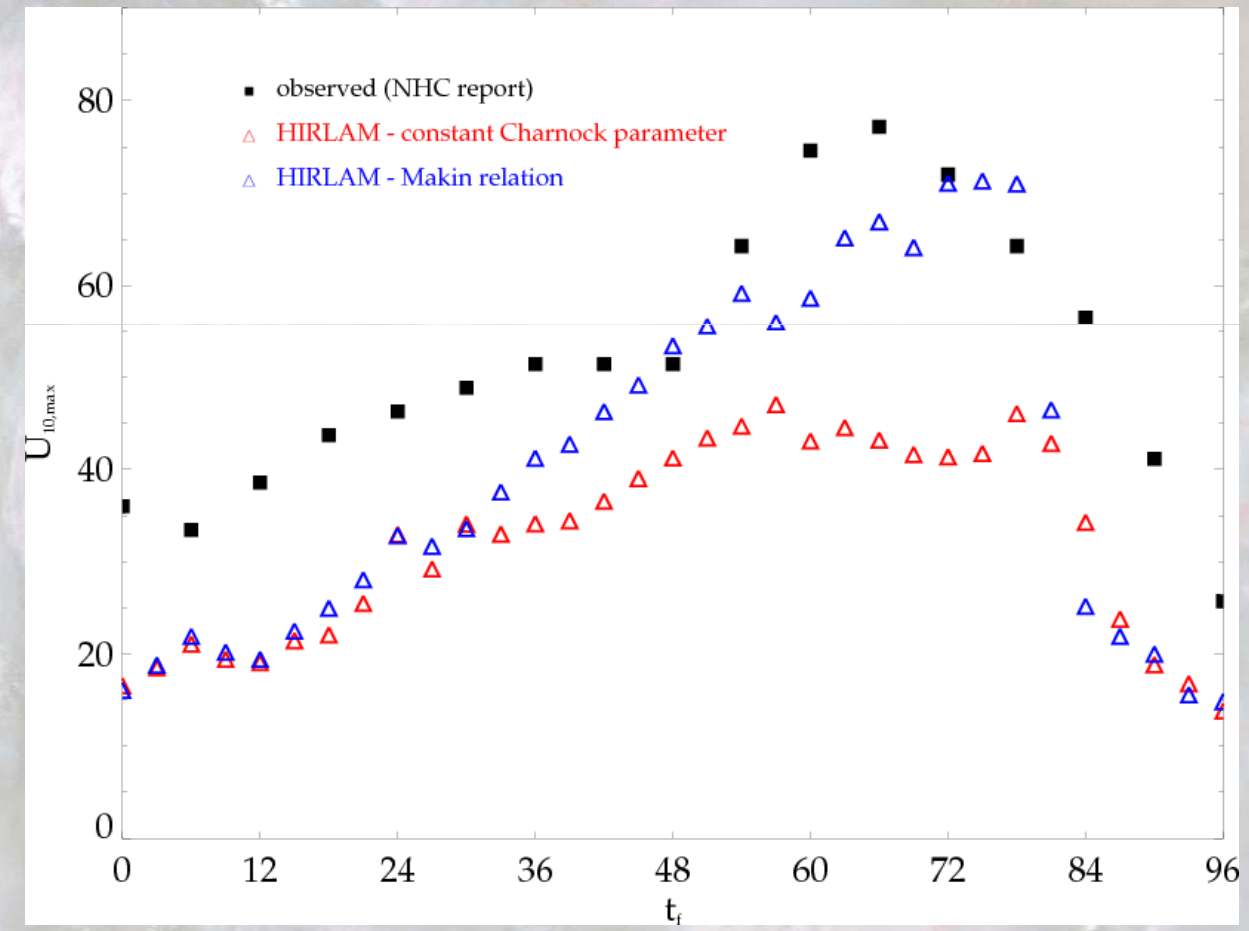
HIRLAM: new relation



HIRLAM: drag relation



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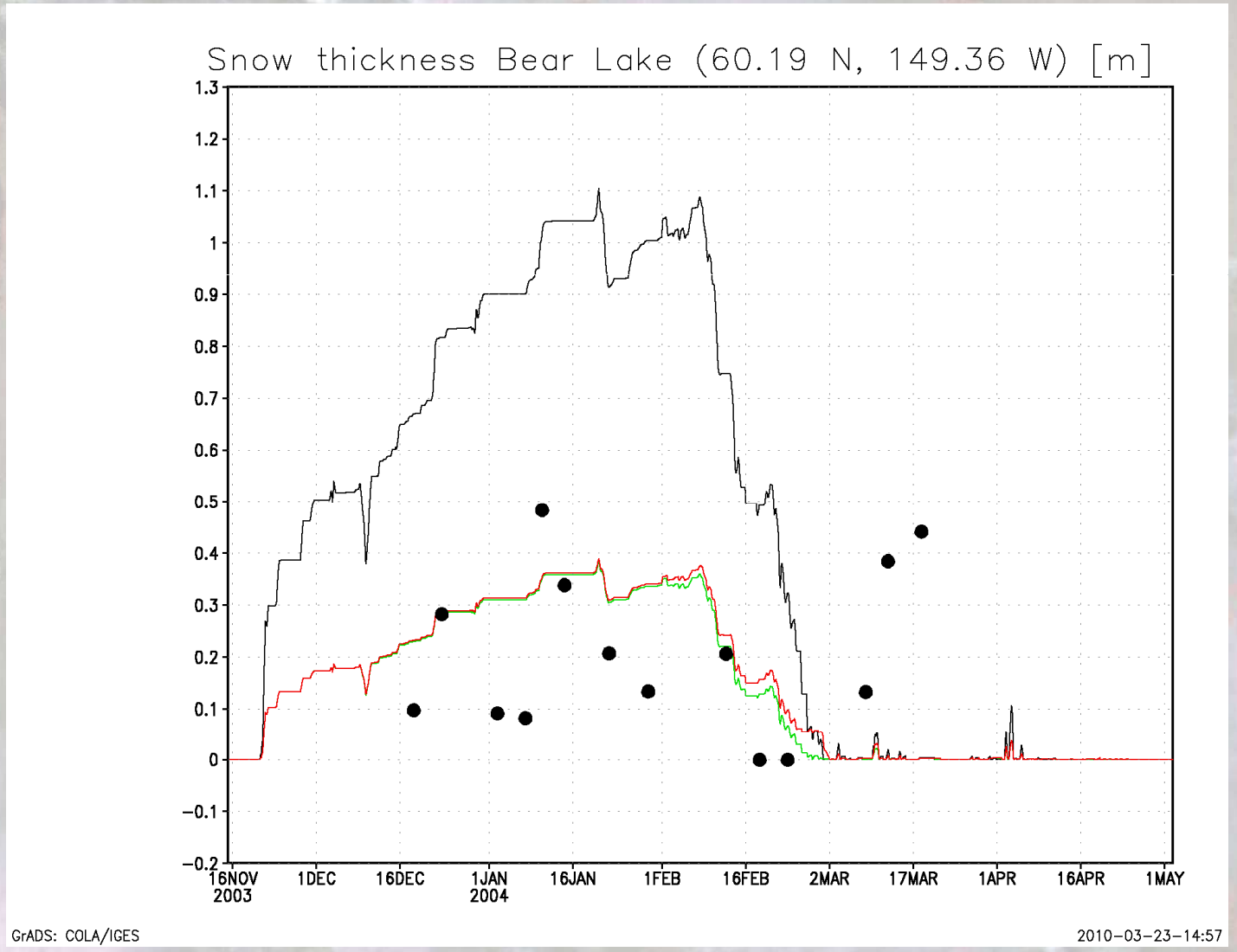
Snow on ice (FLake, Tido Semmler)

- Snow on ice in FLake known to be bad
- Experiments show a large underestimation of ice under snow
- Causes: low density of snow and too strong insulation of ice from atmosphere
- Adjustment of these parameters give much better ice thickness, probably also T2m

Snow on ice (FLake, Semmler)



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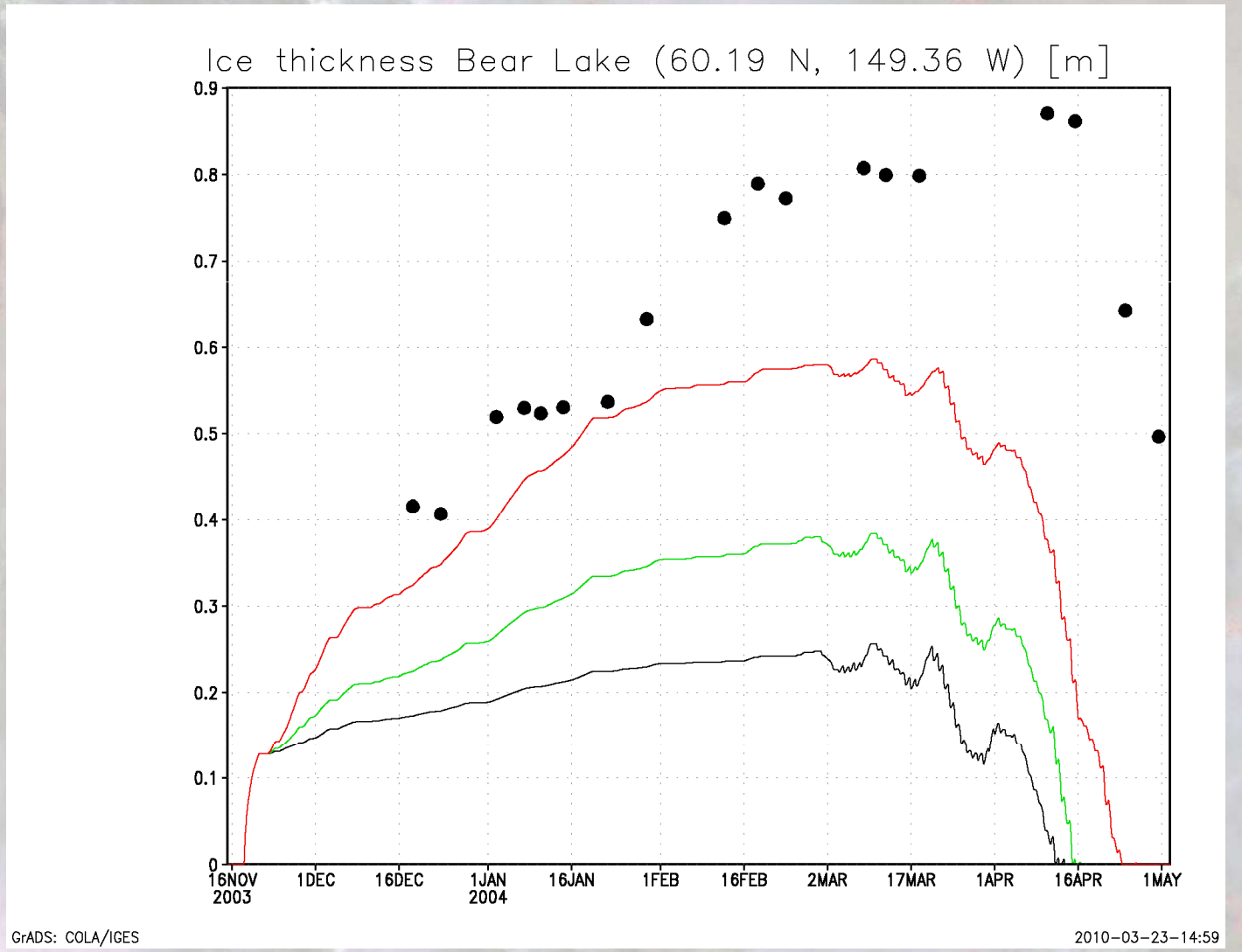

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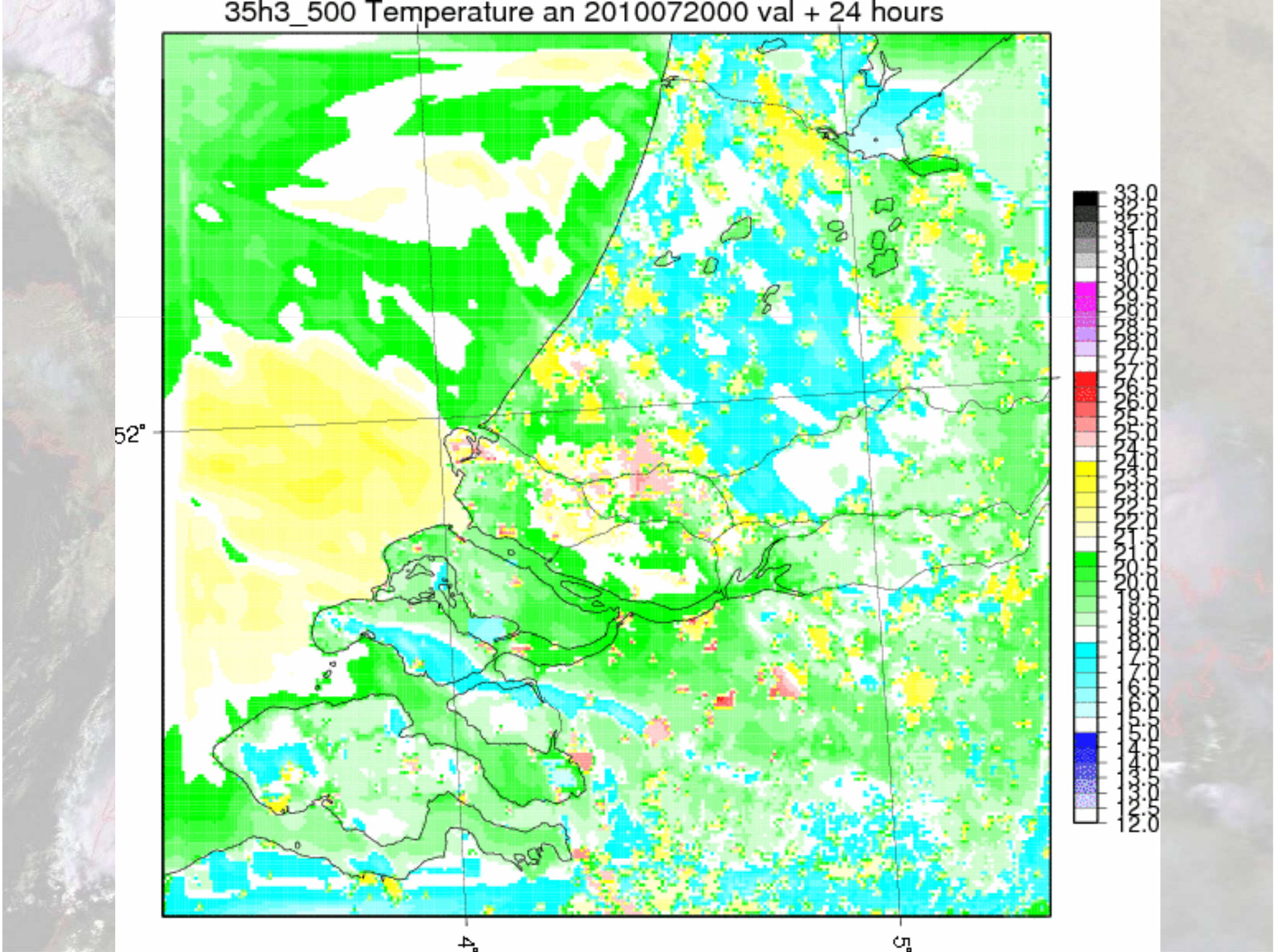
Validation TEB in Netherlands

- City of Rotterdam interested in impact of city on temperature
- Want to make a city forecast
- Most people live in areas influenced by buildings, different temperature regimes in radiation conditions (day and night)
- Compare TEB output with observations in city, temperature and humidity measured on trams.


35h3_500 Temperature an 2010072000 val + 24 hours
52°
4°
5°