HIRLAM
Surface developments 2009/2010

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Thanks: Niels Zweers, Tido Semmler

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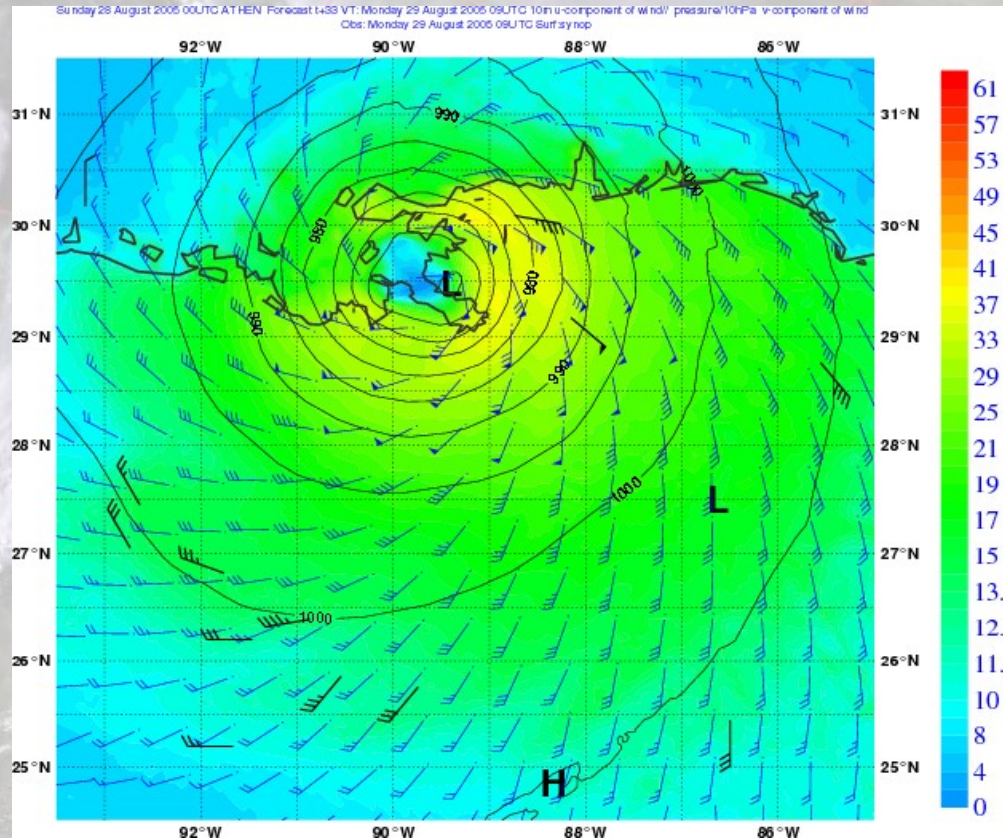   - FLake database extension
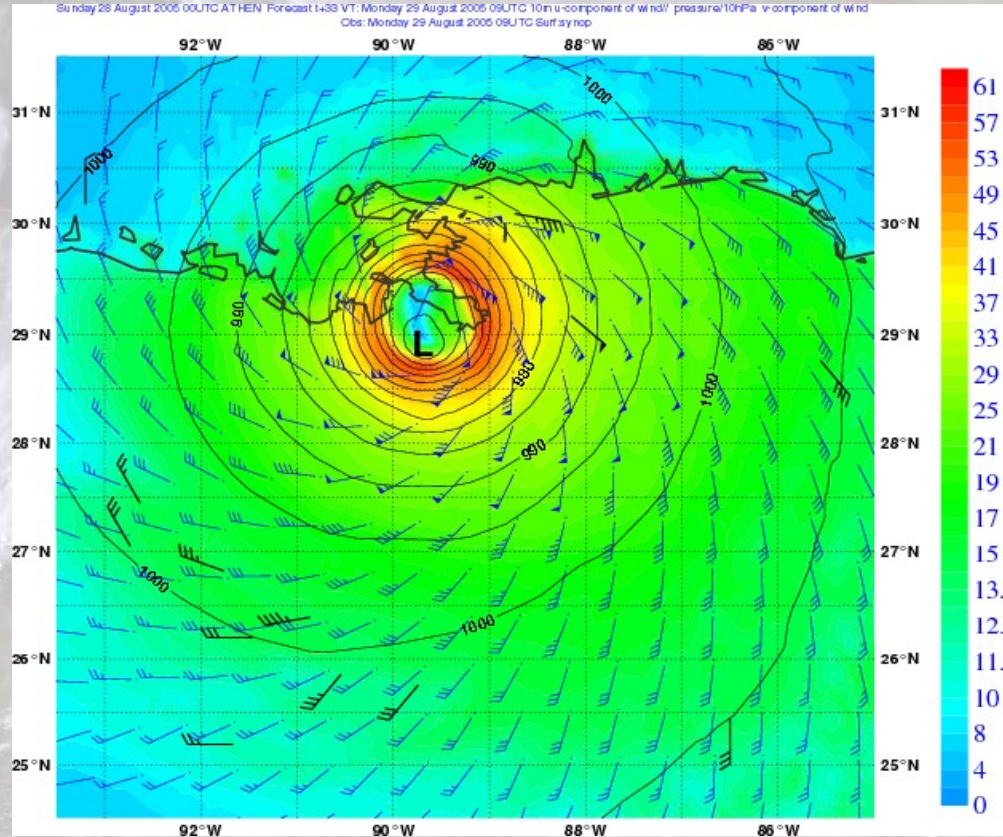
HIRLAM: drag relation

- 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
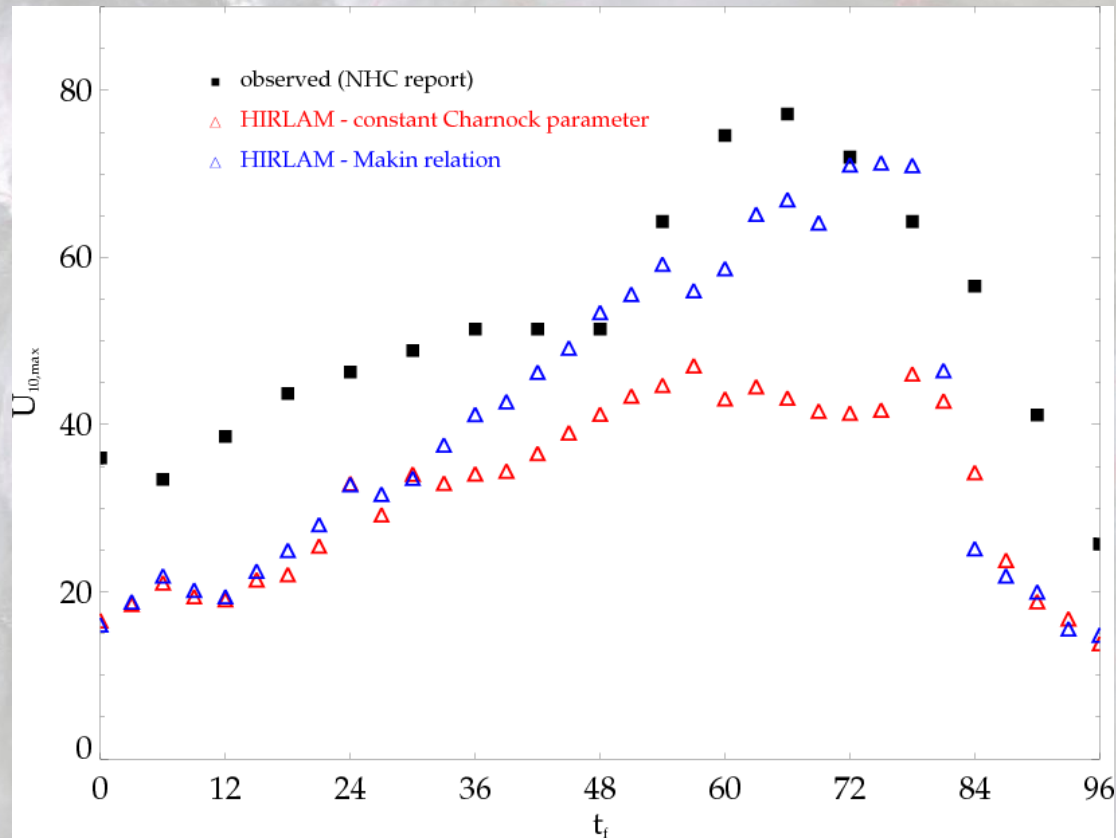
- More information: zweers@knmi.nl

HIRLAM: original relation

Sunday 28 August 2005 00UTC ATHEN Forecast t+33 VT: Monday 29 August 2005 09UTC 10m u-component of wind// pressure/10hPa v-component of wind
Obs: Monday 29 August 2005 09UTC Surf synop

HIRLAM: new relation

Sunday 28 August 2005 00UTC ATHEN Forecast t+33 VT: Monday 29 August 2005 09UTC 10m u-component of wind// pressure/10hPa v-component of wind
Obs: Monday 29 August 2005 09UTC Surf synop

HIRLAM: drag relation

HIRLAM: soil ice problem

- In March large problems with nighttime temperatures developed

- Minimum temperature in cloud free conditions much lower than observed, negative bias sometimes 8K

- Cause: large soil ice reservoir kept deep soil temperatures close to 0°C, strong cooling from above and below
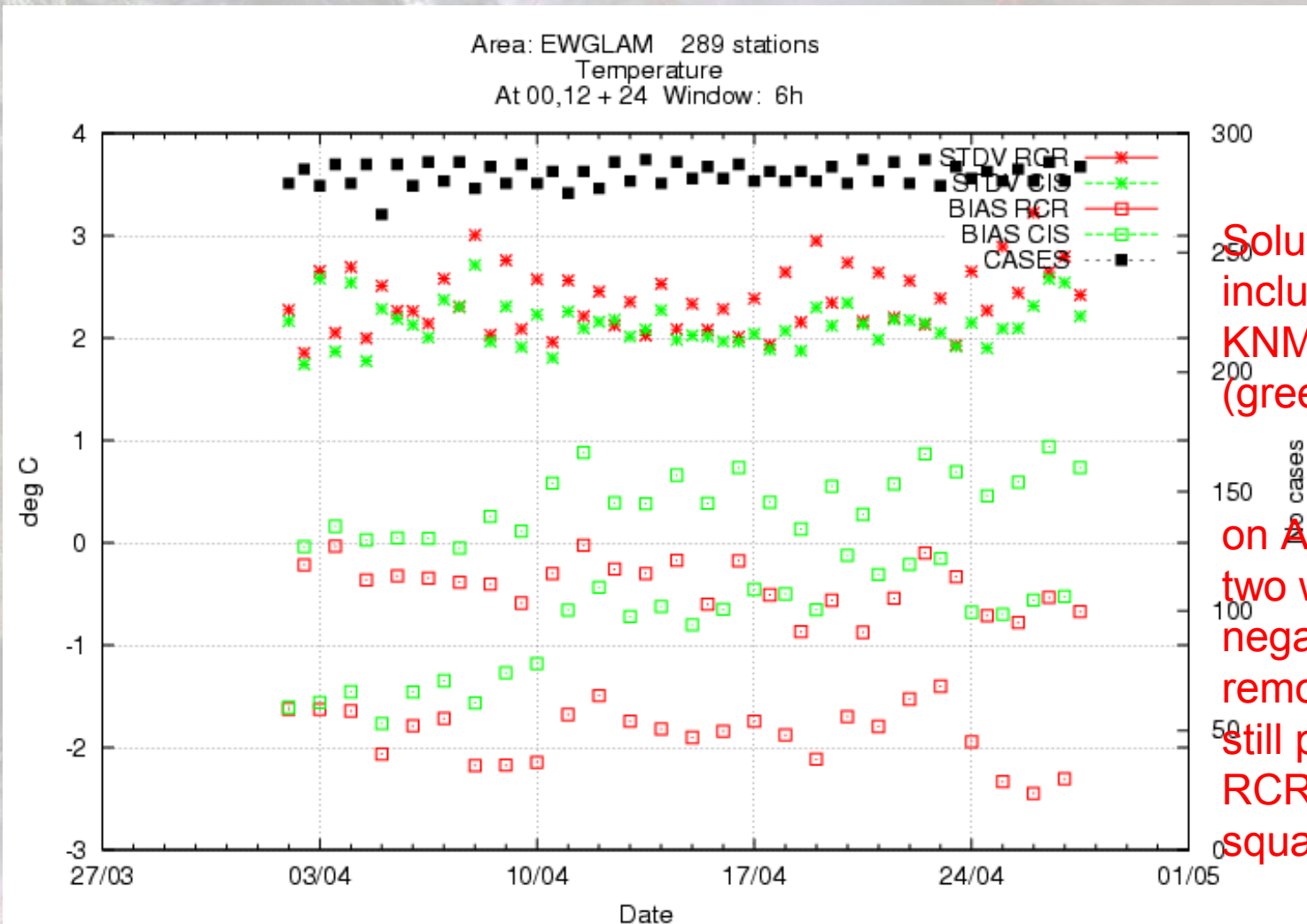
HIRLAM, soil ice problem

- Soil ice reservoir was coupled to soil water reservoir (root zone depth)

- Due to cold winter large buildup of soil ice

- Took very long to melt, negative temperature bias average 2K over EWGLAM stations

- Reduction soil ice reservoir solved problem

HIRLAM, soil ice problem

Area: EWGLAM   289 stations
Temperature
At 00,12 + 24 Window: 6h

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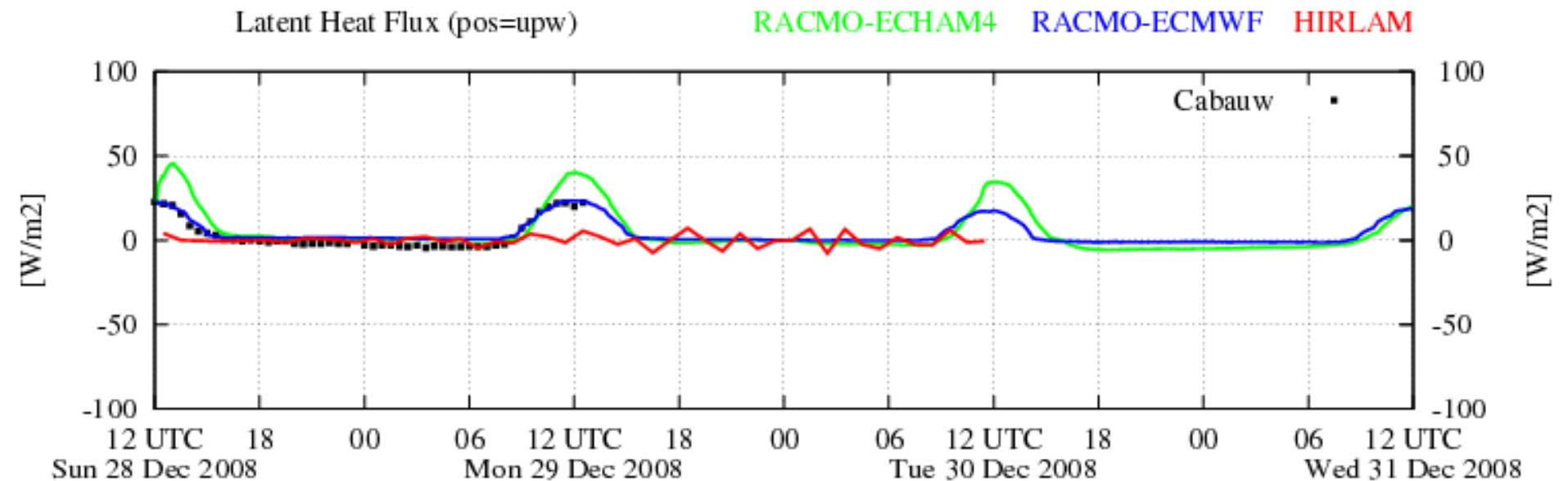
Low cloud and fog problems

- 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

Low cloud and fog problems

Low cloud and fog problem

- 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
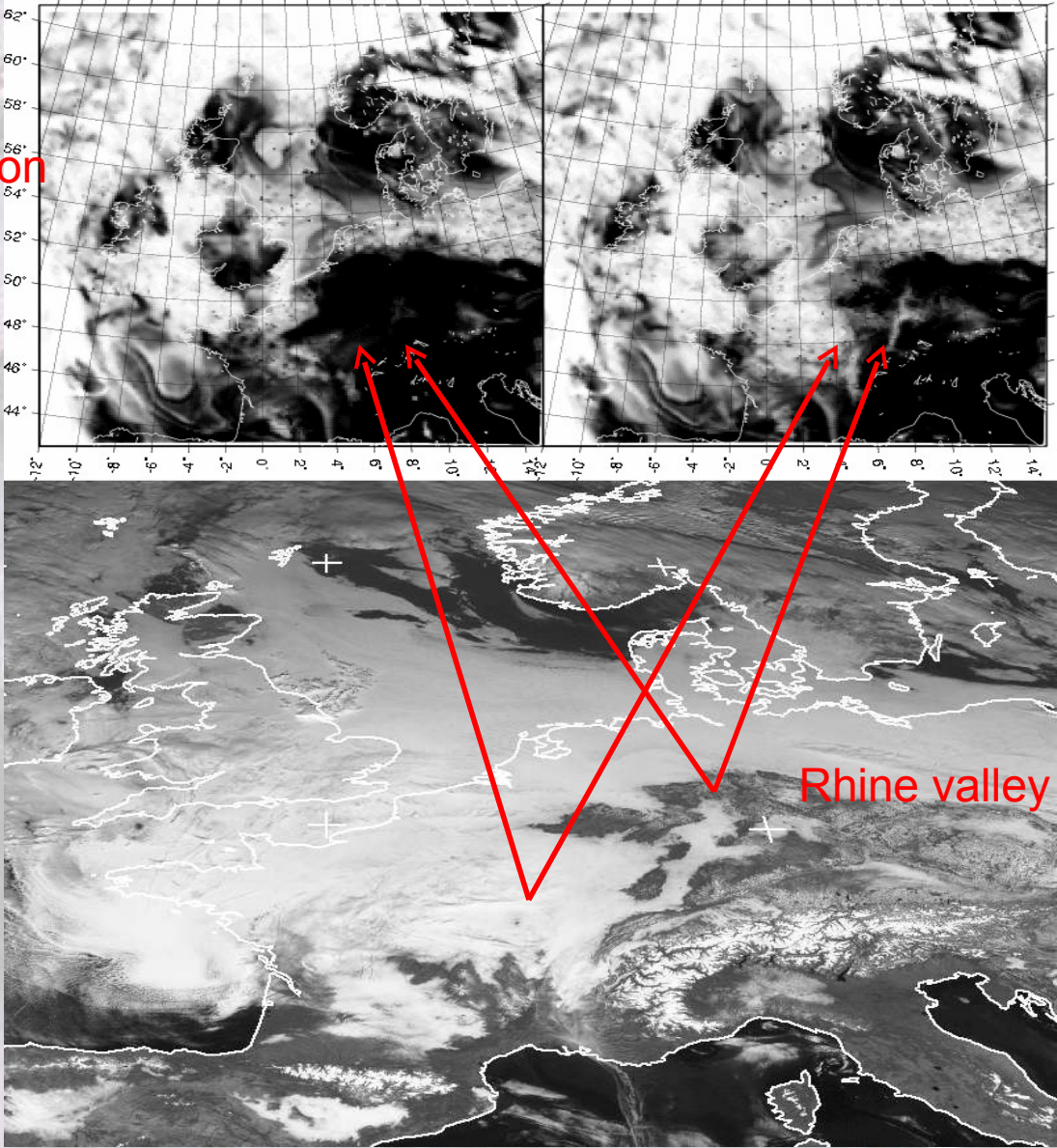
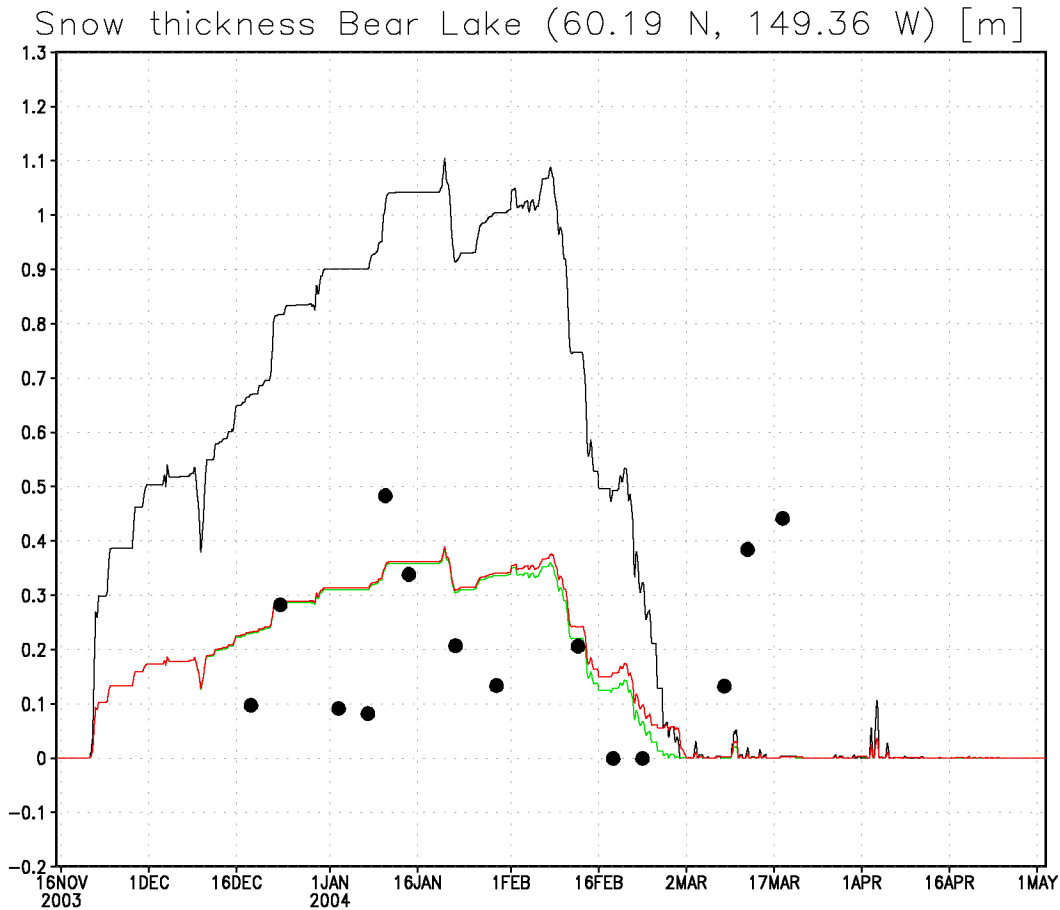Rhine valley filled with fog

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
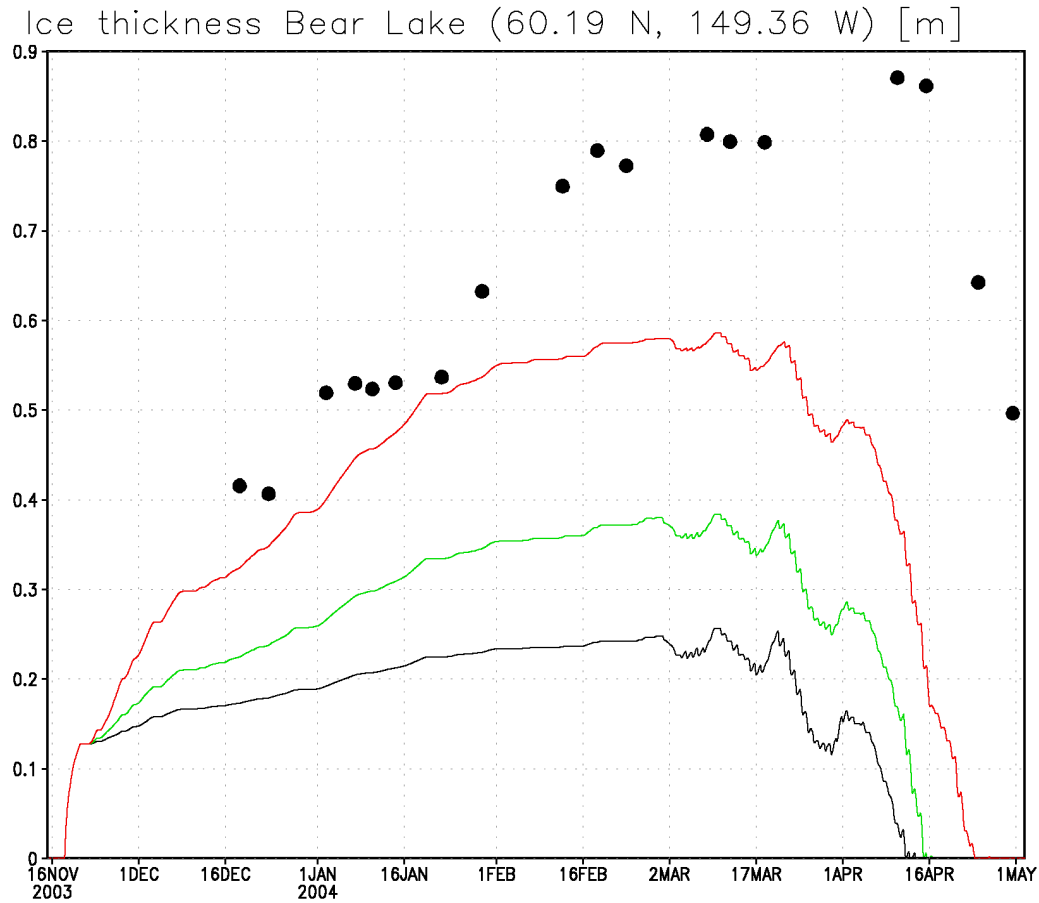
Snow on ice (FLake, Semmler)

Snow thickness Bear Lake (60.19 N, 149.36 W) [m]

Snow on ice (FLake, Semmler)

Ice thickness Bear Lake (60.19 N, 149.36 W) [m]