



HIRLAM surface developments

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HirLAM Contents



- HIRLAM surface work
 - Newsnow scheme (snow and forest)
 - Lake scheme
 - Snow on ice
 - New T2m diagnostics?
- HARMONIE (in cooperation with ALADIN) surface work
- Nilu surface (analysis) work



HIRLAM surface work



- Development and implementation of newsnow scheme
 - Forest tile with canopy scheme, separate canopy temperature and canopy air temperature
 - Snow tiles (low vegetation + bare soil, forest), one layer snow scheme
- Inclusion of Lake parameterization (FLAKE, just like in all other models)
- Inclusion of snow on ice



HIRLAM surface work



- Forest scheme:
 - Problem with forests in Nordic countries esp. in spring
 - Too cold and too wet forests, snow melting too quickly
 - Forest scheme with canopy solves problems
- Snow scheme:
 - One layer snow scheme
 - Melting, refreezing, heat conduction is density and depth dependent
 - Much quicker than old scheme, more sensitive to atmospheric model problems (magnified), old scheme was too slow in cooling conditions

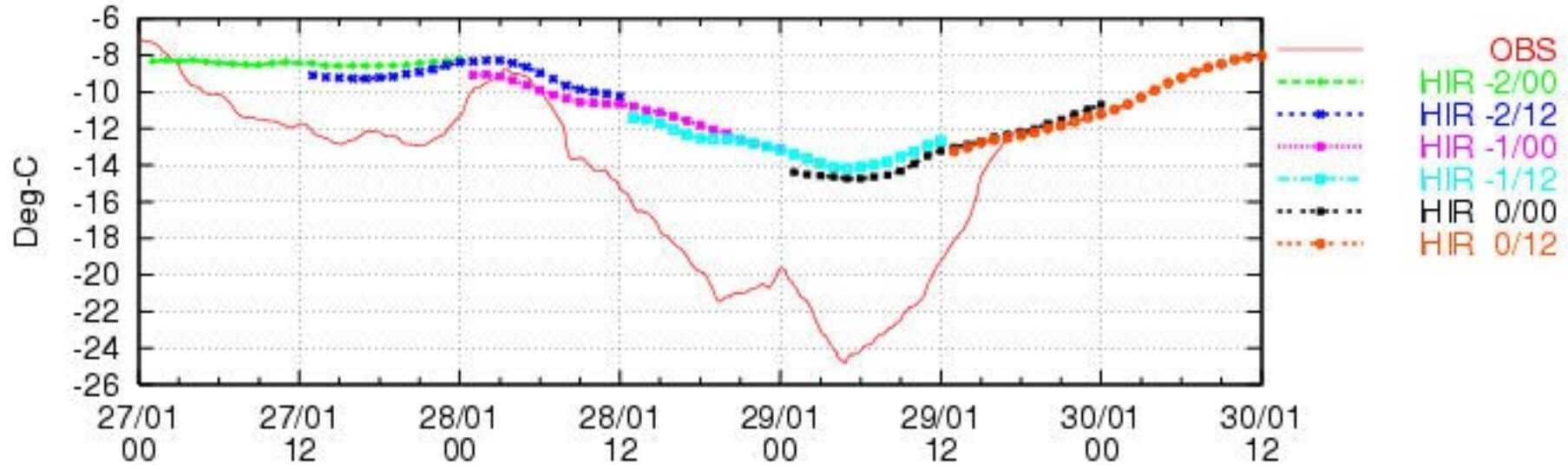
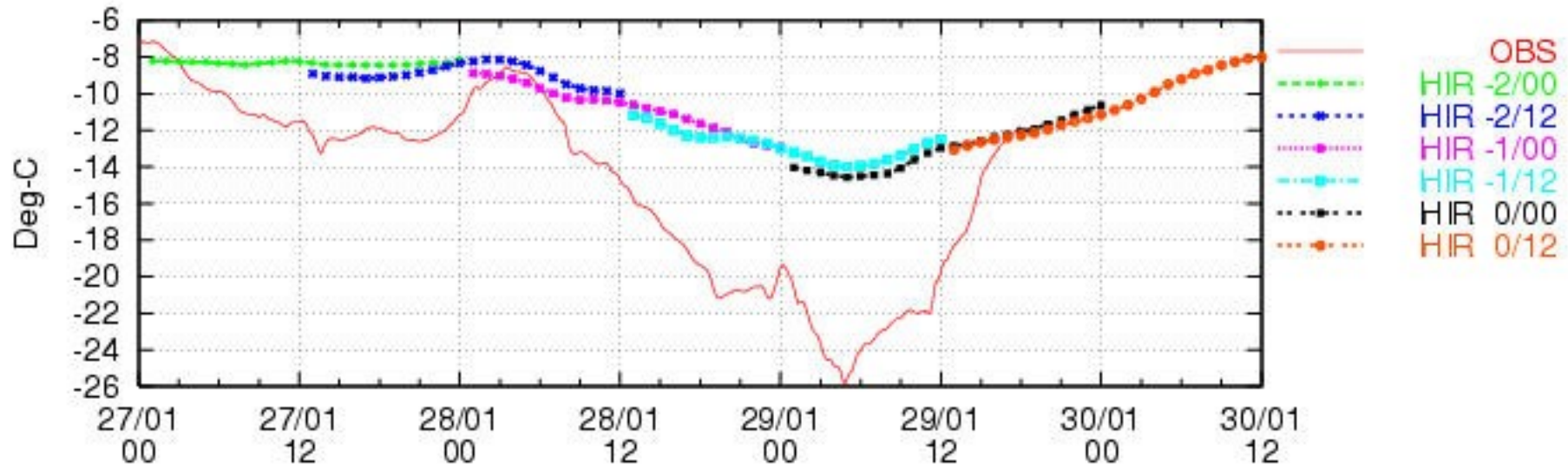


HIRLAM surface work



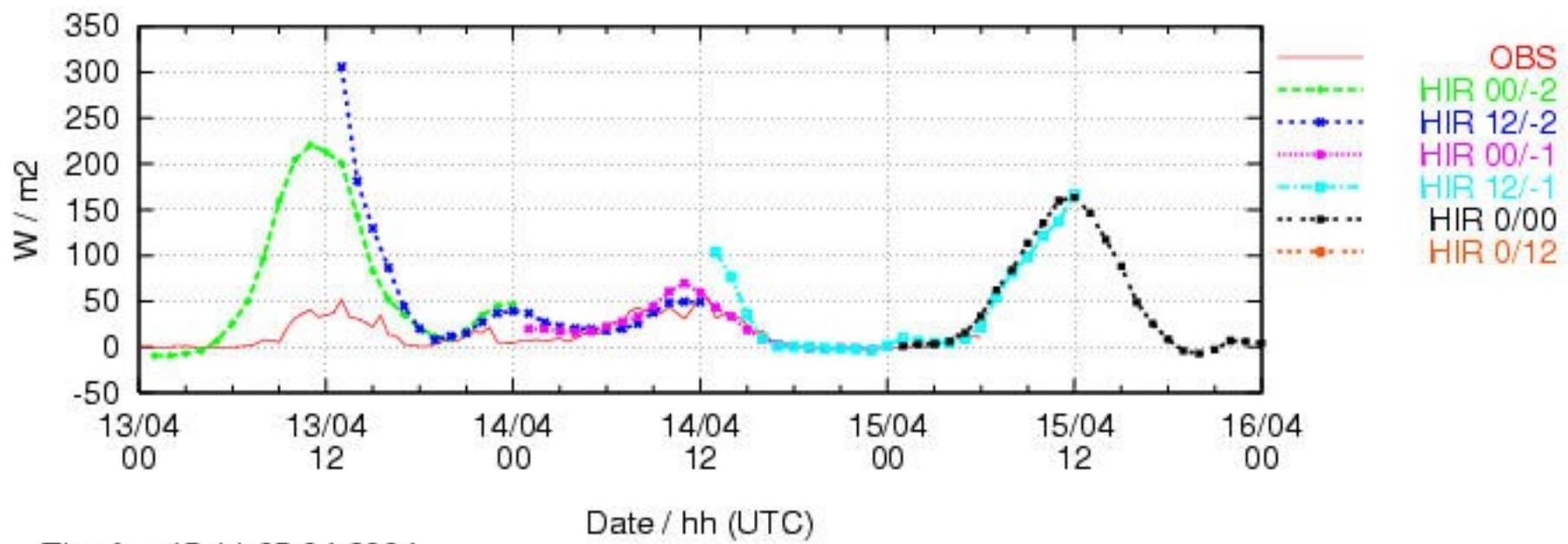
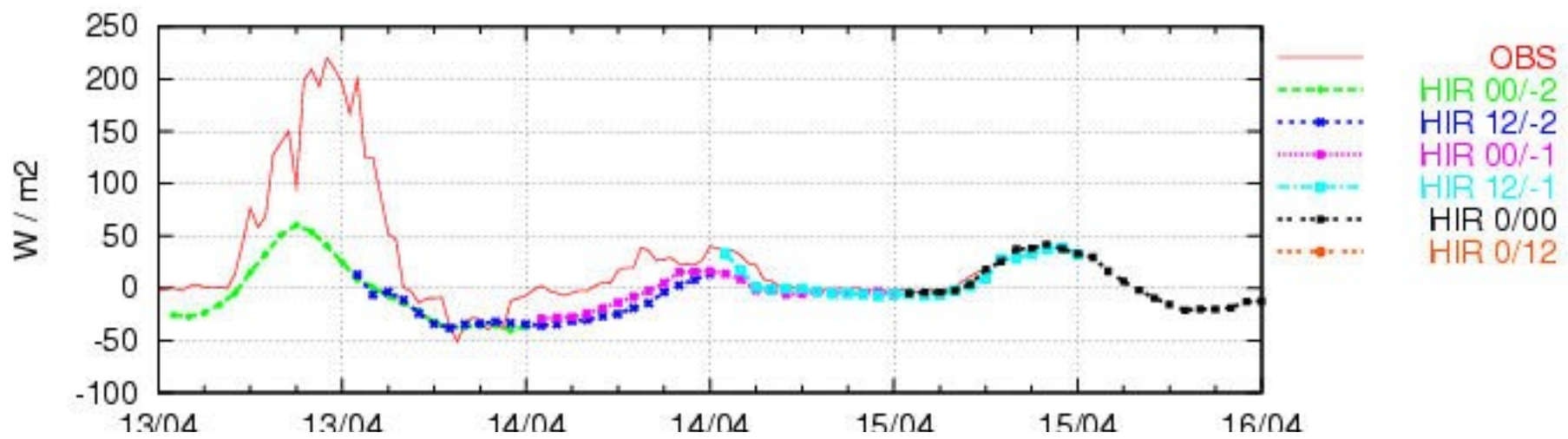
- Forest/snow scheme:
 - Very sensitive to errors, tuning for old surface scheme not correct for new scheme
 - Knowledge of rest of model becomes very important for correct behaviour and tuning of surface scheme
 - Errors in cloud cover, radiation (also clear sky) and microphysics (impact on radiation) holding back implementation of new scheme.
- After some large adjustments in LWD maybe this summer in reference HIRLAM (after 6 years)!

HirLAM) Nordic winter problem



Date / hh (UTC)

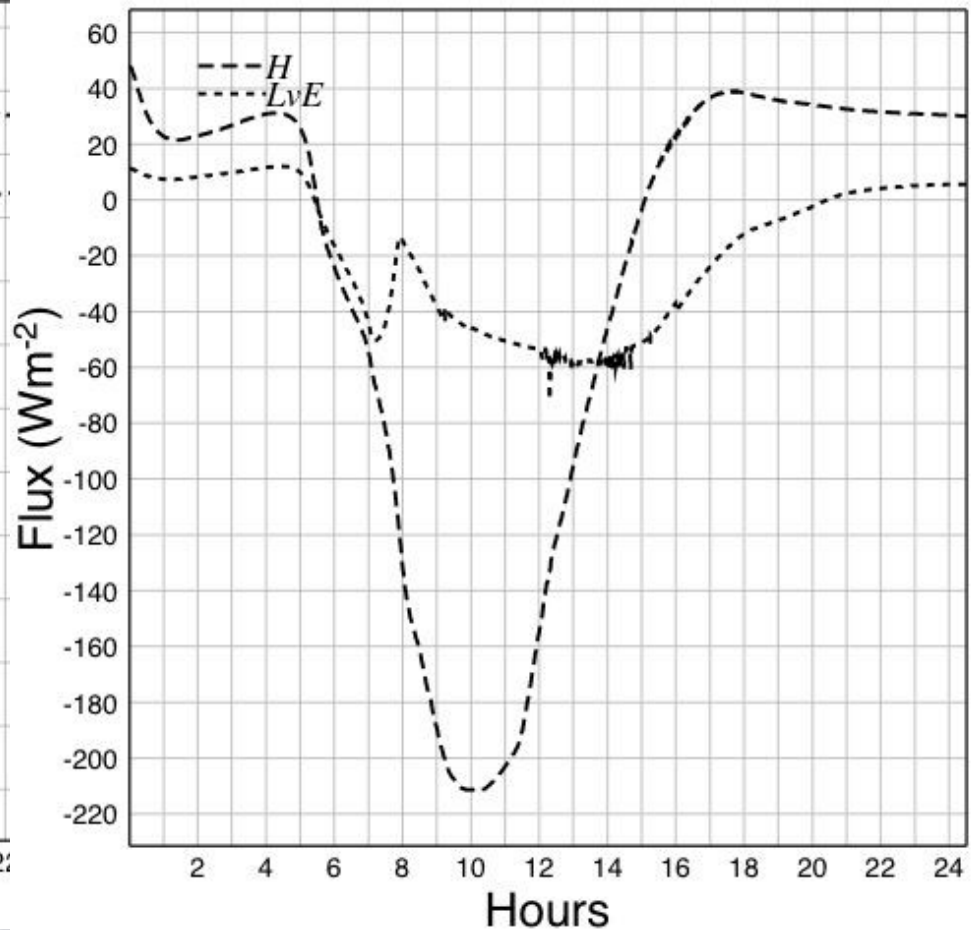
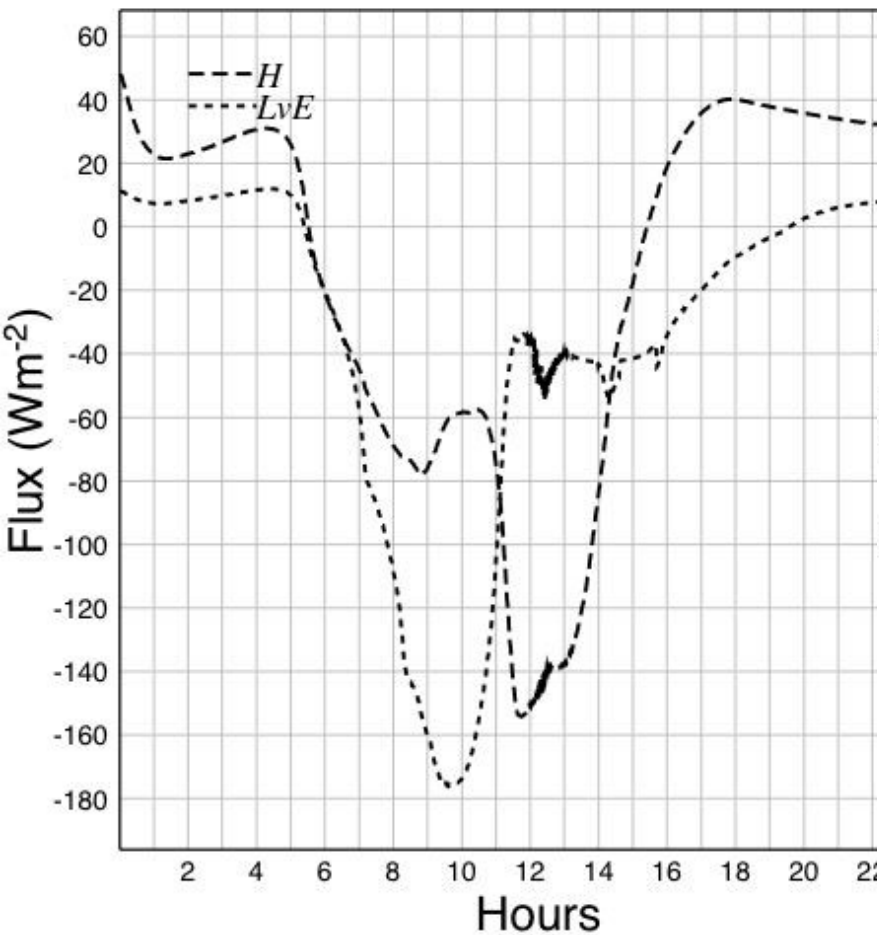
HirLAM) Spring problem



Spring problem (6.3.4snow)



H634_snow_1S40_sprin H634_snow_1S40_spring.8_cw



HIRLAM HIRLAM surface work



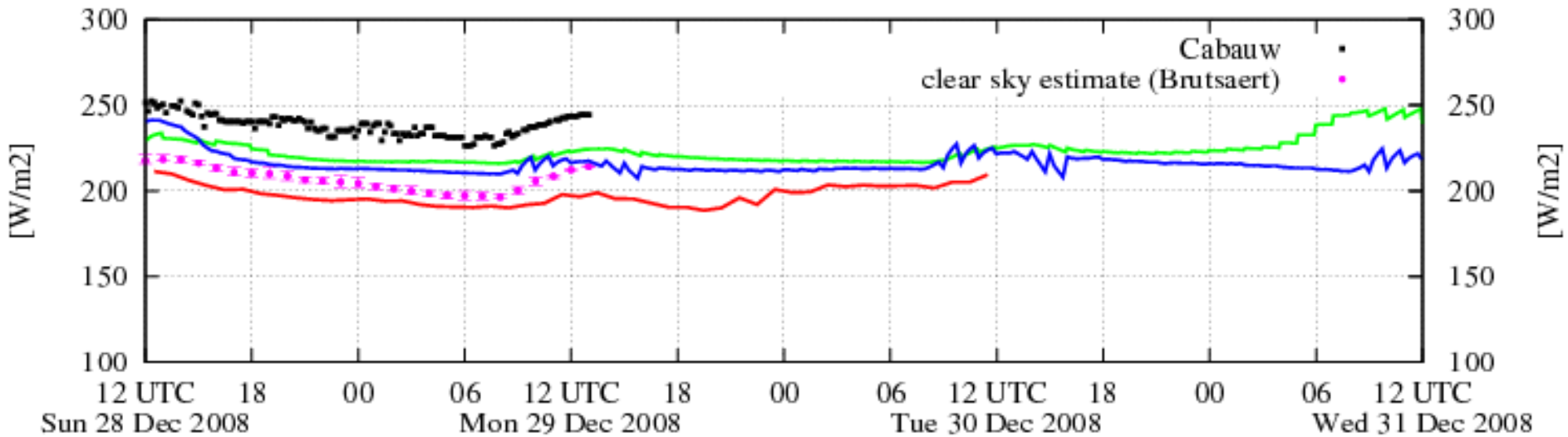
- Forest/snow scheme:

Downwelling Long Wave Radiation

RACMO-ECHAM4

RACMO-ECMWF

HIRLAM





HIRLAM surface work



- Snow on ice:
 - Important for Nordic countries to have (sea) ice param in surface scheme, heat conduction through ice
 - Snow limits heat conduction and changes albedo
 - Snow on ice parameterization necessary
- 2m diagnostics
 - Improvements in 2m diagnostics (adjusted Geleyn formula) important for surface DA
 - Does not solve the long lived stable PBL problem (again mainly Nordic winter problem)



HIRLAM surface work

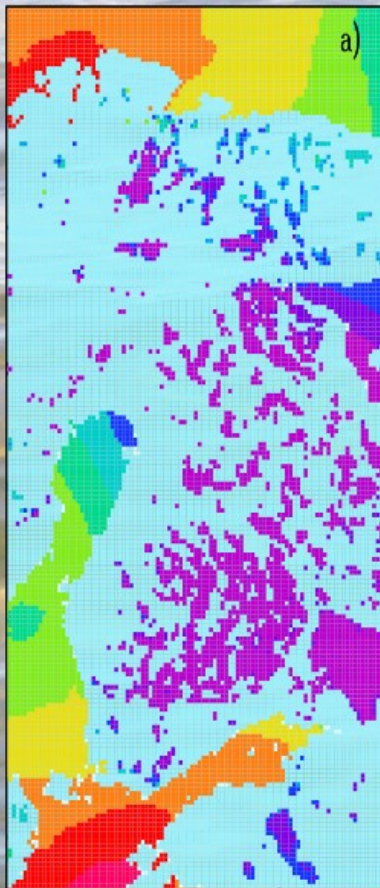


- Inclusion of FLake
 - Important again especially for Nordic countries and countries with large lakes
 - Improves T and Td especially when weather is far from climate average
 - Now T_{lake} is interpolated SST or climate averages

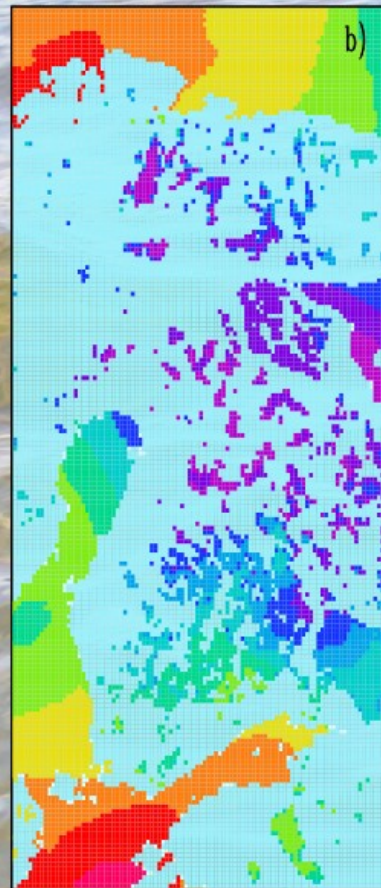
Lake temperatures 10.12.2006

L. Rontu

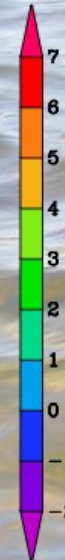
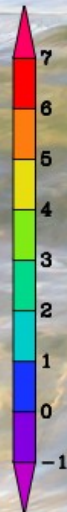
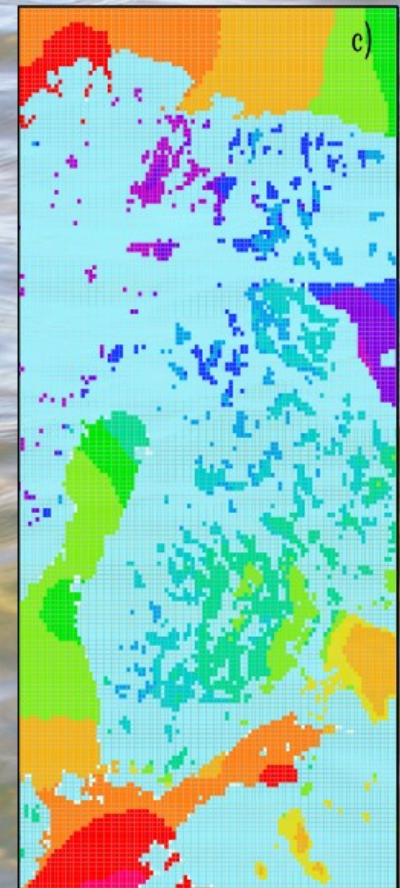
FINLAKE climate 10.12.2006



OBSERVED estimate 10.12.2006

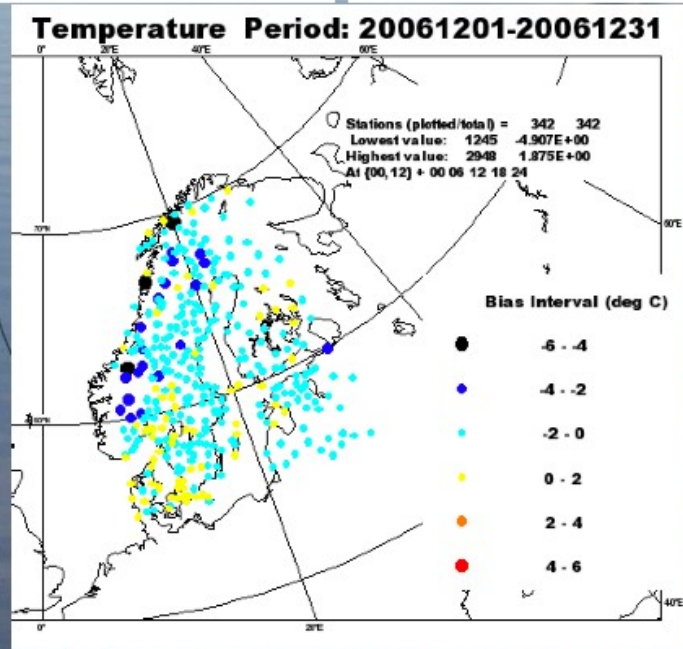
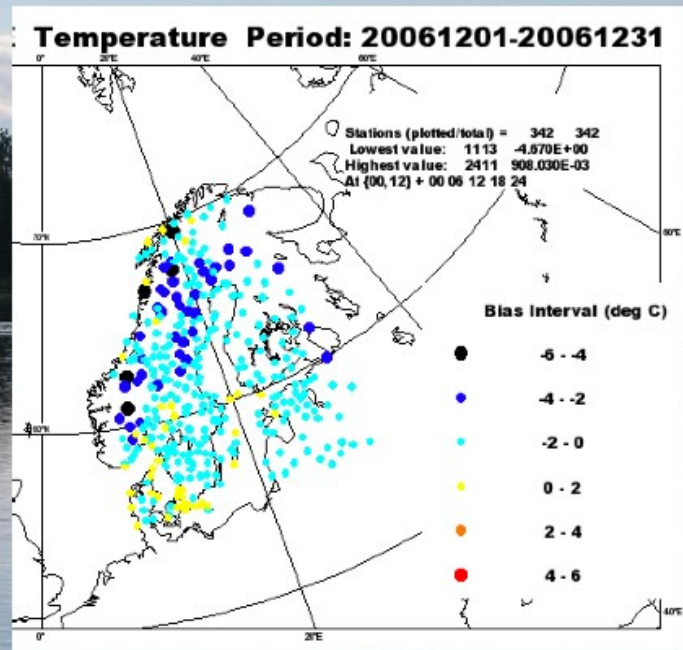
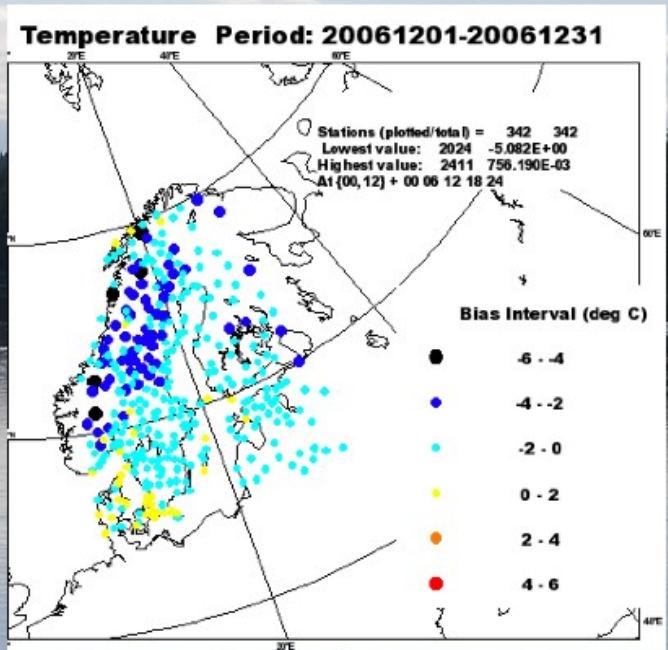


FLAKE simulated 10.12.2006



Statistical verification in December 2006

Hir



L. Rontu

Hiram Remaining issues



- Extension of database, search for funds
- Extension of FLake with snow on ice, for better ice cover period
- Extension to 2D, changing depth for large lakes. T and %ice depend strongly on depth.
- Flow of ice for large lakes
- Intercomparison of lake models (LakeMIP)
- **Role of SRNWP in organization of workshop in 2 years time**



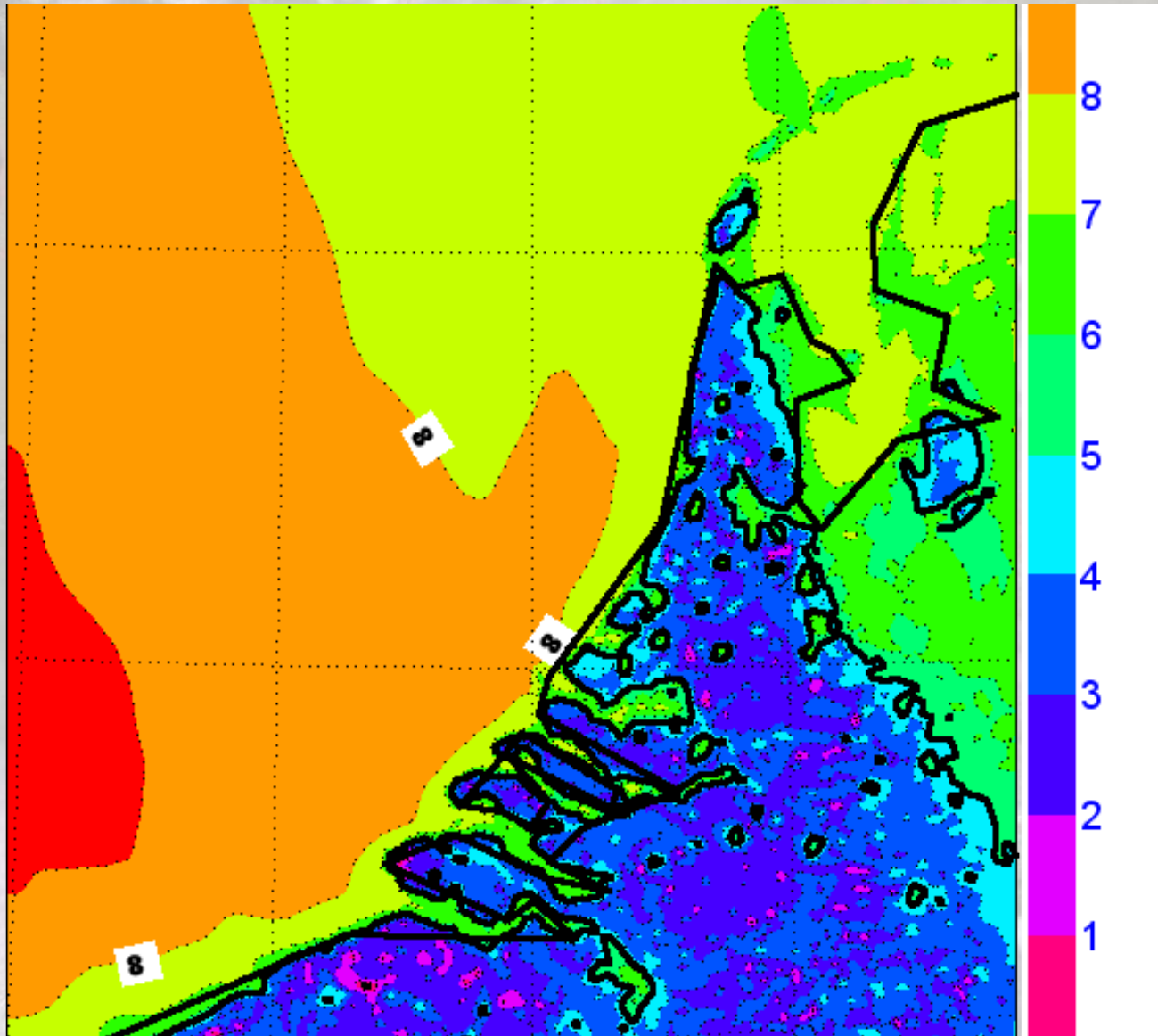
HARMONIE surface work



- Inclusion of forest scheme in SURFEX
- Check of physiography (Scn difference)
- Participation in Geoland project (assimilation with unscented KF)
- FMI/University of Helsinki NUMLAB course
- Porting of snow on ice to SURFEX
- Validating Town Energy Budget through use of observations in towns at schools?



Town effect in HARMONIE





- Assimilate Ts & Soil Moisture from MODIS & AMSR-E with EnKF into SURFEX, later also snow cover
- Code structure based on JFM work EKF
- Comparison of EnKF to EKF
- Evaluate obs with assimilation system
- Evaluate SURFEX with assim system
- Plans for assimilation of SMOS soil moisture data



Concluding remarks



- More and more difficult to improve model with improvements in surface alone
- Whole model has to be taken into account when tuning is done
- Forest, snow and FLake most important developments for HIRLAM
- Cooperation with ALADIN in SURFEX developments