

Experiences of the use of monthly and seasonal EPS forecasts in Finland

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Background: the model

- *Watershed simulation and forecasting system (WSFS)* is producing forecasts for almost all notable lakes and rivers in Finland.
- The core of the system is a conceptual HBV style model.
- Additionally the system includes early warning system and web-based interface with different applications for model control and data pick up and visualization.
- The forecasts and simulated data are used e.g. for flood management, regulation planning, water quality analysis and general information about water resources.
- Internet: <http://www.environment.fi/waterforecast>

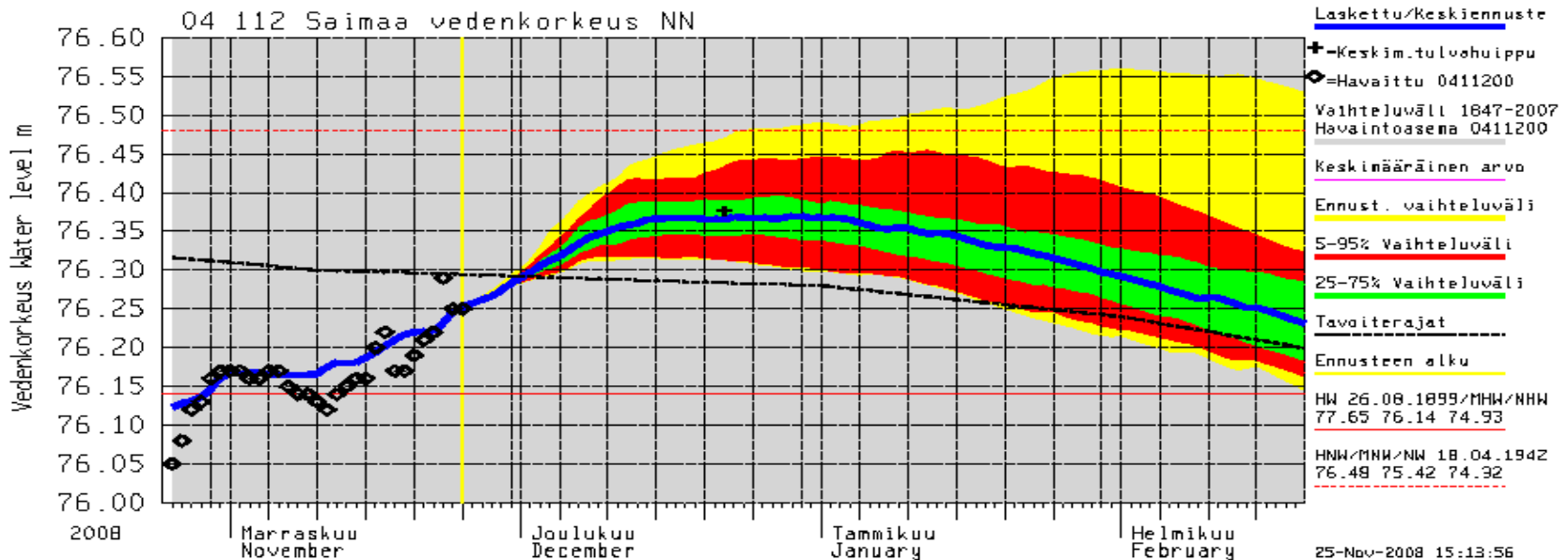
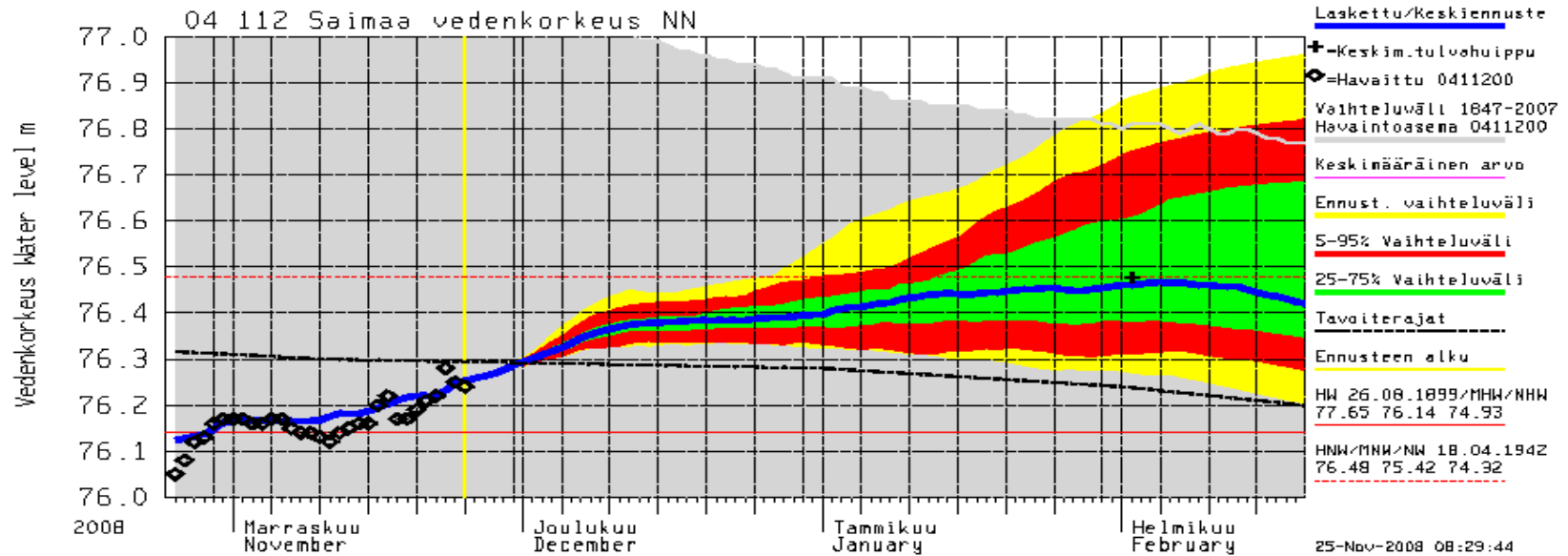
Hydrology in Finland

- There are large catchments with several big lakes in Finland.
- Delays are long: e.g. in lake Saimaa it was possible to know in December 2008 that the water level will be very high also in April 2009, just before the snow melt and the spring flood.
- Even very long hydrological forecasts can be valuable in Finland.

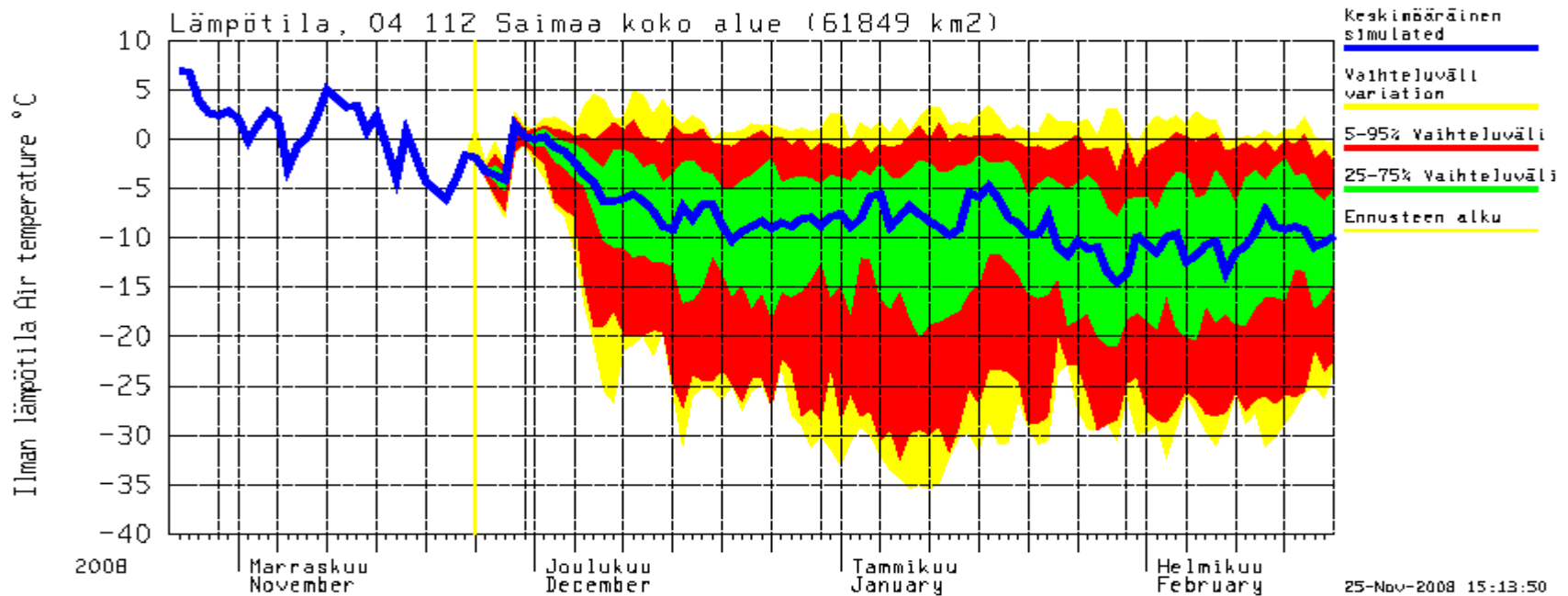
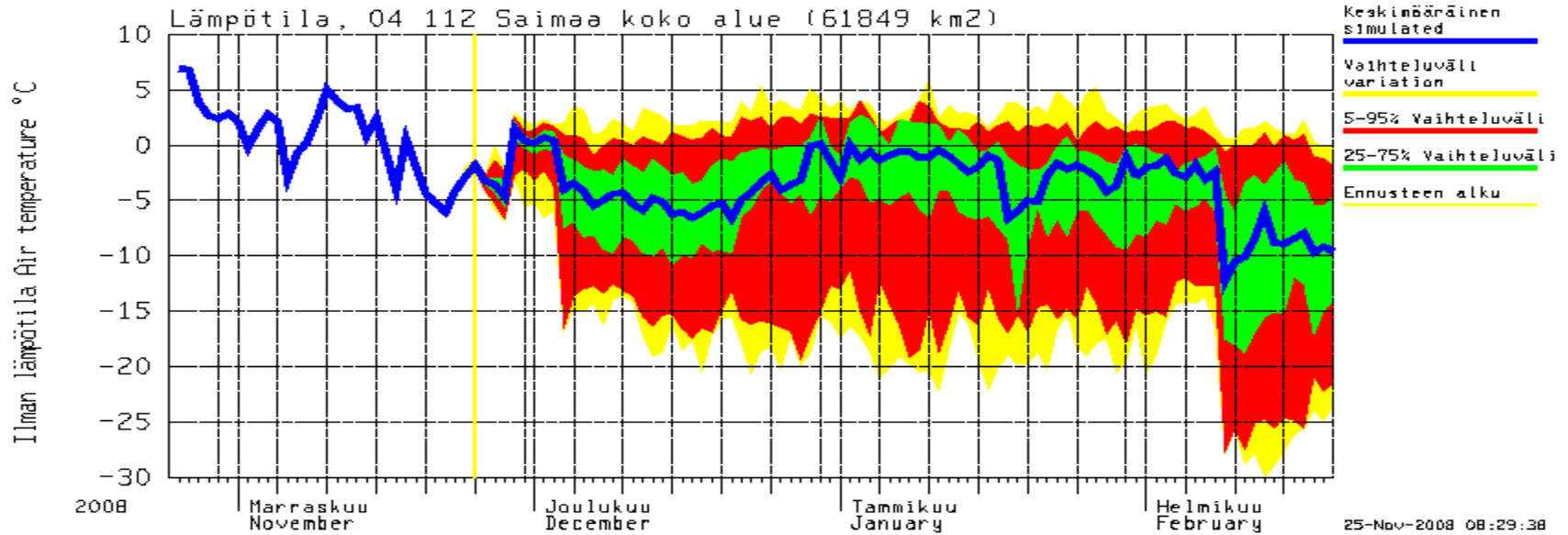
Use of the EPS forecasts

- The input of the operational model is:
 - Observed weather (in history)
 - 10 days EPS (the first days are corrected against the deterministic forecast got from FMI)
 - Climatology of the last 50 years: every member of EPS is continued by data from a certain historical year to produce the probabilistic hydrological forecast
- 10 days EPS has been in operational use since year 2000.
- Since 2007 experimental forecasts have been made using monthly and seasonal EPS during the first 3 months of the forecast (instead of 50-years climatology).

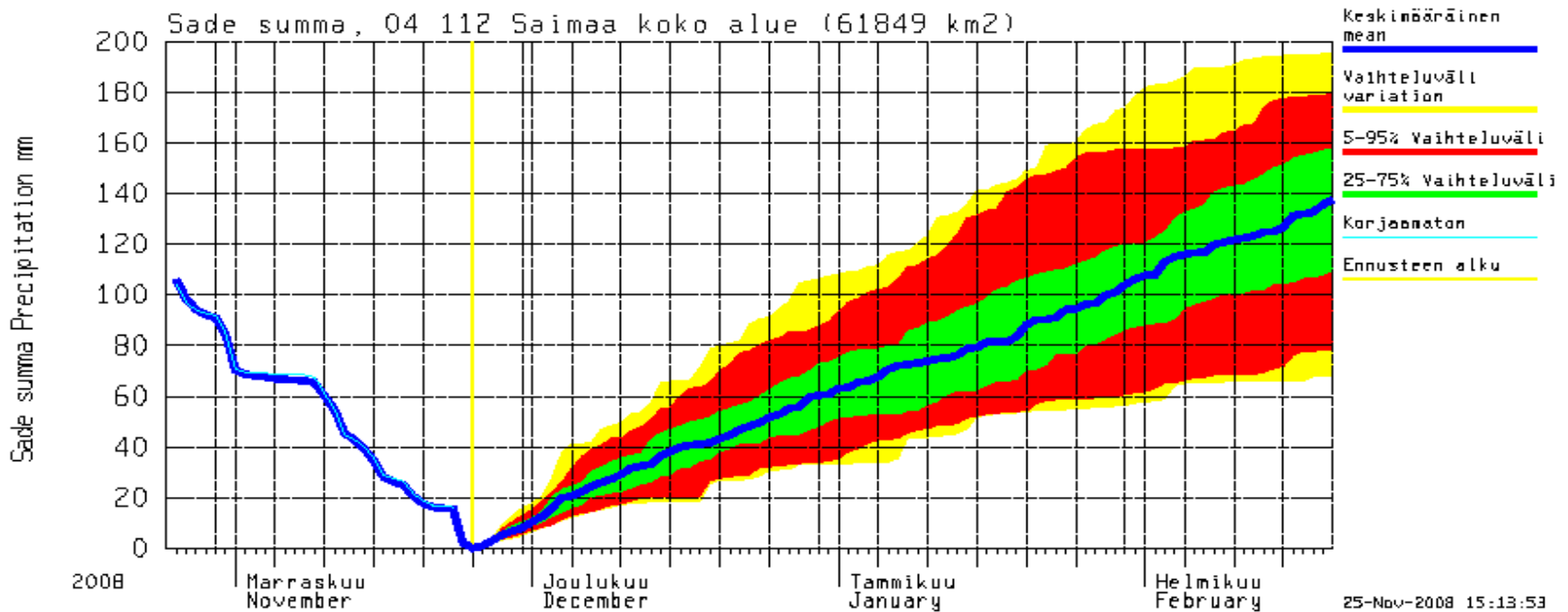
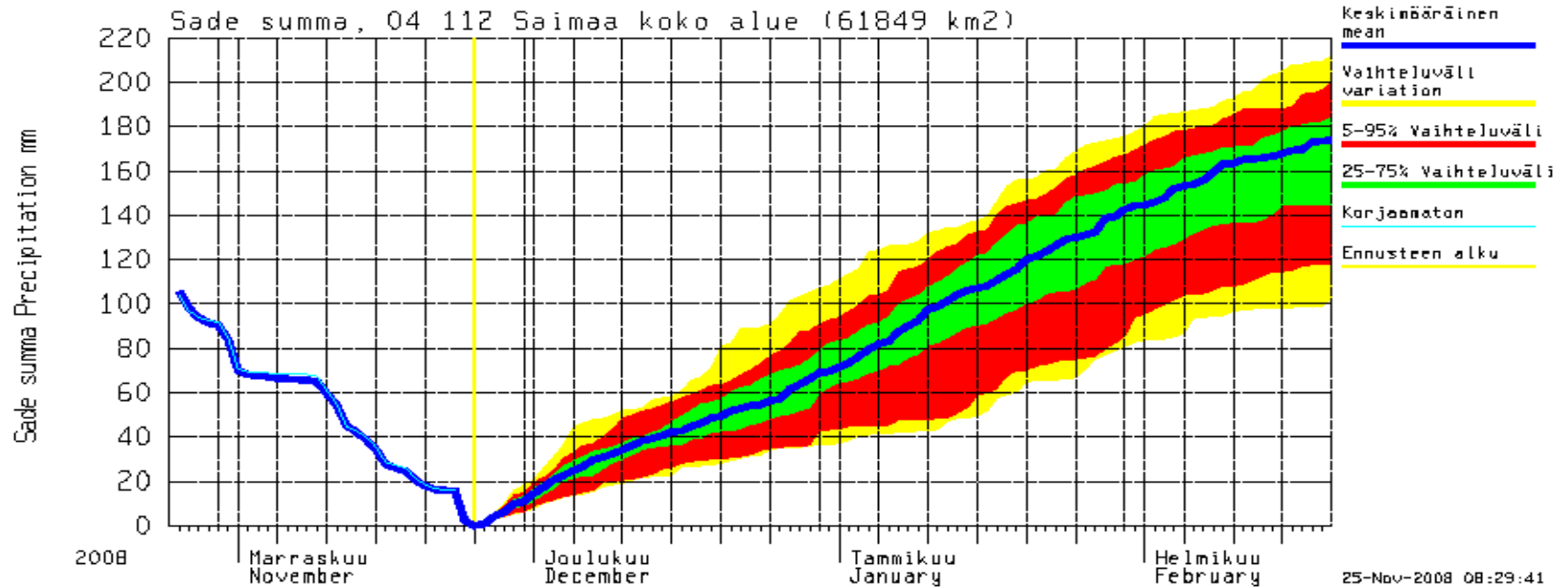
Forecasts done in 25.11.2008 by using monthly/seasonal EPS (upper picture) and by using climatology. Water level 28.1.2009 is 76,52 m (!)



Temperature used in the forecasts



Precipitation (cumulative)

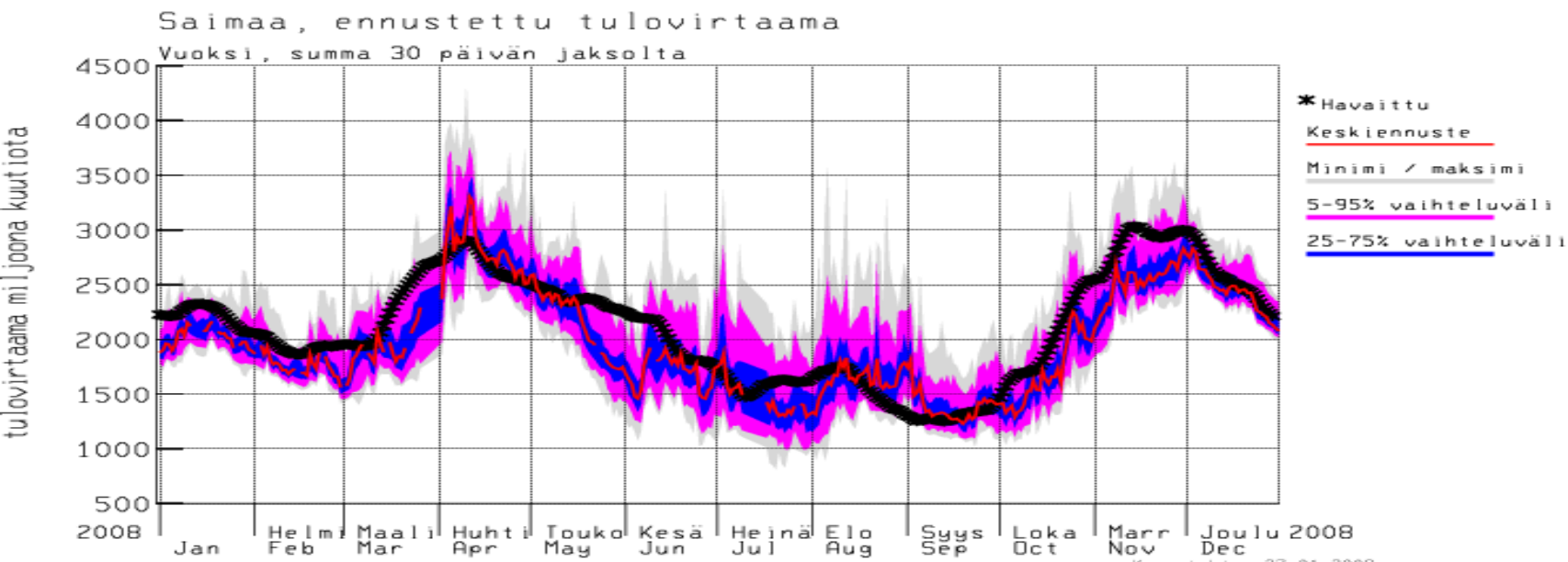
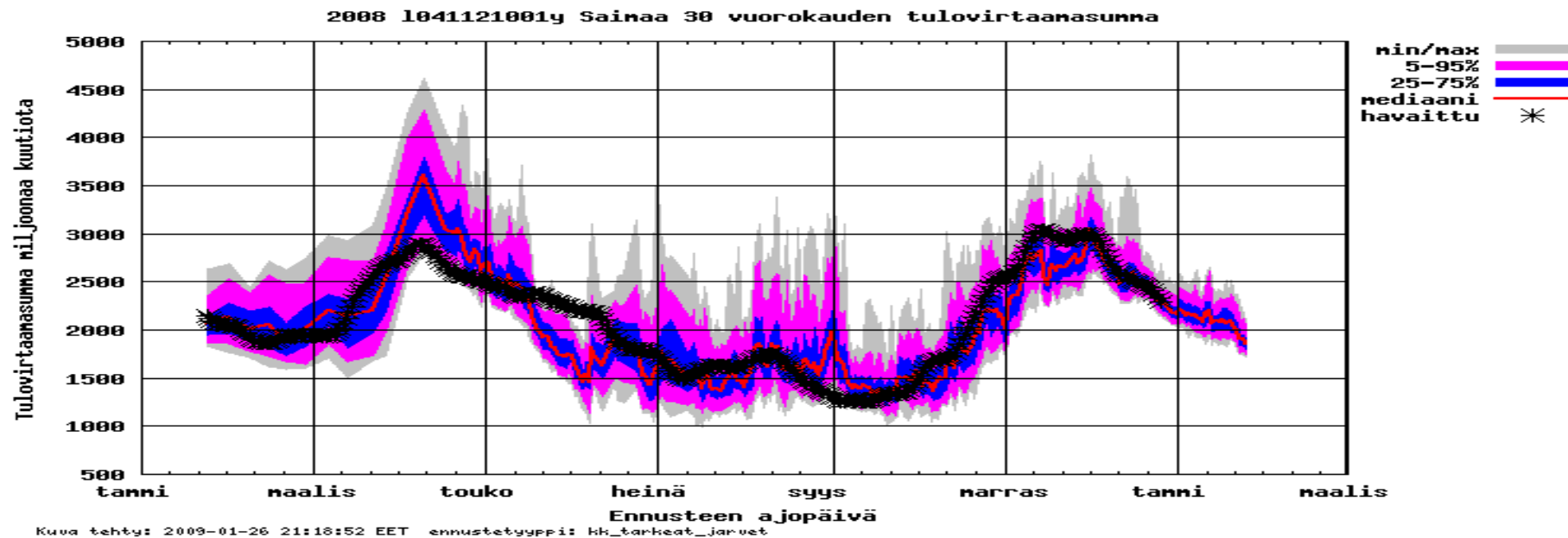


Verification of the forecasts

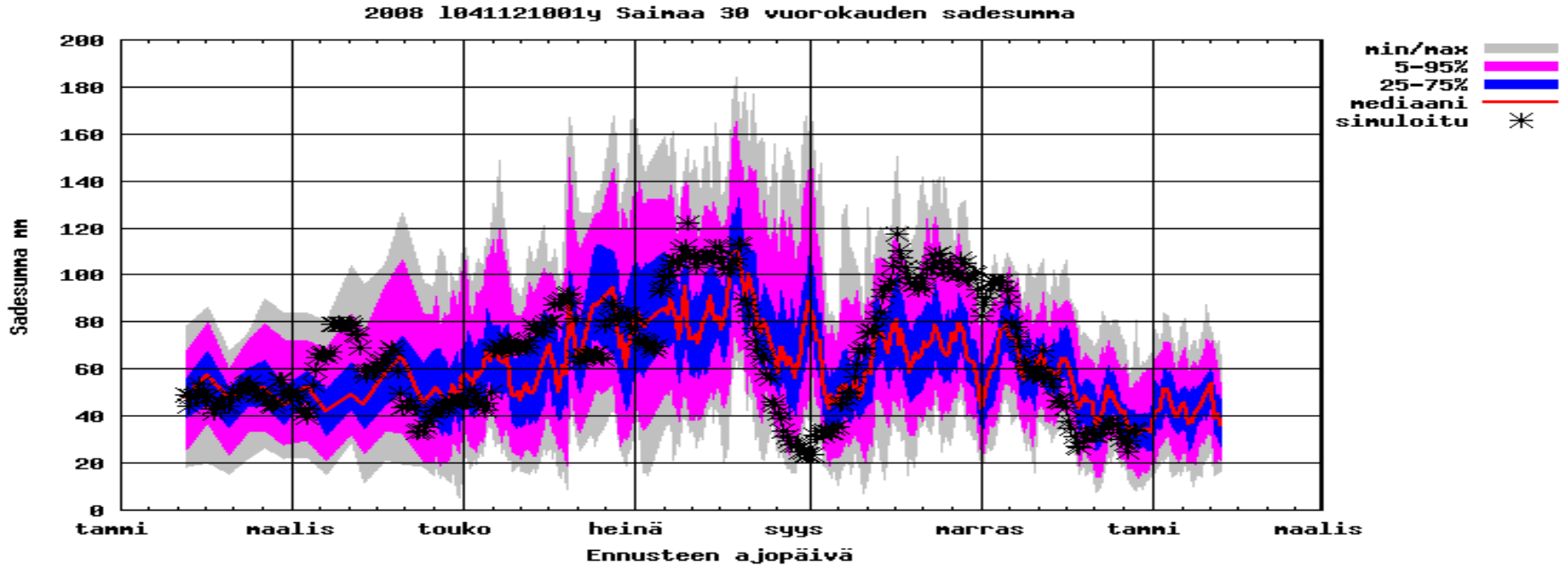
- For now the verification of the forecasts is mainly based on visual comparison of the forecasted and observed water level, discharge and inflow. Also numerical criteria is used.
- The interesting question is: is the EPS forecast better than climatology (first two weeks it is, but what about after that?)
- There's not yet enough data and analysis to make confident conclusions but the experiences from the last and recent winter are encouraging.
- The work is going on...

Examples of verification pictures

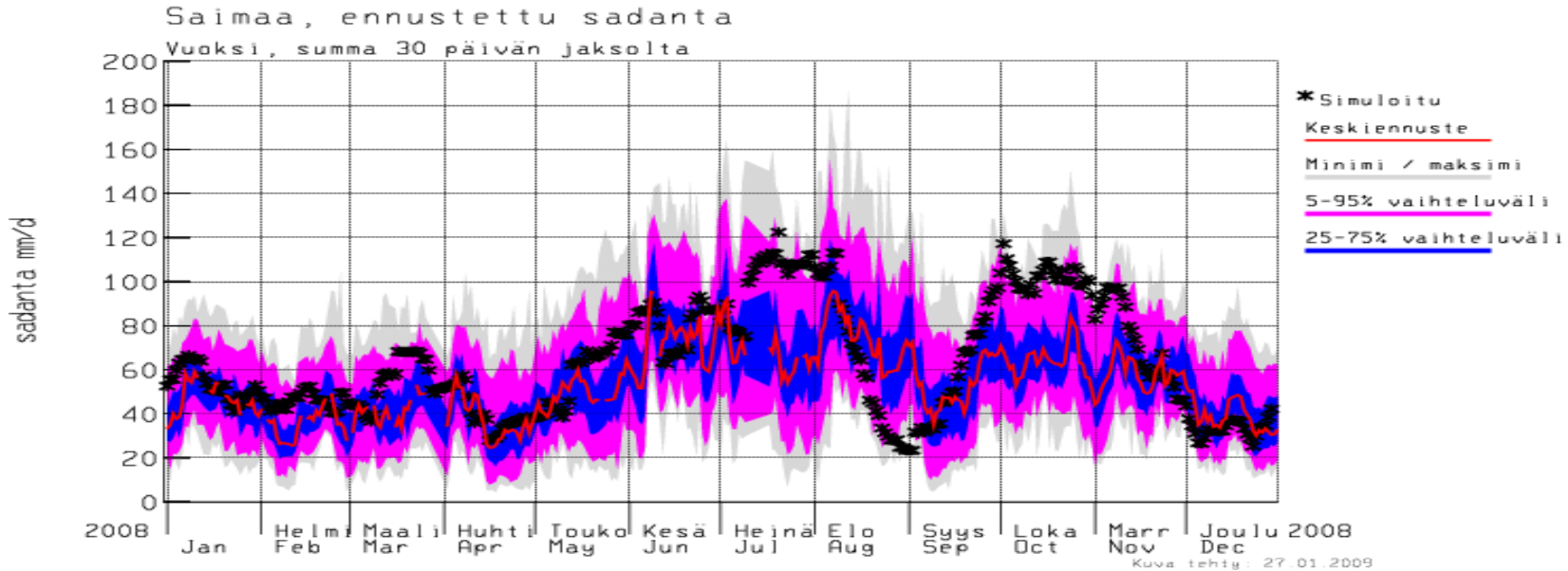
Total inflow of lake Saimaa for 30 days period (EPS-forecast in the upper pic.)



Precipitation used in the forecasts, sum of 30 days



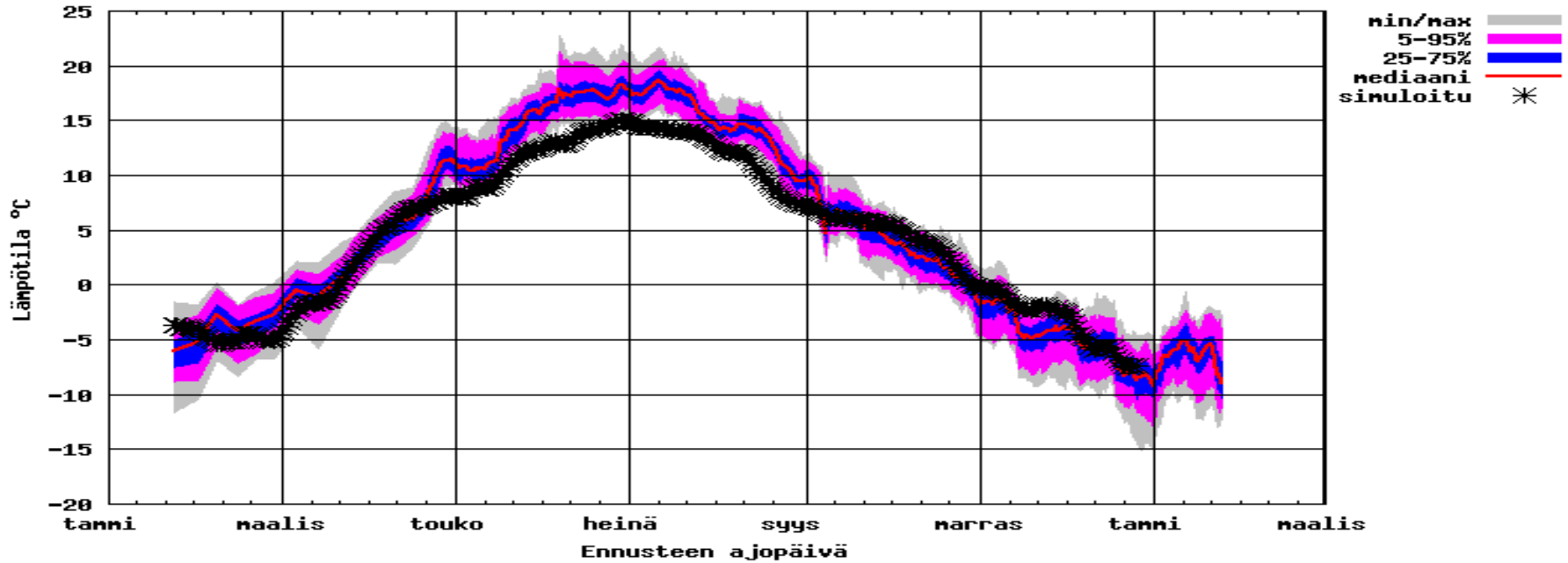
Kuva tehty: 2009-01-26 21:18:52 EET ennustetyyppi: kk_tarkeat_jarvet



Kuva tehty: 27.01.2009

Temperature used in the forecasts, mean of 30 days

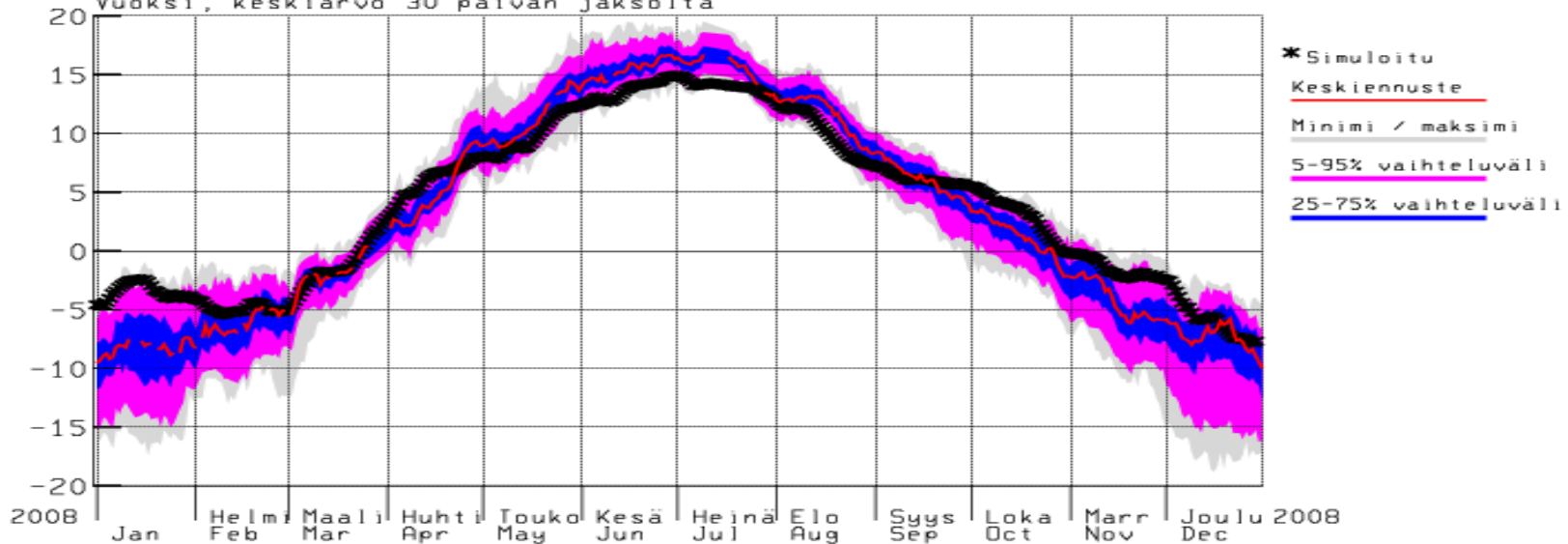
2008 1041121001y Sainaa 30 vuorokauden lämpötilan keskiarvo



Kuva tehty: 2009-01-26 21:18:52 EET ennustetyyppi: kk_tarkeat_jarvet

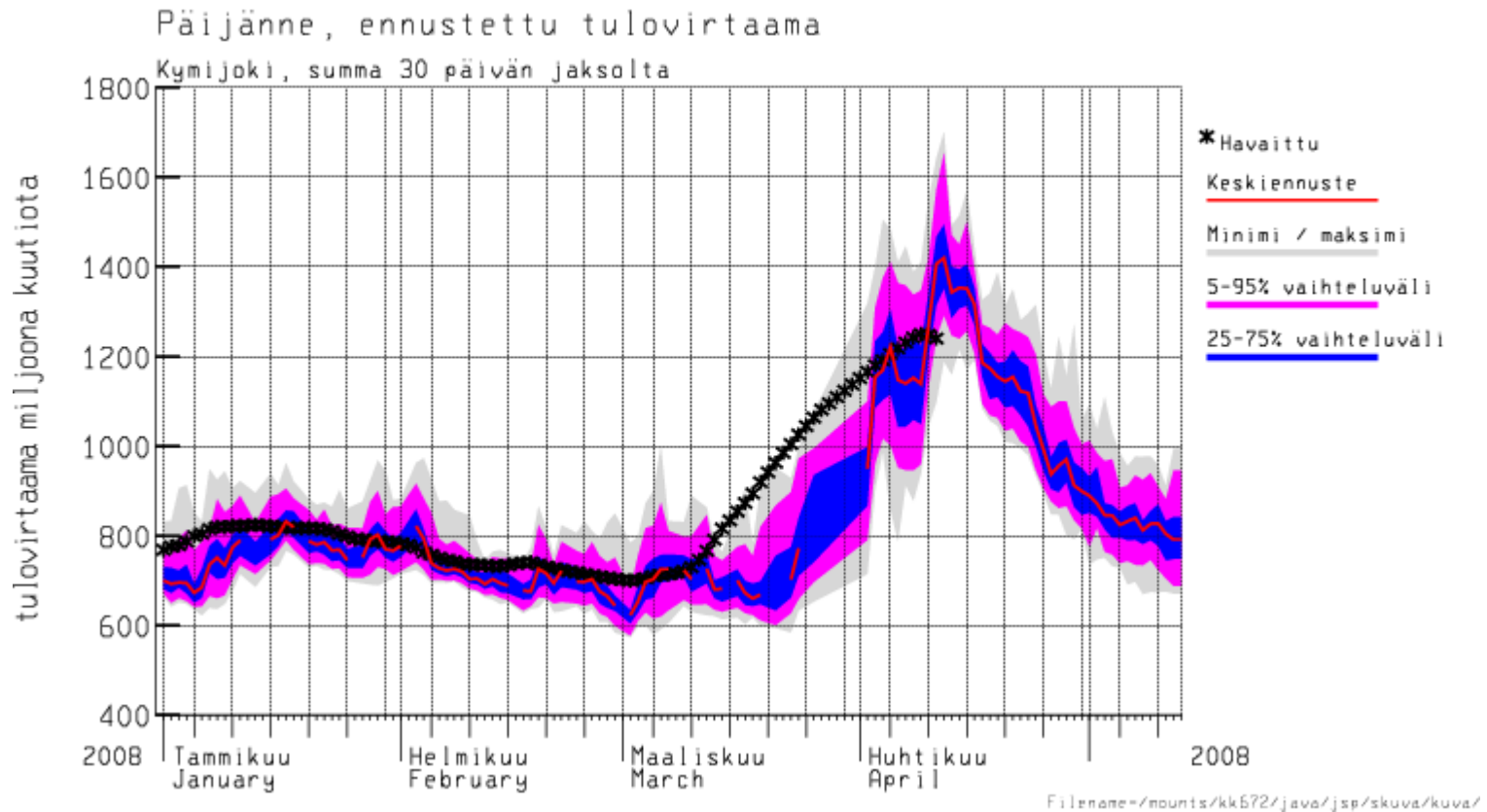
Saimaa, ennustettu lämpötila

Vuoksi, keskiarvo 30 päivän jaksolta

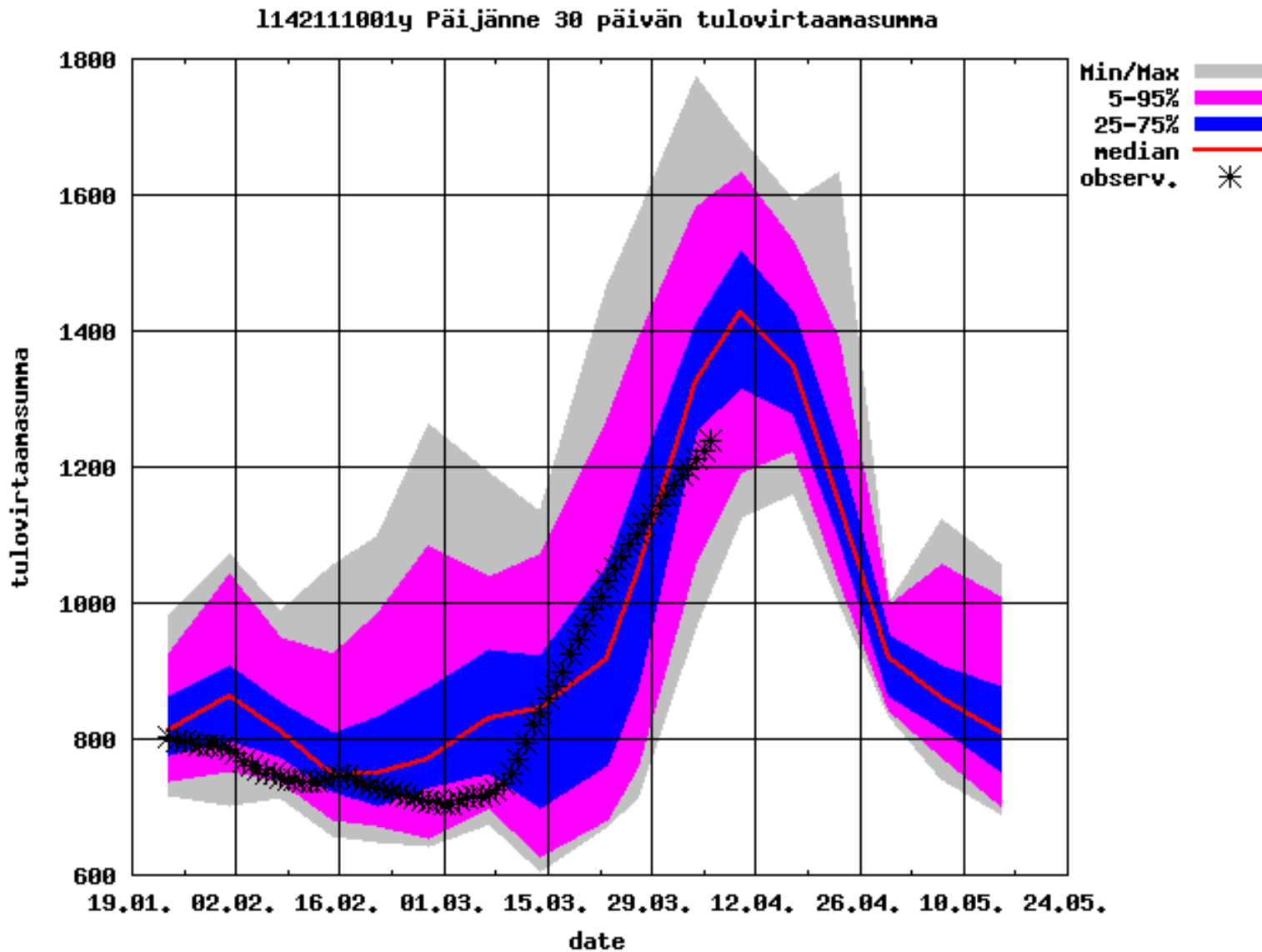


Kuva tehty 27 01 2009

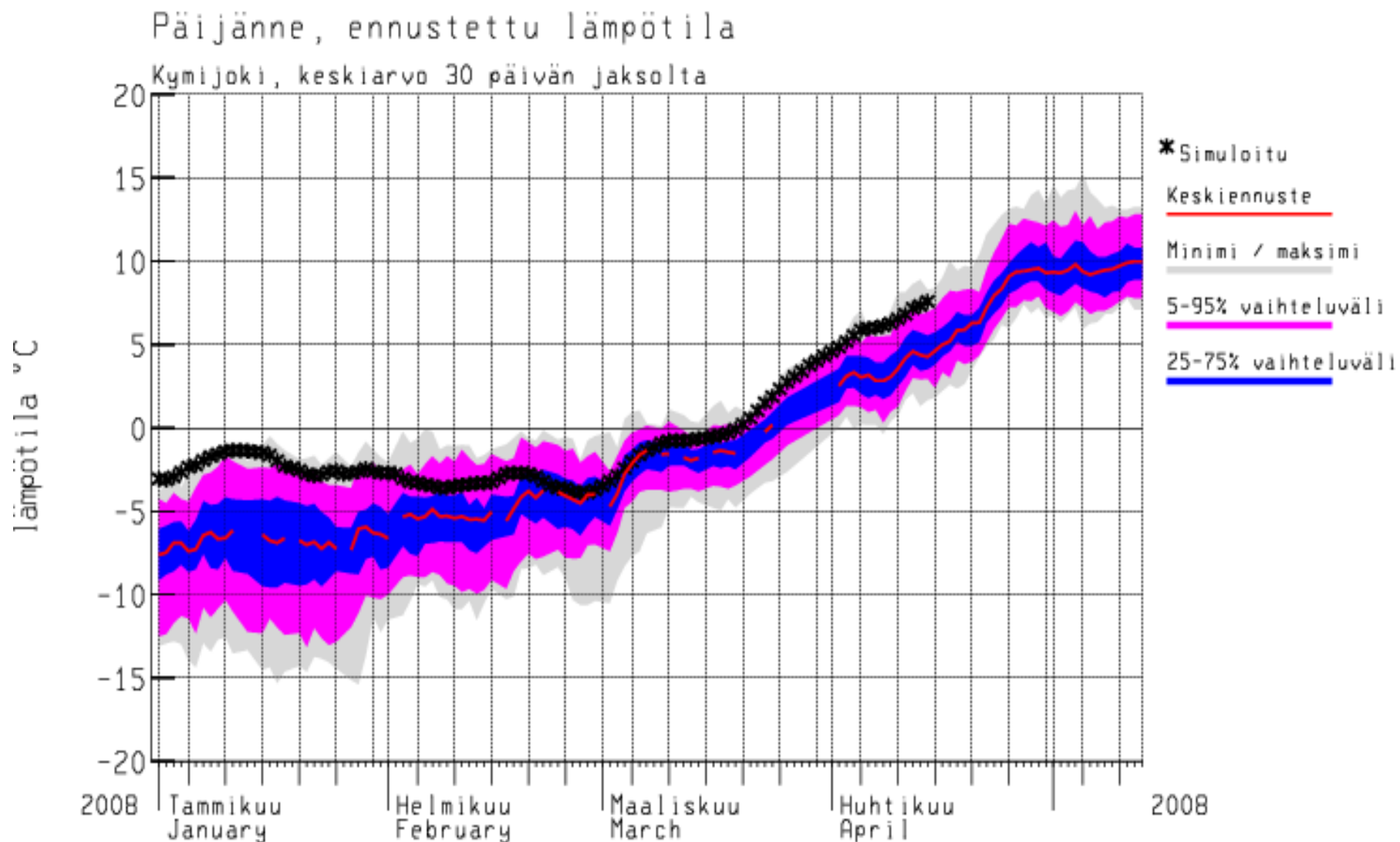
Inflow forecast of lake Päijänne with climatology in 2008, * = observed 30 d inflow sum (10^6 m^3)



Inflow forecast of lake Päijänne with monthly ECMWF forecast, *= observed inflow sum (10^6 m^3)

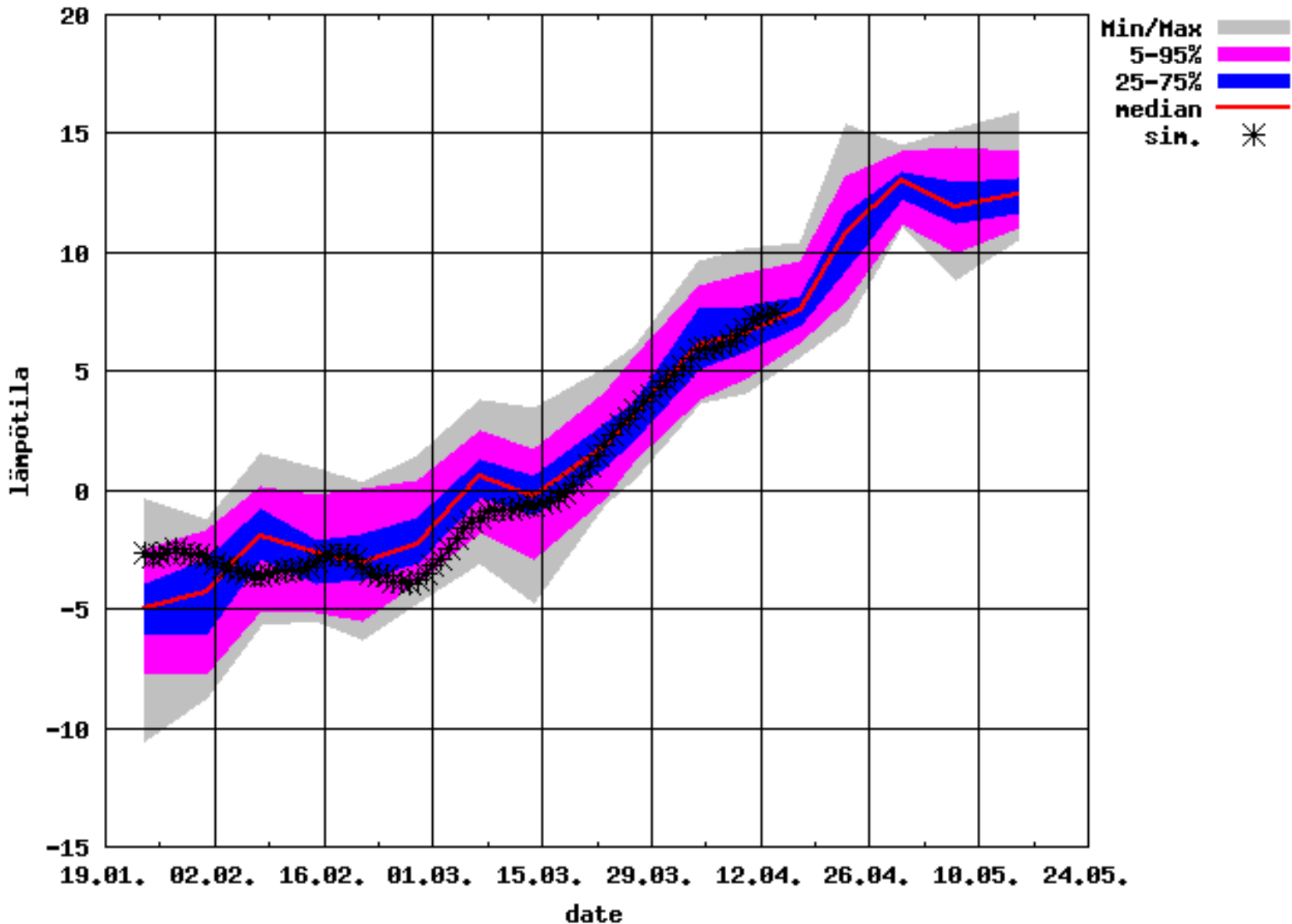


Temperature forecast from climatology, * = observed 30 d mean



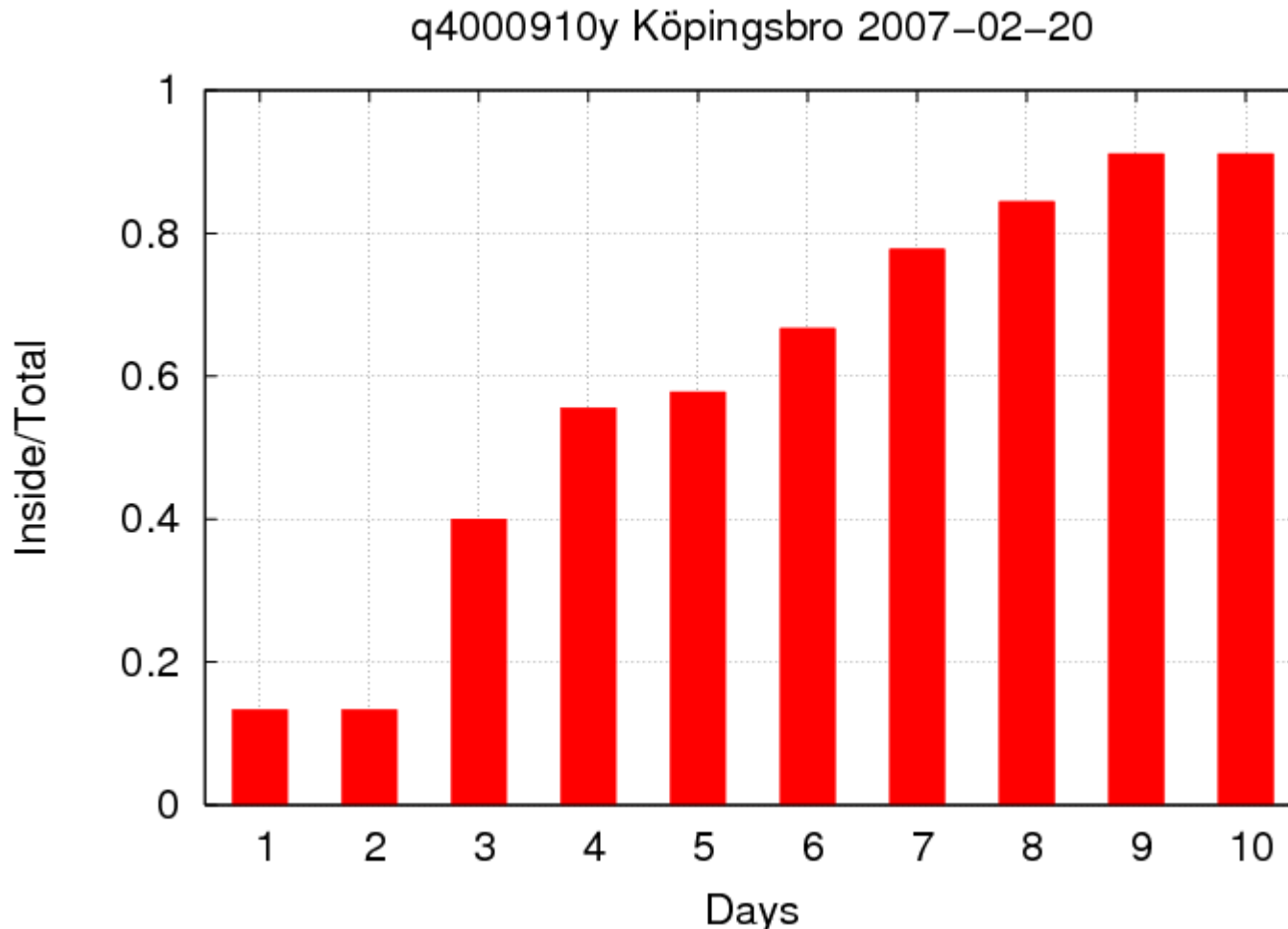
Temperature forecast from monthly ECMWF, * = observed mean

1142111001y Päijänne 30 päivän lämpötilan keskiarvo

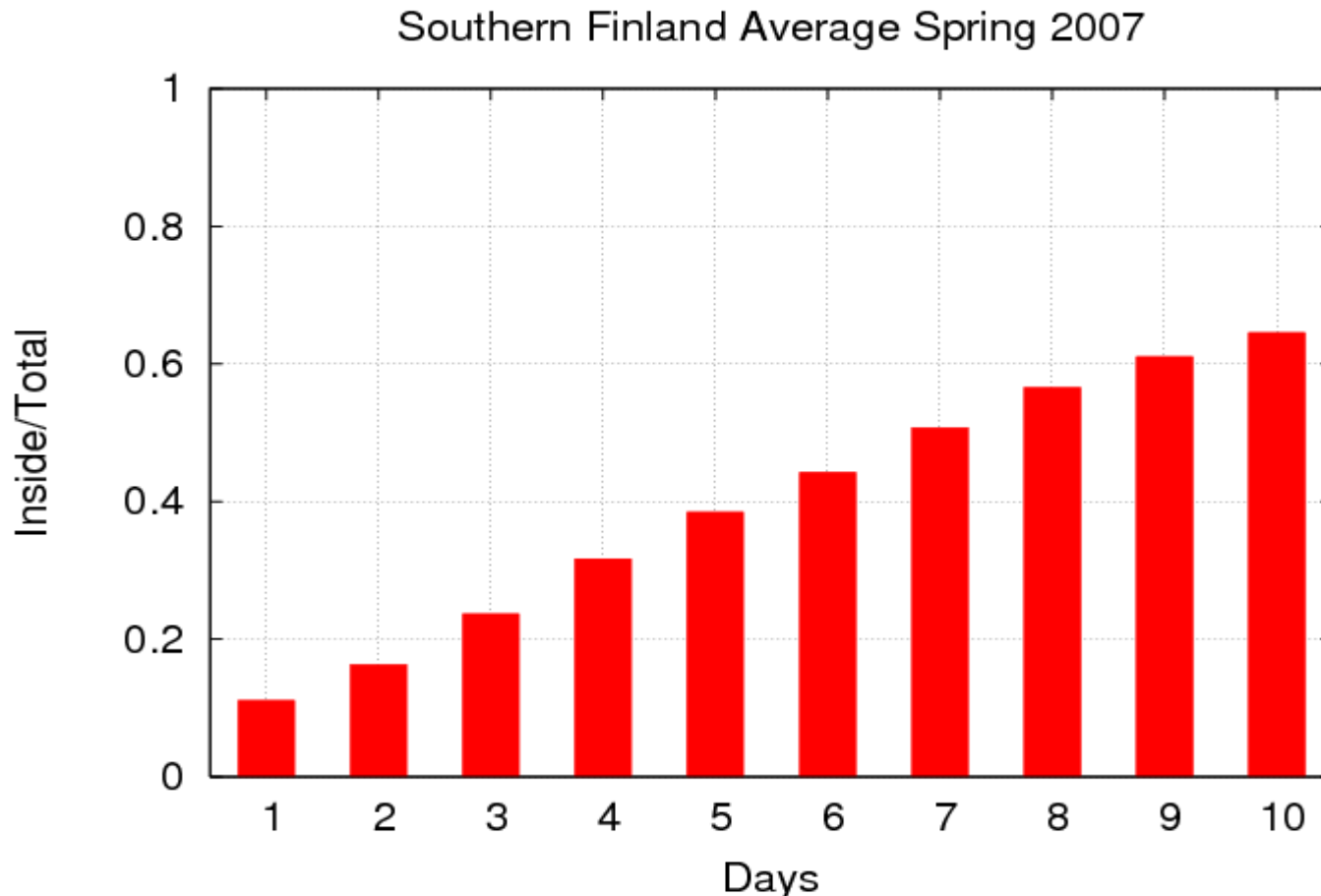


Verifications of 10 days EPS:

Percentage of cases when observed discharge is inside max-min forecast envelope in 1-10 days, Maalahdenjoki , Köpingsbro, 20.2-6.4.2007



Percentage of cases when observed discharge is on the average inside the max-min forecast envelope during 1...10 days. Flood periods are selected from 1.1.-15.4.2007 for 57 catchments in southern Finland



Any questions?

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