



ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

ECMWF MONTHLY FORECASTS IN FINLAND 2006 - 2007

**Ilkka Juga
Finnish Met Institute (FMI)**

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Use of ECMWF monthly (and seasonal) forecasts

- **Regular forecasts to the general public on TV and radio cover the forecasting length up to 10 days.**
- **Outlooks about the coming weather in the monthly and seasonal range are occasionally issued to the media. The seasonal forecast is issued in FMI's Climatic Review once a month.**
- **Some special customers use the extended range forecast information (for example the Finnish Environment Institute in their hydrological forecasts and flood warnings).**
- **ECMWF monthly and seasonal forecasts are evaluated in FMI and there are plans to start regular extended range forecasting in the near future for the public.**



Evaluation of ECMWF monthly forecasts, the ensemble mean anomaly maps, 2006-2007 (104 forecasts). Focus in southern Finland

- **What was the usability of the 2-metre temperature and precipitation anomaly forecasts (weekly averages)?**
- **What was the amount of right signals for anomaly during forecast weeks 1, 2, 3 and 4? How many "no signal" cases?**
- **Forecast and analysis data for southern Finland were collected from ECMWF web-pages, the verification archive.**
- **Weekly means from synoptic observations (for example at Helsinki airport) were used to find the most pronounced temperature and precipitation anomalies for case studies.**

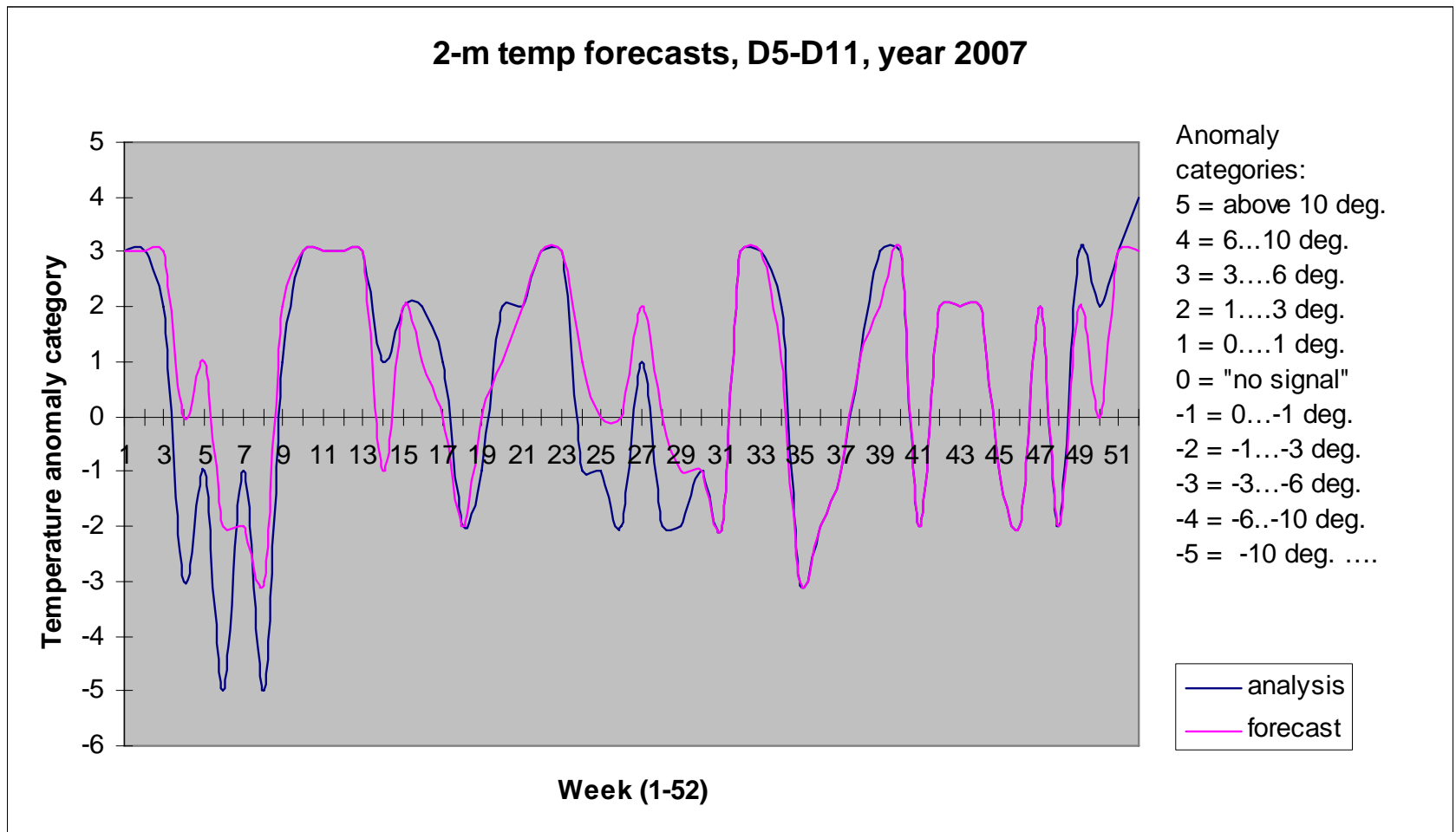


ECMWF monthly forecast evaluation area



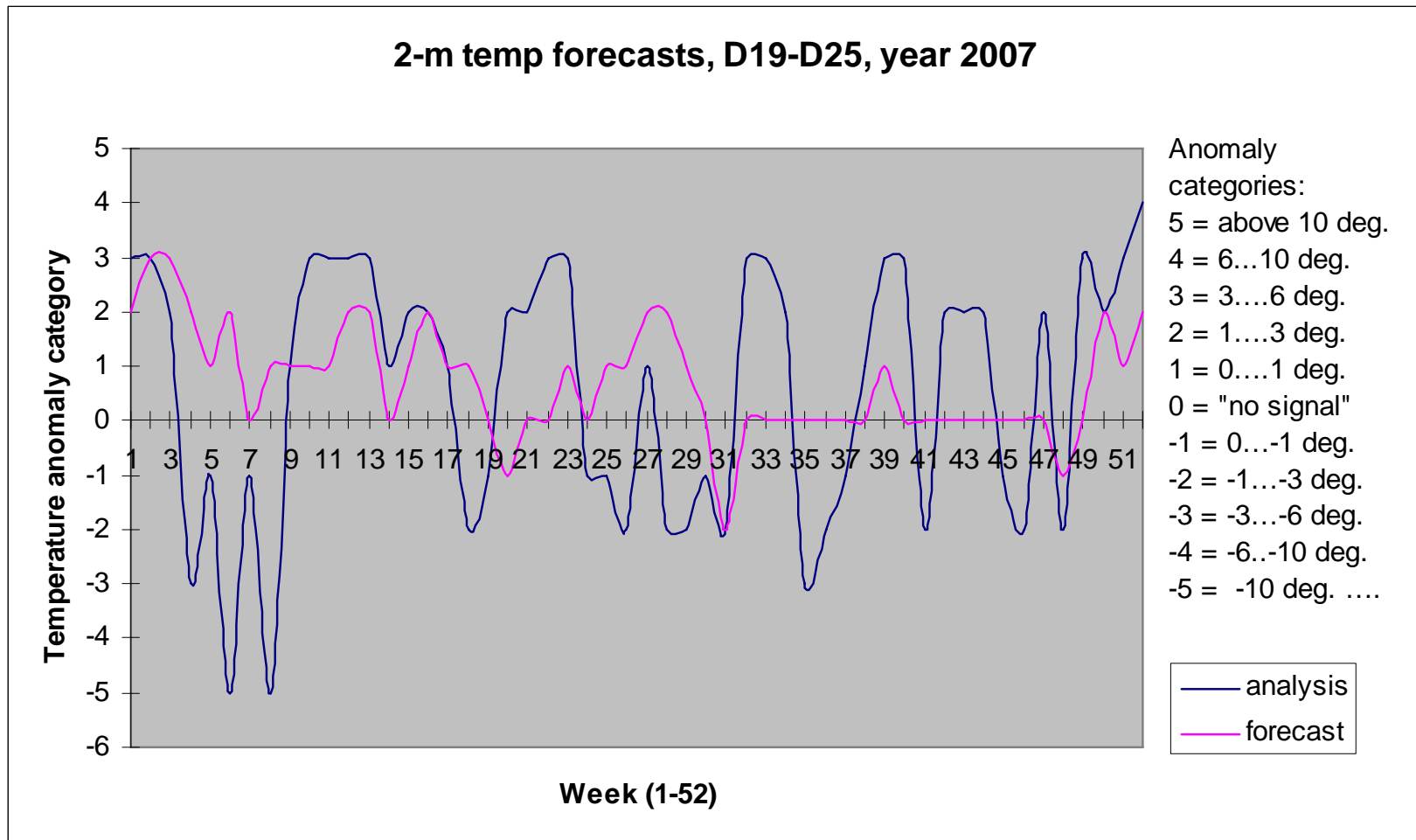


An example of ECMWF monthly forecast, year 2007. Forecast and analysis of 2-m temperature weekly anomaly in southern Finland. Forecast length: days 5 to 11. (Forecast is marked by red, analysis by blue curve)



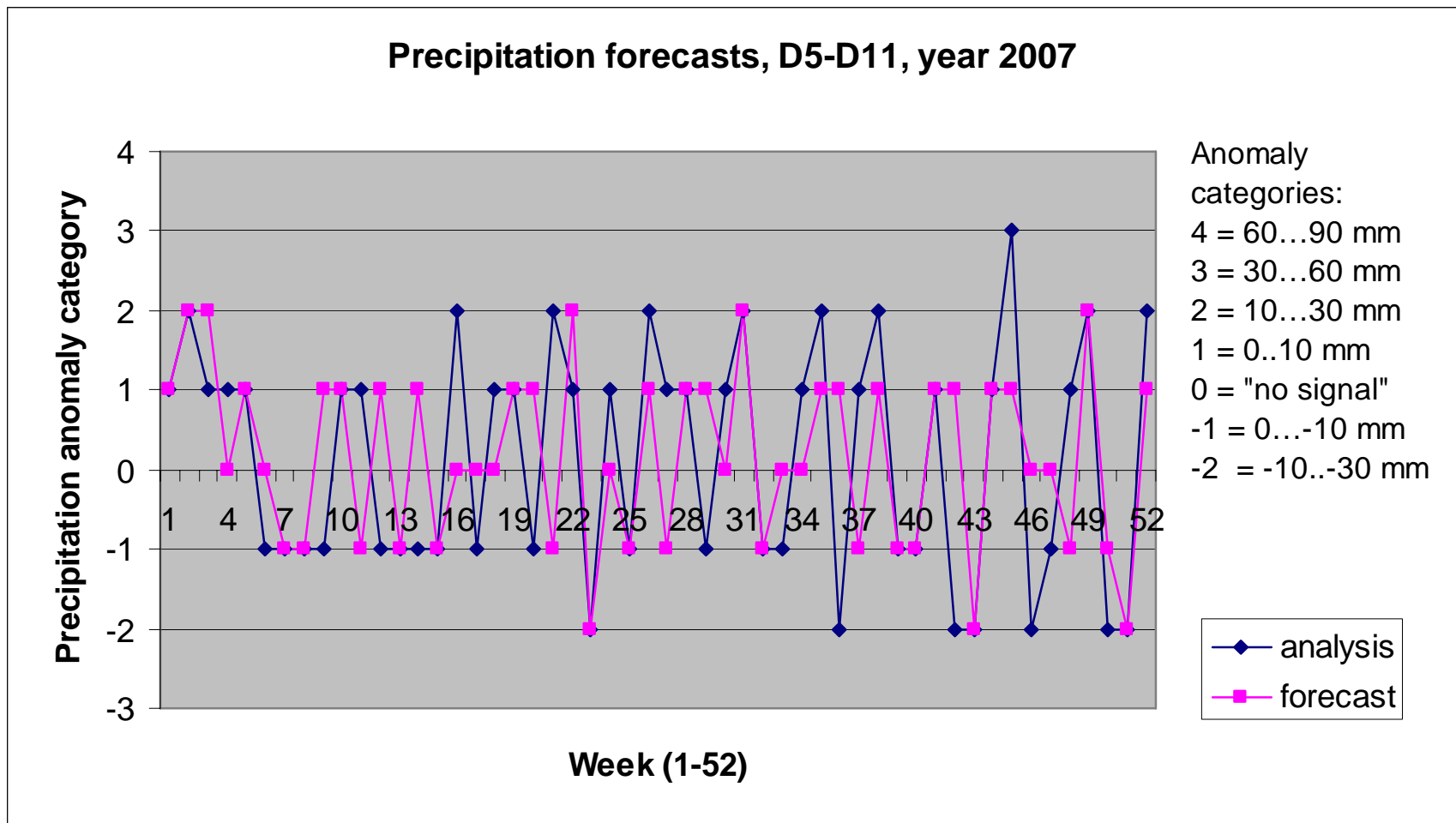


An example of ECMWF monthly forecast, year 2007. Forecast and analysis of 2-m temperature weekly anomaly in southern Finland. Forecast length: days 19 to 25. (Forecast is marked by red, analysis by blue curve)



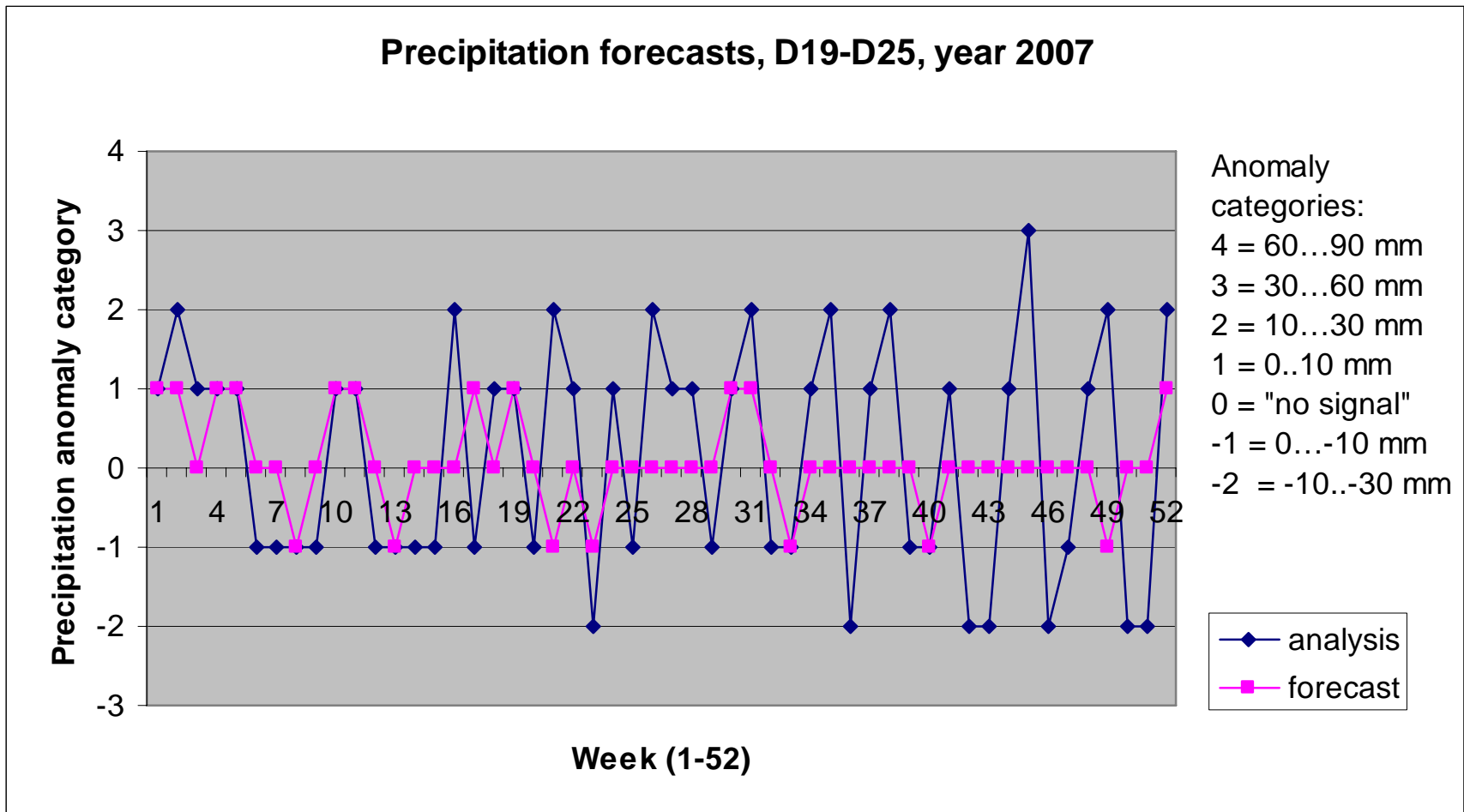


An example of ECMWF monthly forecast, year 2007. Forecast and analysis of total precipitation weekly anomaly in southern Finland. Forecast length: days 5 to 11. (Forecast is marked by red, analysis by blue curve)





An example of ECMWF monthly forecast, year 2007. Forecast and analysis of total precipitation weekly anomaly in southern Finland. Forecast length: days 19 to 25. (Forecast is marked by red, analysis by blue curve)



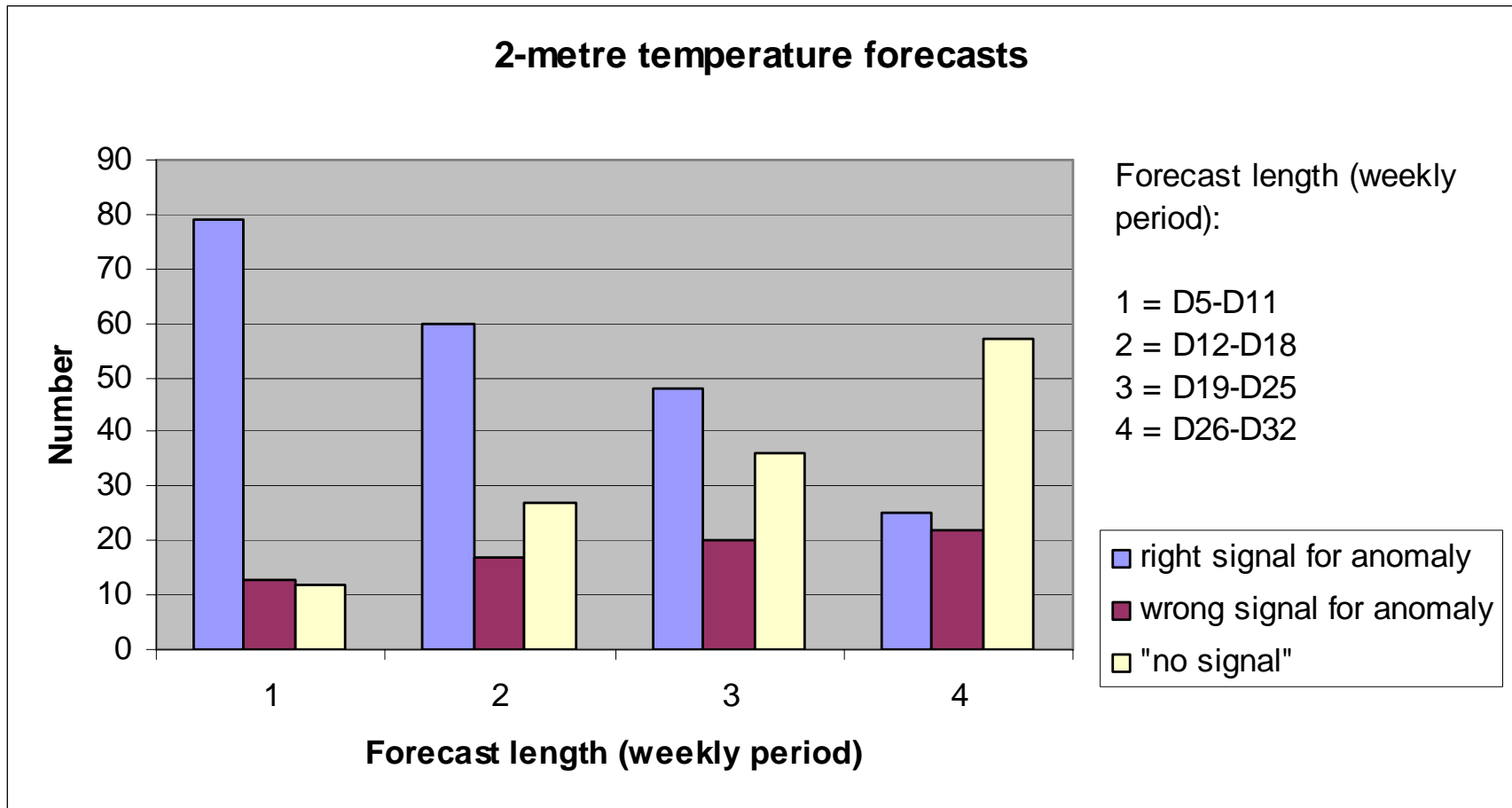


Simple evaluation method of signals for weekly anomalies (2-m temperature and precipitation)

- **Right signal:**
 - Positive anomaly predicted, positive observed
 - Negative anomaly predicted, negative observed
- **Wrong signal:**
 - Positive anomaly predicted, negative observed
 - Negative anomaly predicted, positive observed
- **No signal:**
 - Blank area covers the whole southern Finland in the forecast

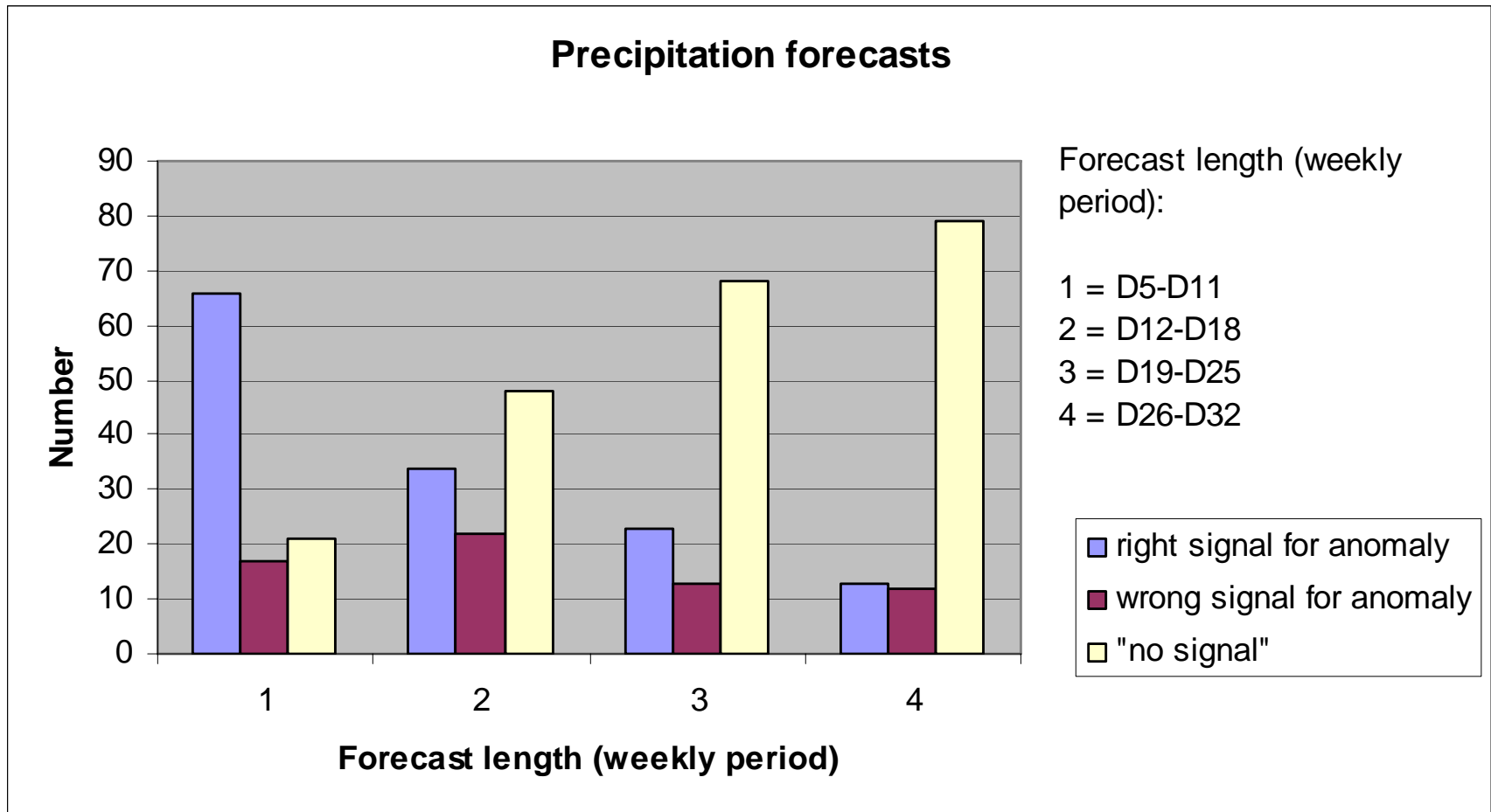


ECMWF monthly forecasts, 2006-2007 (104 cases). Forecasts of 2-metre temperature anomaly over weekly periods in southern Finland, the proportion of right and wrong signals for the anomaly (and for "no signal" cases)





ECMWF monthly forecasts, 2006-2007 (104 cases). Forecasts of total precipitation anomaly over weekly periods in southern Finland, the proportion of right and wrong signals for the anomaly (and for "no signal" cases)





Summary of the results and conclusions

- Both the 2-metre temperature and precipitation anomaly forecasts were generally valuable during the first forecast week (days 5 to 11). In some weather situations with rapid changes the forecast could give a wrong signal for the anomaly.
- 2-metre temperature forecasts had some value up to the third forecast week (days 19-25). However, forecasts in 2007 had notably weak signals for negative 2-metre temperature anomalies and numerous "no signal" cases. Forecasts in 2006 were slightly better in this respect.



Summary of the results and conclusions

- The value of precipitation forecasts drops faster than the value of temperature forecasts: there were about 60 % "no signal" cases among week-3 forecasts (days 19-25). Nevertheless, when there was a (weak) signal for the precipitation anomaly, it was more often right than wrong. But some very rainy cases missed the signal in the forecast.
- When making a forecast also other products should be used alongside the anomaly maps, for example:
 - **Clusters (weekly means)**
 - **Tercile maps**
 - **EPS-grams and Plumes**

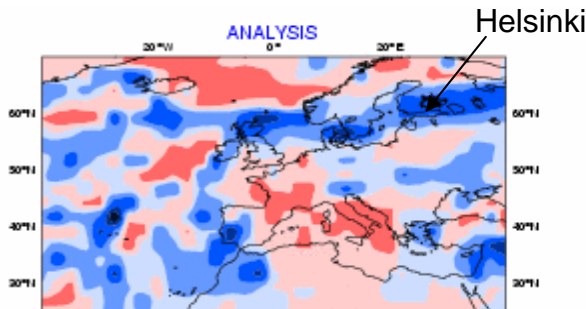


Interesting cases

- **Several interesting cases during 2006-2007. Two of them were chosen for examination:**
 1. Wet period in southern Finland during 23.-29.10. 2006. ECMWF monthly forecasts verifying during that period did not have any signal for positive precipitation anomaly beyond days 5-11.
 2. Warm and dry period 26.3.-1.4. 2007. ECMWF monthly forecasts verifying during this period were relatively good.

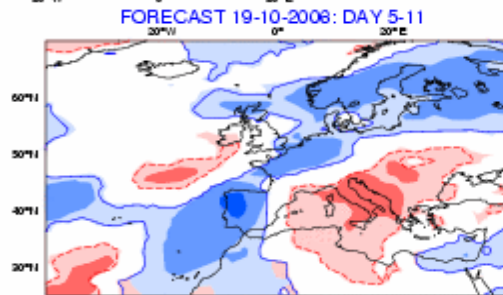


Case 1: Wet period, 23.-29.10. 2006. At Helsinki airport the total precipitation was 86.3 mm (anomaly of c. +69 mm). ECMWF precipitation anomaly forecasts and verifying analysis. Notice the poor week-2 (D12-D18) forecast.

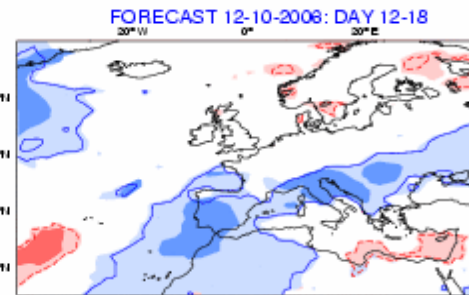


Analysis and ECMWF Monthly Forecasting System
Precipitation anomaly
Verification period: 23-10-2006/TO/29-10-2006

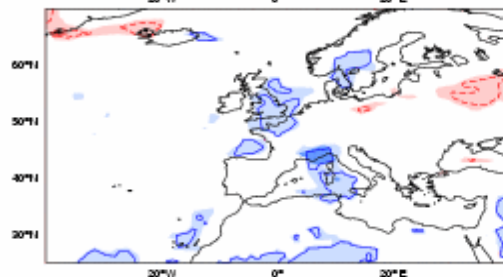
ensemble size = 51 climate size = 60
Shaded areas above 90% significance
Solid contour at 95% significance



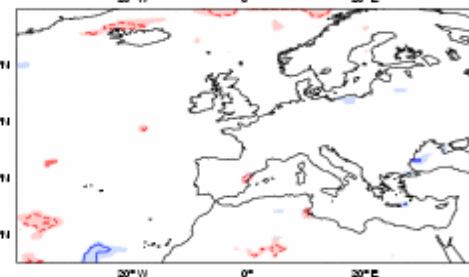
FORECAST 19-10-2006: DAY 5-11



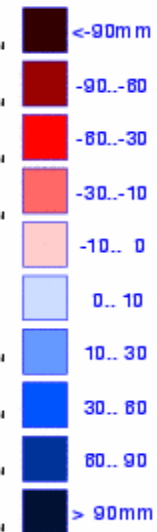
FORECAST 12-10-2006: DAY 12-18



FORECAST 05-10-2006: DAY 19-25

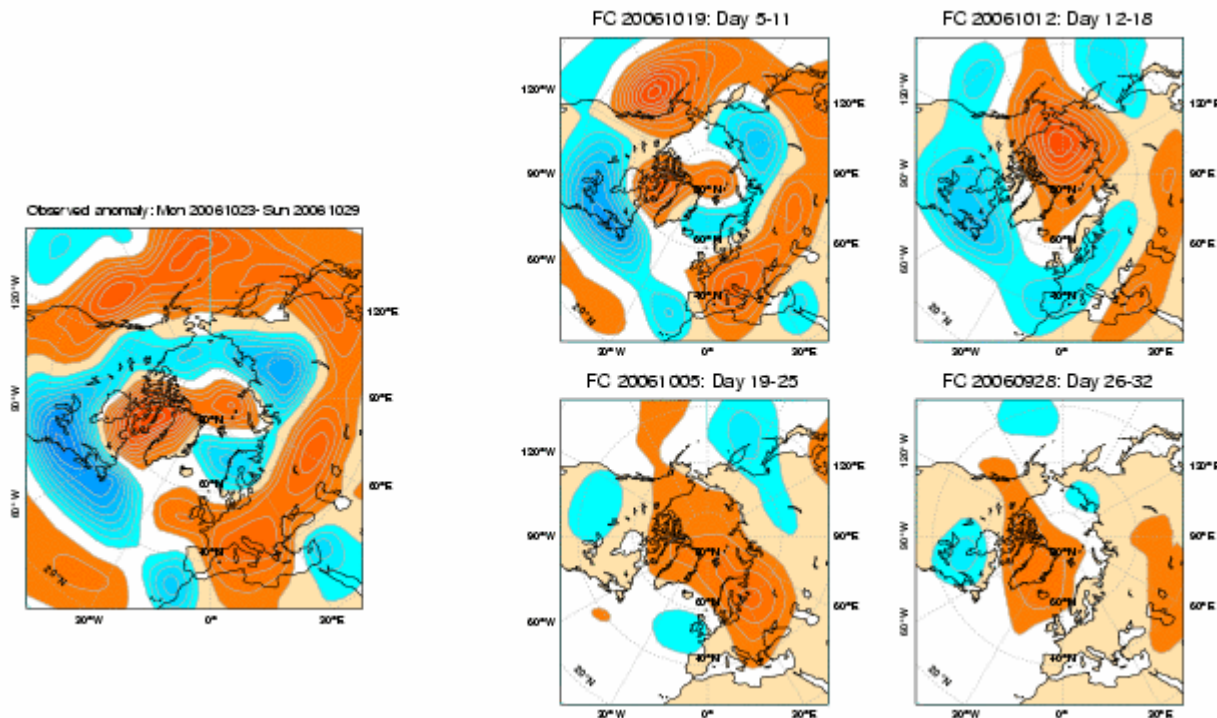


FORECAST 28-09-2006: DAY 26-32



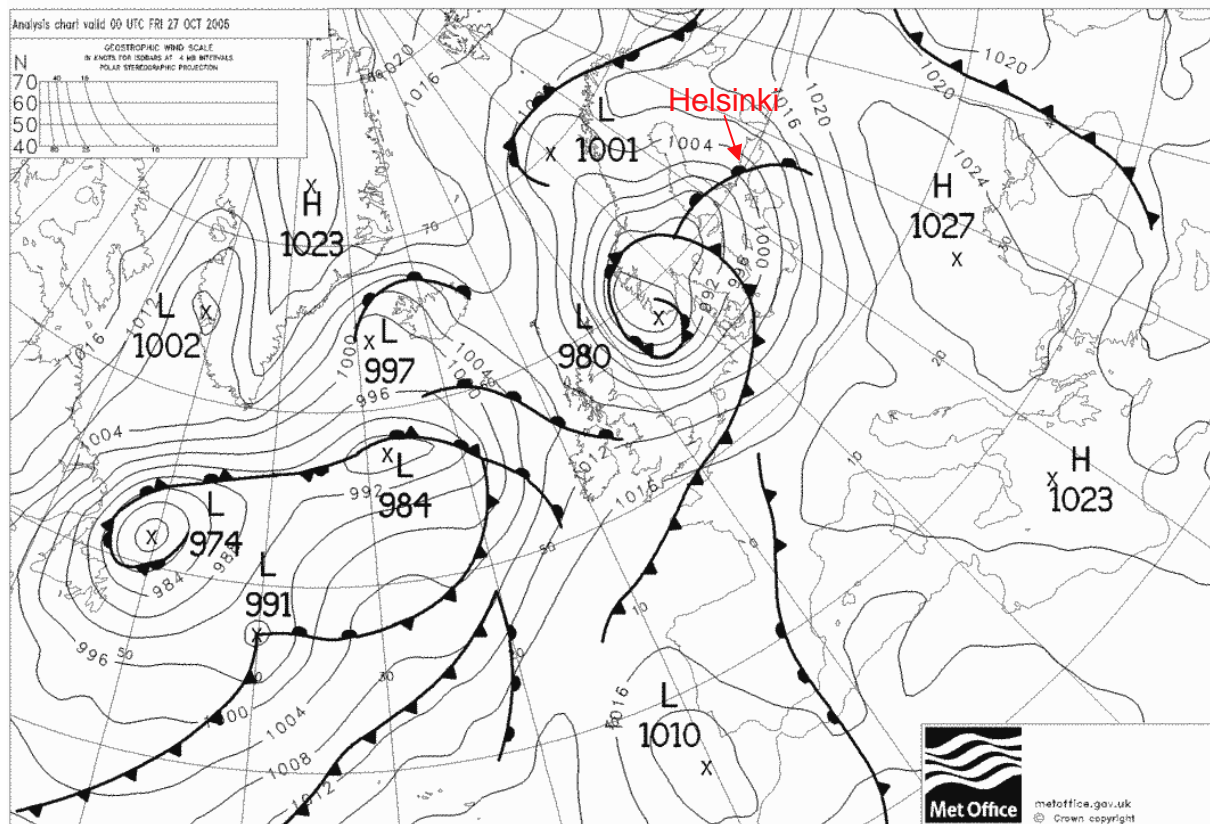


ECMWF 500 hPa anomaly forecasts for period 23.-29.10. 2006 and the verifying analysis (left). During week-2 (D12-D18) there was a large negative anomaly over most parts of Europe, while in the analysis we have a mostly positive anomaly (except for the negative anomaly over Scandinavia)



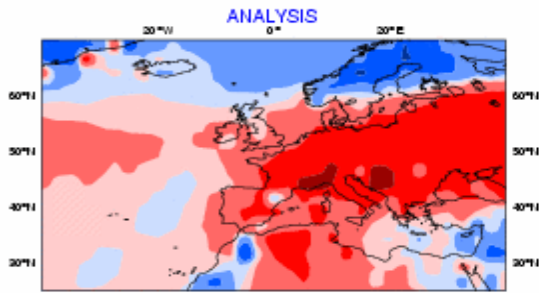


During 23.-29.10. 2006, a couple of deep lows moved over southern Finland to east with a lot of precipitation; see for example this synoptic analysis of 27.10. 2006 00 UTC (by UK Met Office)



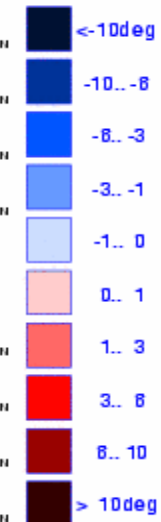
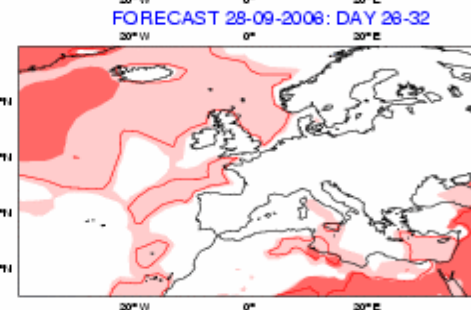
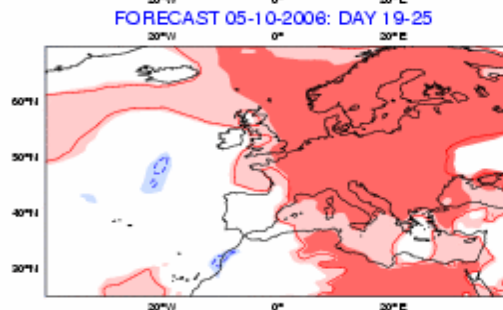
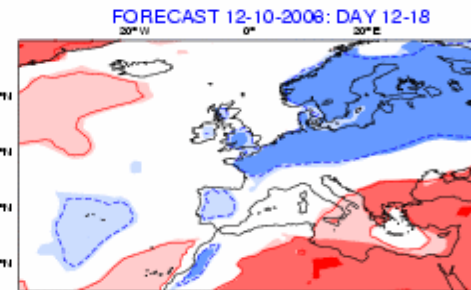
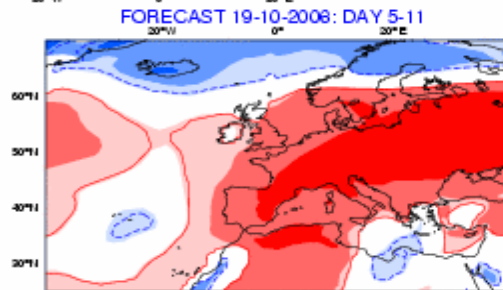


ECMWF 2-metre temperature anomaly forecasts and verifying analysis for 23.-29.10. 2006. Notice the large negative anomaly during week-2 (D12-D18 forecast), extending too far south when compared to the analysis



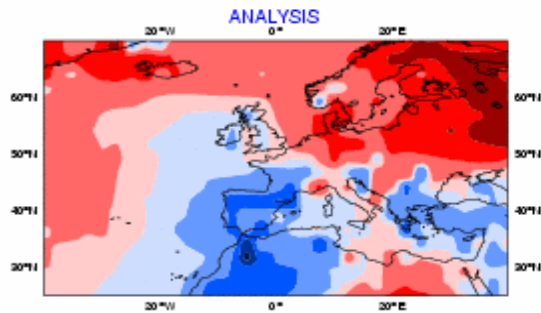
Analysis and ECMWF Monthly Forecasting System
2-meter Temperature anomaly
Verification period: 23-10-2006/TO/29-10-2006

ensemble size = 51 climate size = 60
Shaded areas above 90% significance
Solid contour at 95% significance



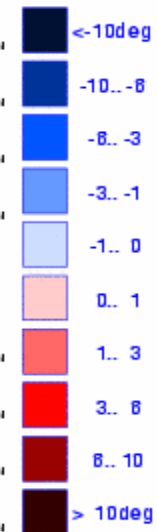
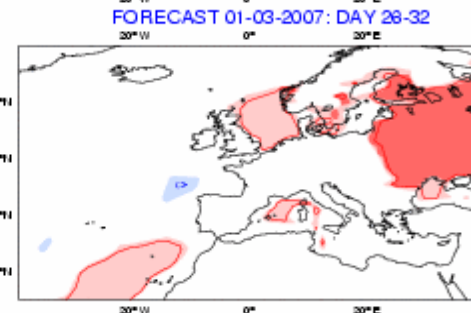
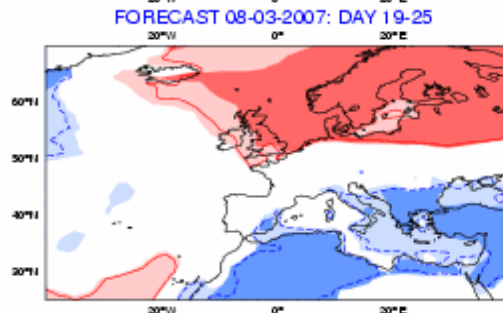
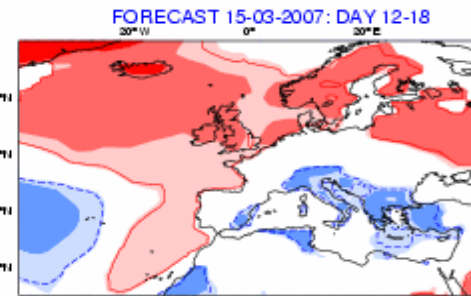
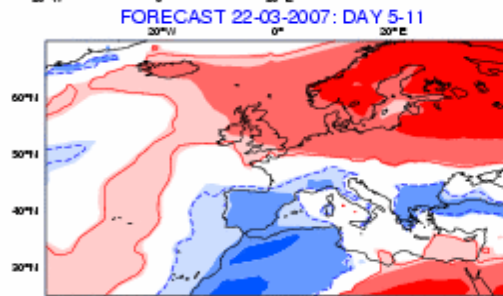


Case 2. Warm period, 26.3.-1.4. 2007. At Helsinki airport the weekly temperature anomaly was +5.9 degrees and a new all time high for March, +17.5 degrees, was observed. ECMWF temperature anomaly forecasts and the verifying analysis. Notice the warm signal up to the week-4 (D26-D32)



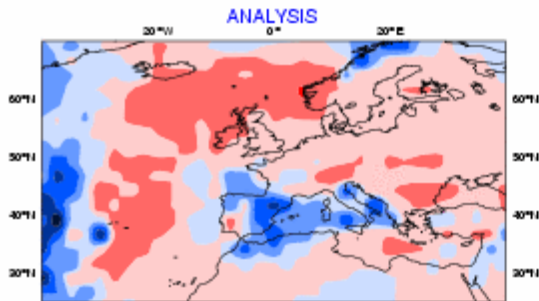
Analysis and ECMWF Monthly Forecasting System
2-meter Temperature anomaly
Verification period: 26-03-2007/TO/01-04-2007

ensemble size = 51 , climate size = 60
Shaded areas above 90% significance
Solid contour at 95% significance



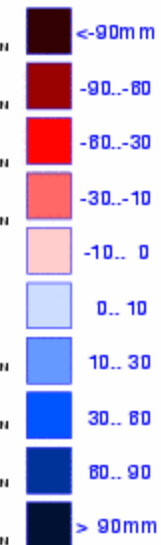
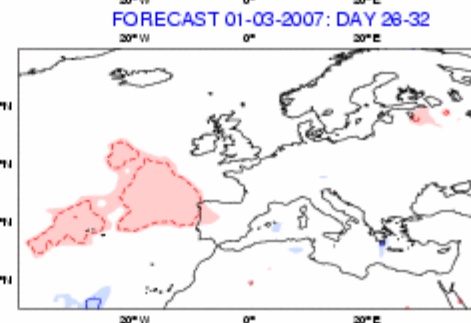
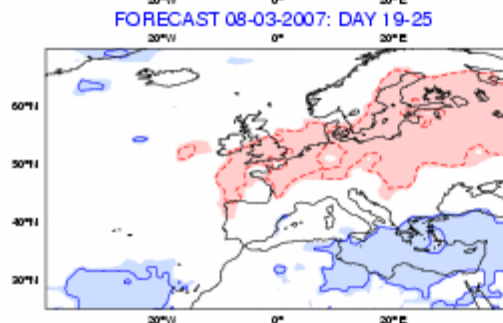
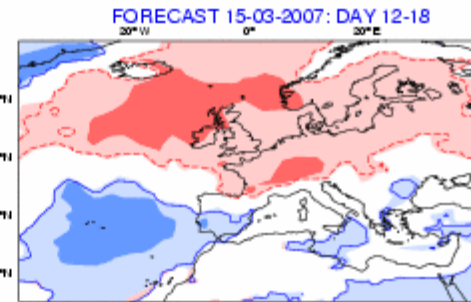
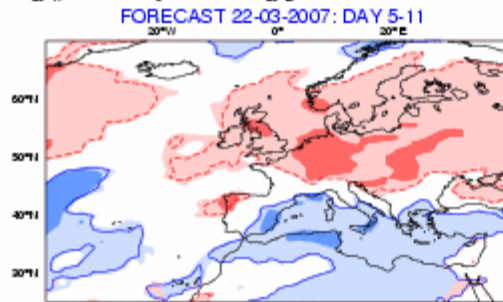


The warm and dry period 26.3.-1.4. 2007, at Helsinki airport with no precipitation observed. ECMWF precipitation anomaly forecasts and the verifying analysis. Notice the quite good D19-D25 forecast



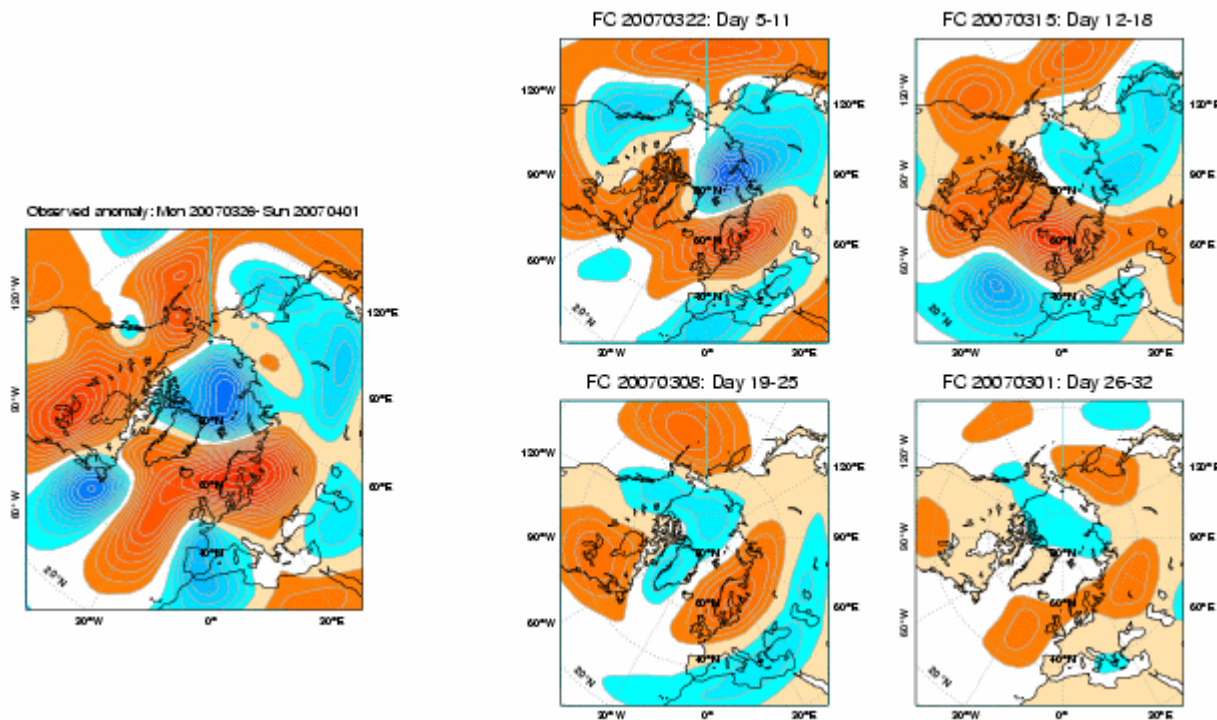
Analysis and ECMWF Monthly Forecasting System
Precipitation anomaly
Verification period: 26-03-2007/TO/01-04-2007

ensemble size = 51 climate size = 60
Shaded areas above 90% significance
Solid contour at 95% significance



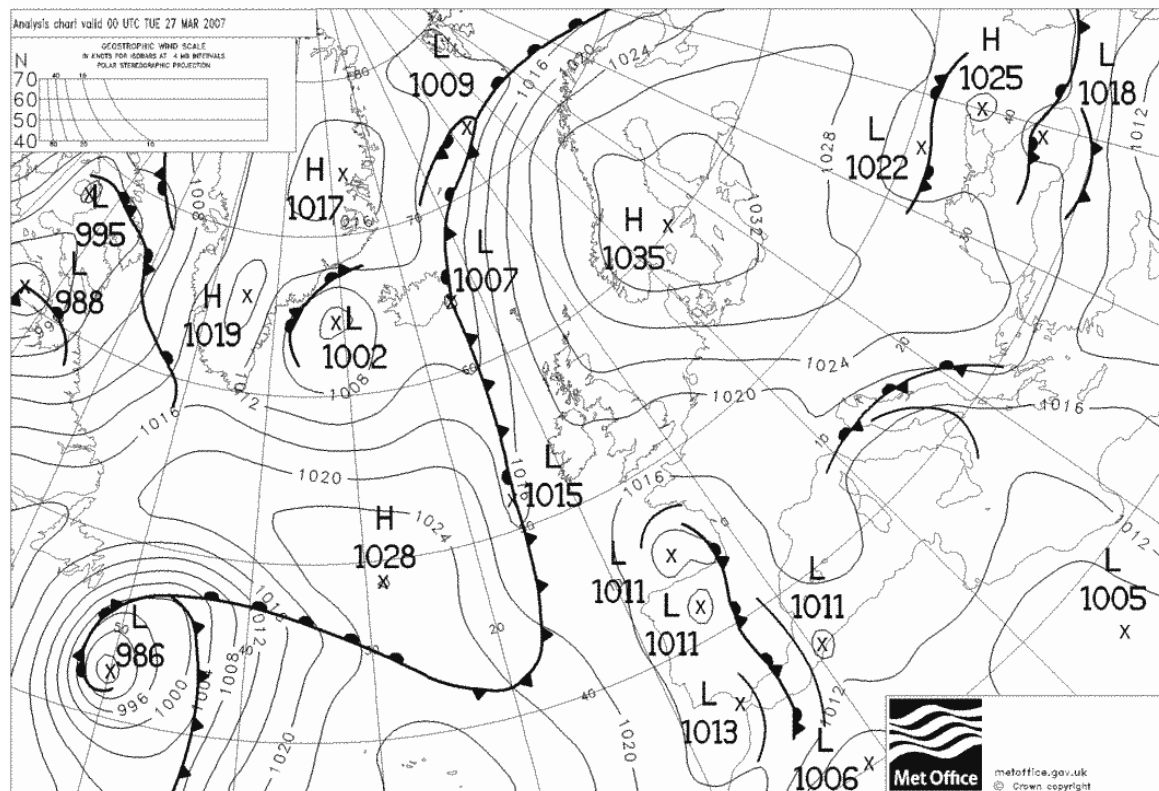


ECMWF 500 hPa anomaly forecasts for 26.3.-1.4. 2007 and the verifying analysis (left). The observed positive anomaly over Northern Europe is well predicted up to week-4





During 26.3.-1.4. 2007 a high pressure prevailed over Scandinavia as seen in the synoptic analysis from 27.3. 2007 00 UTC (by UK Met Office). The temperature in Finland was much above normal and the weather was dry





Thank you!