

Hirlam Verification scores, 1st Quarter 2003.

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1 Introduction

The operational Hirlam verification scores from the first quarter of this year have been requested and compiled. The period is 1 January - 31 March 2003 with 00 and 12 UTC forecasts combined. All the Hirlam operational institutes have kindly provided me with the requested scores, RMS and bias for mean sea level pressure, 10 m wind speed, 2 m temperature, 850 hPa temperature, 500 hPa height and 250 hPa wind speed. (The institutes are the ones in Denmark, Finland, Ireland, the Netherlands, Norway, Sweden and Spain.) Sweden, Norway and Denmark did only have values for every 12 hours forecast range for the upper air verification (and Denmark actually every 12 hours for the other near surface variables as well). The Netherlands provided wind vector values for 10 m and 250 hPa winds rather than speed and those numbers have not been included. Apart from those exceptions the verifications are complete. Norway and Finland made significant changes, both in resolution and version of the Reference system during the period. For technical reasons Norway supplied the operational system at the time whereas Finland had the data for the new system also during the parallel run.

Also Météo-France have supplied their scores for ARPEGE over a European/Atlantic area and their ALADIN-France ones. They are not so easy to compare directly due to the global model in the first case and the very limited area in the second case. Also the Météo-France ECMWF verifications for the same area have somewhat different values compared with ECMWF verifications from the other countries, indicating differences in areas (and possibly measure for winds (vector or speed)). The results are not shown due to these reasons, and the already crowded graphs, but they have been inspected and compared.

The data has been compiled and processed for plotting. The results are commented below. It should be pointed out that the displayed scores cannot be used to compare or rank the forecast quality of the various Hirlam installations and operations. The model domains are all different and proximity of the verification stations to boundaries varies between installations. Furthermore, a somewhat different sample of verification stations has been employed at each institute due to the area, reception (and possibly quality control) all being individual.

2 Mean sea level pressure

There is some variation in the growth rate mean sea level RMS errors. Denmark and now Ireland have the lowest and Norway the highest error growth. As mentioned above, the Norwegian data are mainly from the old system.

The average (00 and 12 UTC) bias is fairly small for most but with a negative trend for a few countries (Ireland, Finland and Sweden to some extent).

HIRLAM Verifications Jan–Mar 2003

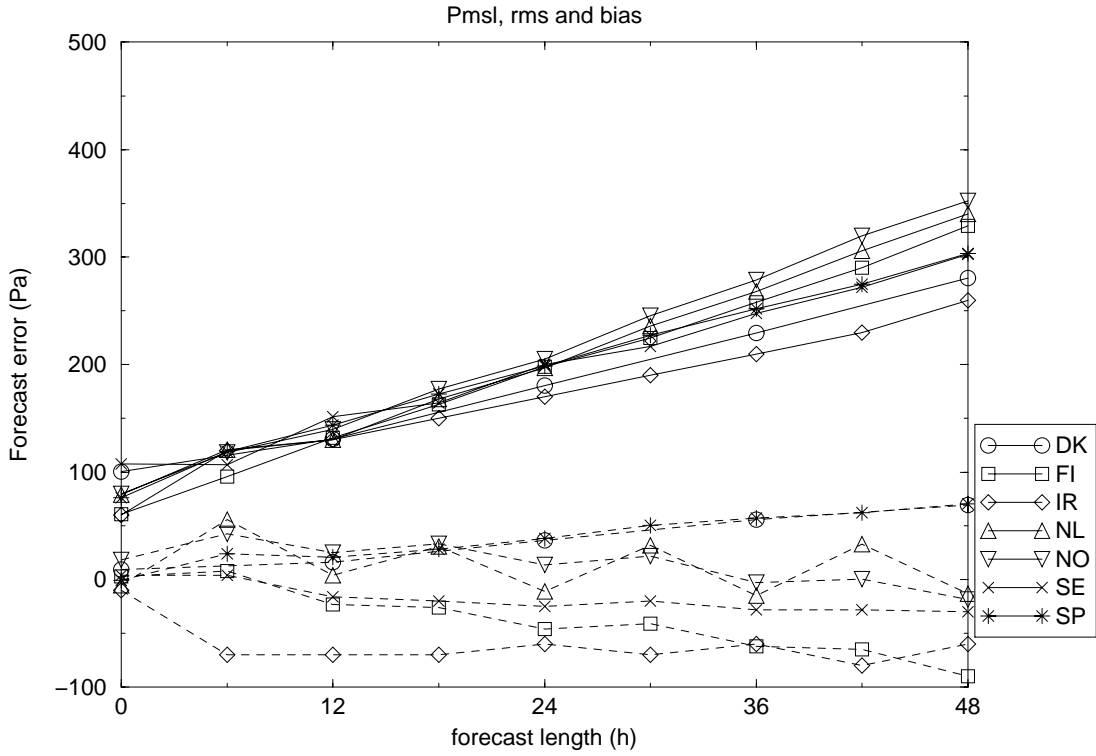


Figure 1: HIRLAM RMS errors and bias for mean sea level pressure forecasts.

HIRLAM Verifications Jan–Mar 2003

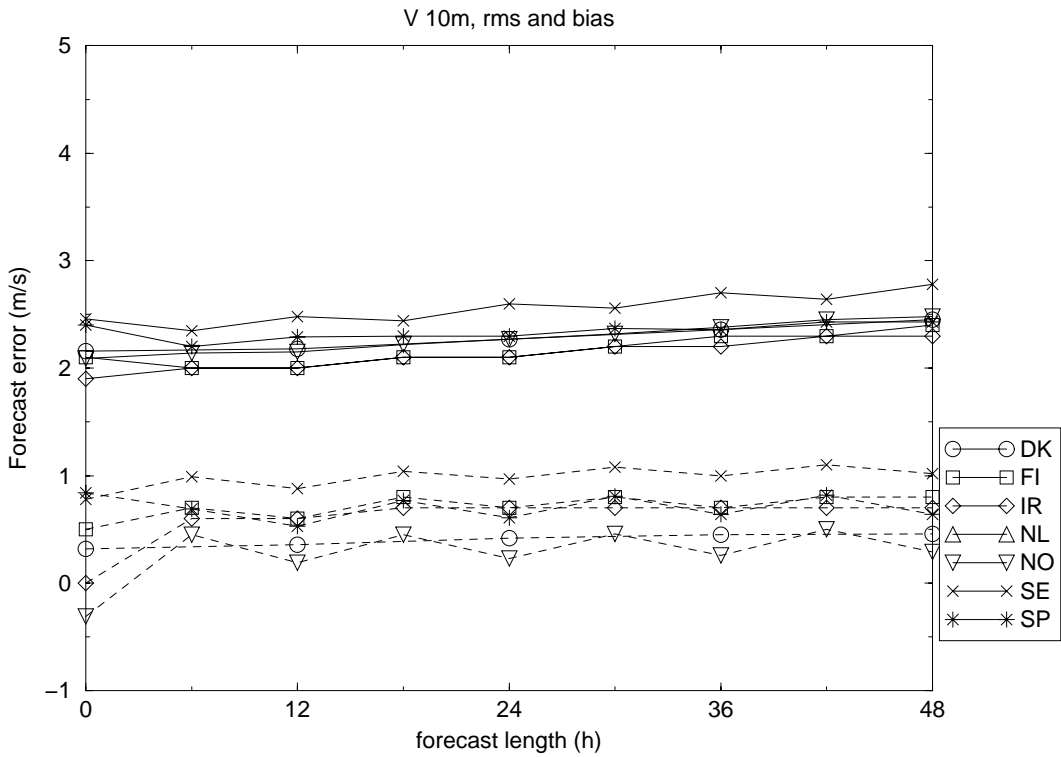


Figure 2: HIRLAM RMS errors and bias for 10 m wind speed forecasts.

3 10 m wind speed

The RMS errors of 10 m winds are slightly lower than last year's (NL38) and increase only slowly with forecast range. Most of the centres are close to each other except Sweden which has larger RMS (probably due to positive bias due to a known effect with the stable modification to CBR already used there).

Bias curves differ a bit and all are positive, with Sweden having largest bias.

4 2m temperature

The RMS errors are fairly similar to last year's and quite close together except for Norway, which used the old physics most of the period. Netherlands has lower errors than the rest.

The biases, on the other hand, are very different from last year, maybe due to the weather situation, but also some (Finland and Sweden) used ISBA. There is hardly any negative bias, rather a tendency towards positive. (In another place in this NL the Finish verifications show that during the very cold spells over snow, the positive bias was huge and this probably is reflected in these average values).

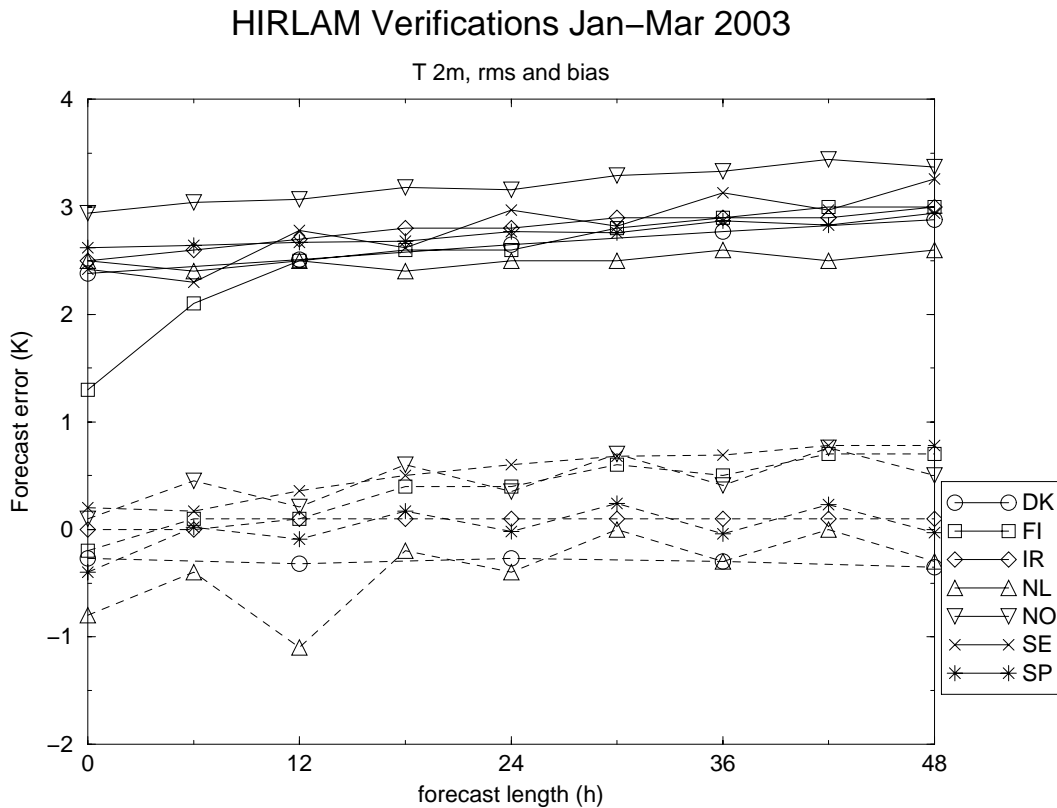


Figure 3: HIRLAM RMS errors and bias for 2m temperature forecasts.

5 Upper air verifications

The 850 hPa temperature RMS scores are this year closer together than before. In general are they similar to last year's but the the worst ones then (Finland and Netherlands) have improved noticeably. The biases are also much closer together than before and fairly small.

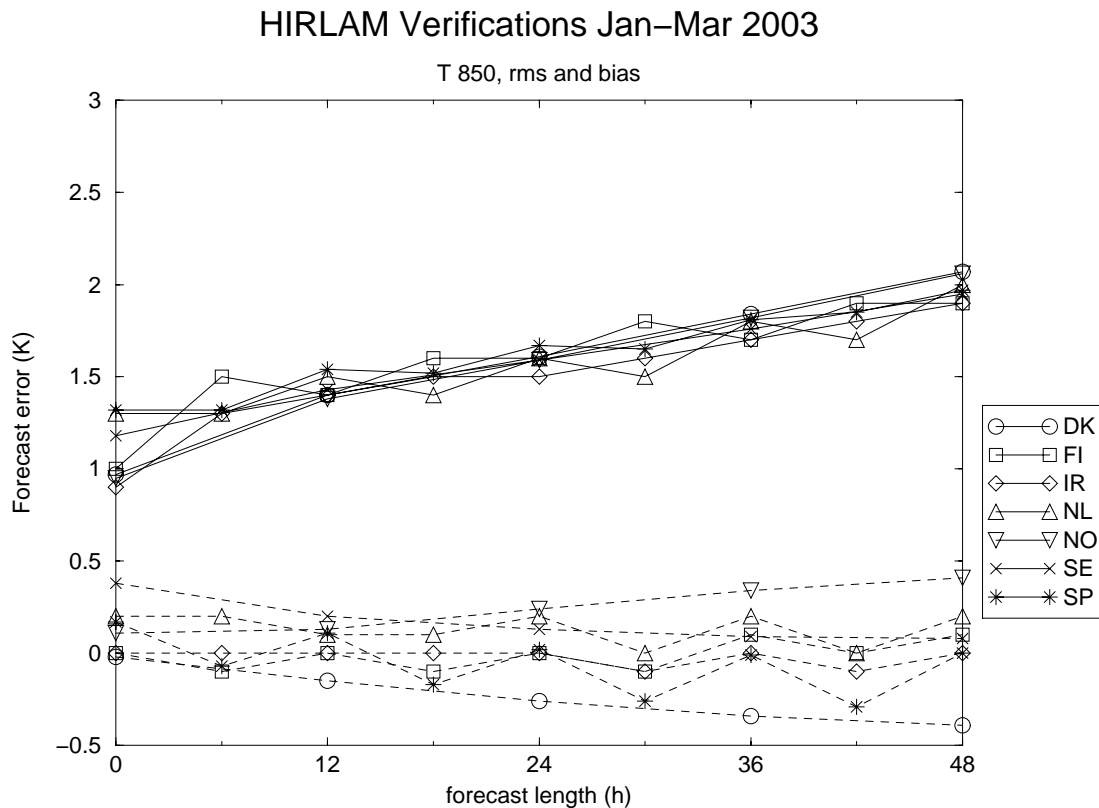


Figure 4: HIRLAM RMS errors and bias for 850 hPa temperature forecasts.

500 hPa geopotential RMS errors are quite similar to last year, although Netherlands have become worse and Ireland better than before. The biases still show quite a variation with only Ireland being noticeably negative and some others weakly positive, which is different from last year.

The 250 hPa wind RMS errors are fairly similar to last year's but show a smaller variations between institutes than before. Particularly Finland has improved (probably 3D-VAR as was suggested for other institutes last year) whereas Spain is still noticeably worse than the others (still using the old version with OI). The biases are very small and close together.

HIRLAM Verifications Jan–Mar 2003

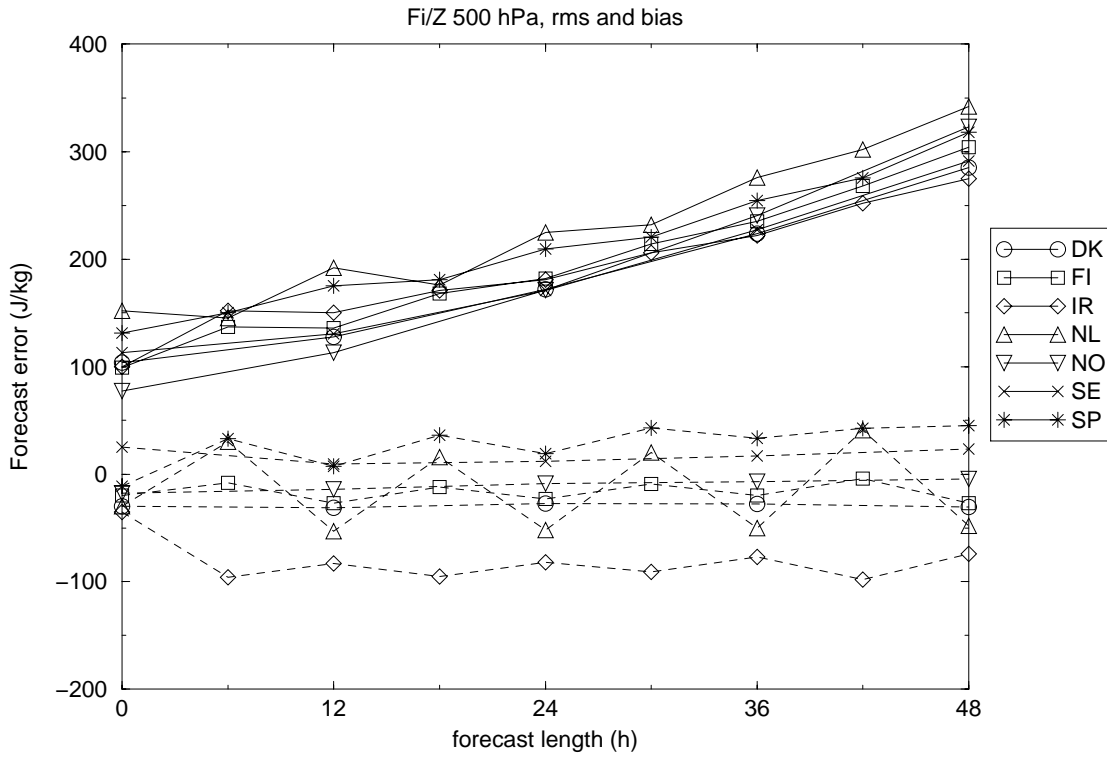


Figure 5: HIRLAM RMS errors and bias for 500 hPa geopotential forecasts.

HIRLAM Verifications Jan–Mar 2003

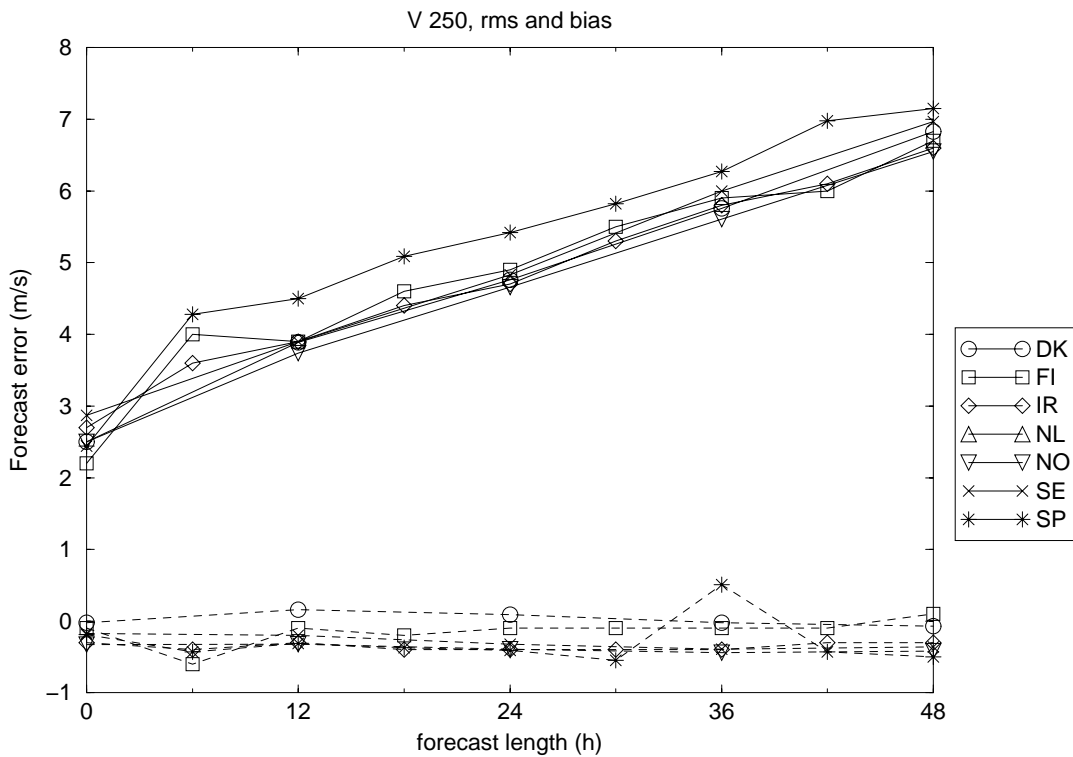


Figure 6: HIRLAM RMS errors and bias for 250 hPa wind forecasts.

6 Global models

Although the global (and non-Hirlam) models are not part of this comparison, results of ECMWF forecasts (12 UTC) have been compiled in Norway (and others) and UK forecasts by Norway. The RMS errors for mean sea level pressure are lower for the global UK model (although marginally in the beginning of the forecasts) and particularly for ECMWF, which has much lower RMS than UK (not shown).

For 10 m winds, the situation is very different and UK has larger RMS errors than DMI HIRLAM (please use the preceding figure if you to compare how others relate to DMI), and ECMWF only marginally lower errors than DMI (see below). For 2m temperature forecasts, the UK errors are quite a bit higher than the others and ECMWF has similar or marginally higher errors than DMI HIRLAM. The biases in ECMWF seem to have a diurnal cycle (which has been noticed in parallel tests with EC physics by Erik van Meijgaard and Cisco de Bruijn). The comparison with the 12h values (and the 00 + 12 UTC base time average) is of course not fair, but the other 6 hourly values do not display such a strong cycle.

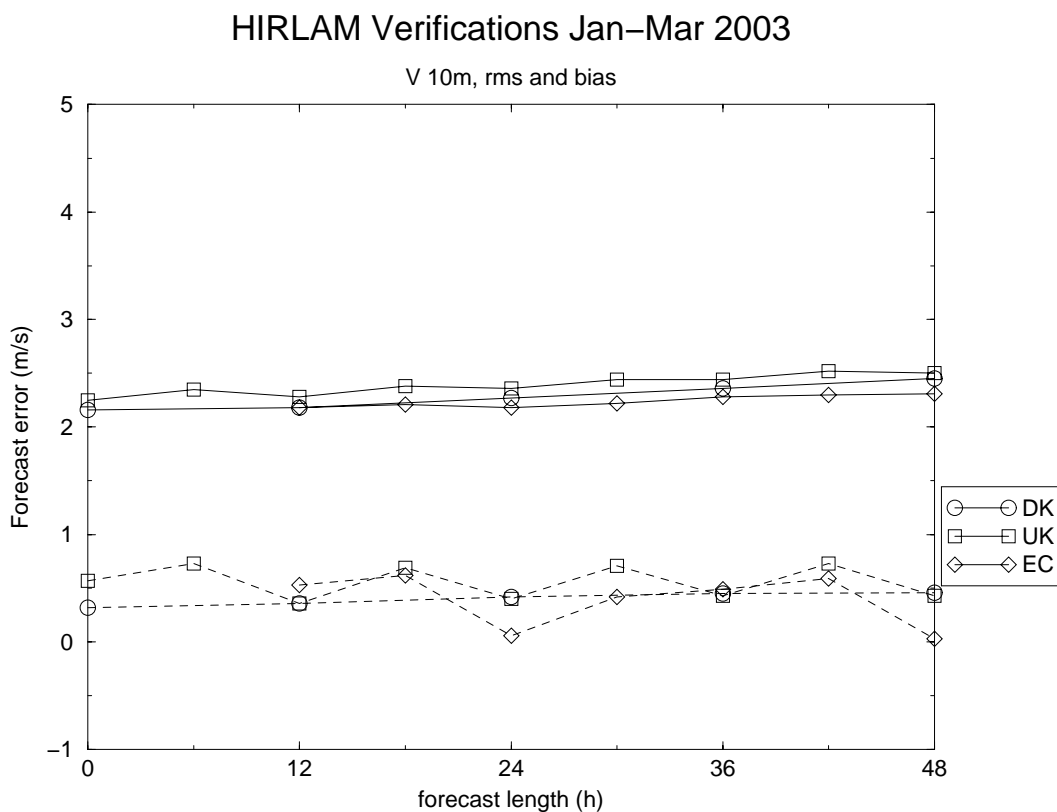


Figure 7: DMI HIRLAM, Met Office and ECMWF RMS errors and biases for 10 m wind forecasts.

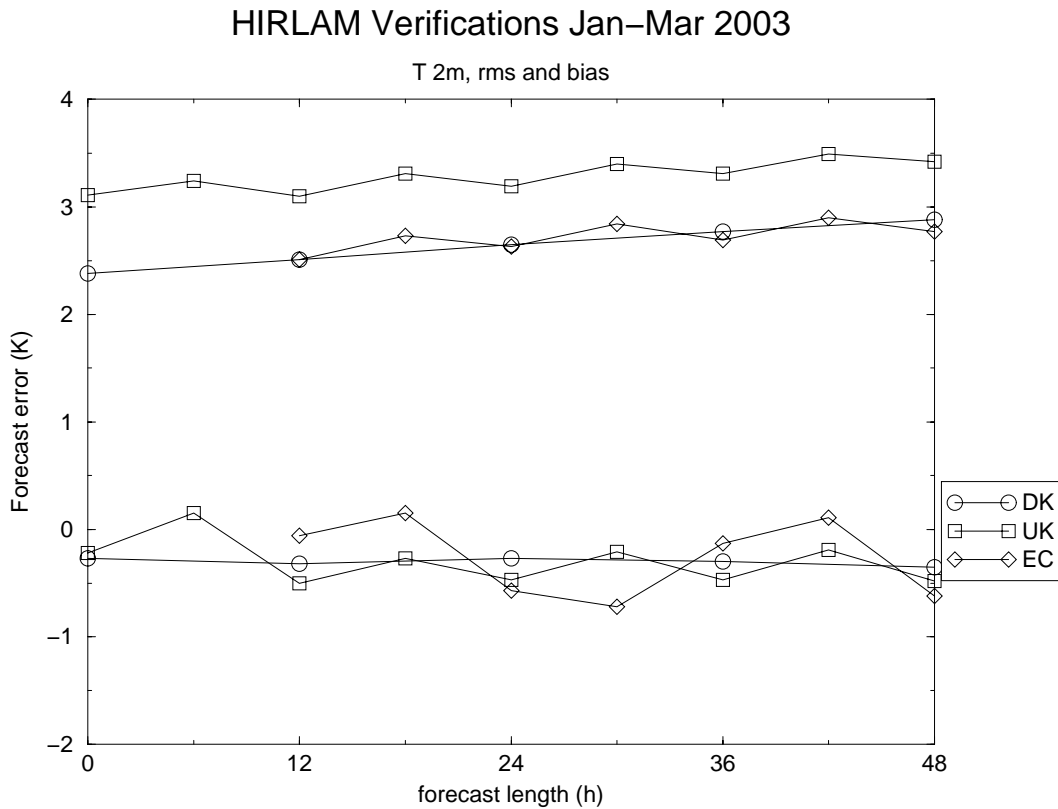


Figure 8: DMI HIRLAM, Met Office and ECMWF RMS errors and biases for 2 m temperature forecasts.