

# The ISBA scheme for HIRLAM5: latest results prior to the operational implementation

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## 1.- Modifications recently introduced in the code

Previously, different versions of the new surface parameterization based on the mosaic approach and on ISBA for the land fractions were tested for certain periods and with the old analysis package. The following set of parallel runs covers all seasons and studies the impact of both packages, surface assimilation and surface parameterization, against the reference surface.

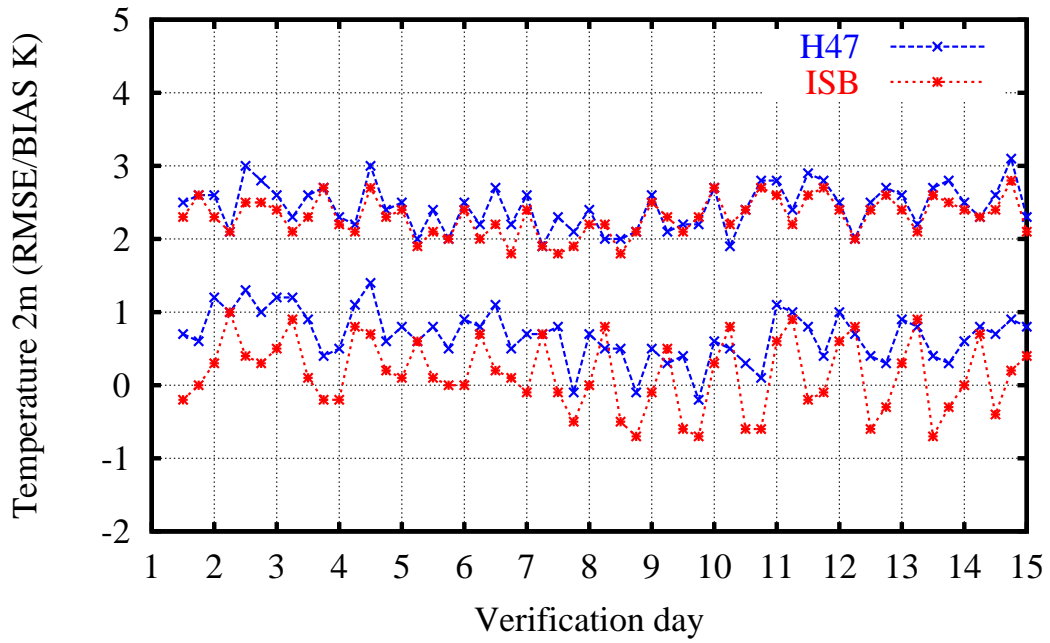
Besides the new fully re-coded surface analysis module, the following minor modifications were introduced: i) new tables for minimum stomatal resistance (the same used at the ECMWF model); ii) The maximum value of the ground thermal coefficient,  $max(C_g)$ , and the vegetation thermal coefficient,  $C_{veg}$ , was returned to  $1.2 \cdot 10^{-5}$ ; iii) Correction of a bug affecting to run-off computation; iv) Use saturation value instead field capacity to compute bare soil relative humidity:  $H_u = 0.5(1 - \cos(\pi \frac{w_s}{w_{sat}}))$  [to compensate the effect of the excessive "too frequent small precipitation"];v) Same snow formulation as in the reference surface.

Two weeks periods were simulated in each of the four seasons: i) 1-15 January 1996; ii) 15-30 April 1995; iii) 1-15 July 1995; iv) 1-15 October 1994. A reduced testing area covering most of Central Europe (65.0N, 30.0E, 2.5W, 40.5S) was chosen as integration domain. Reference was HIRLAM 4.7.2 with 0.5 degrees resolution and 31 levels.

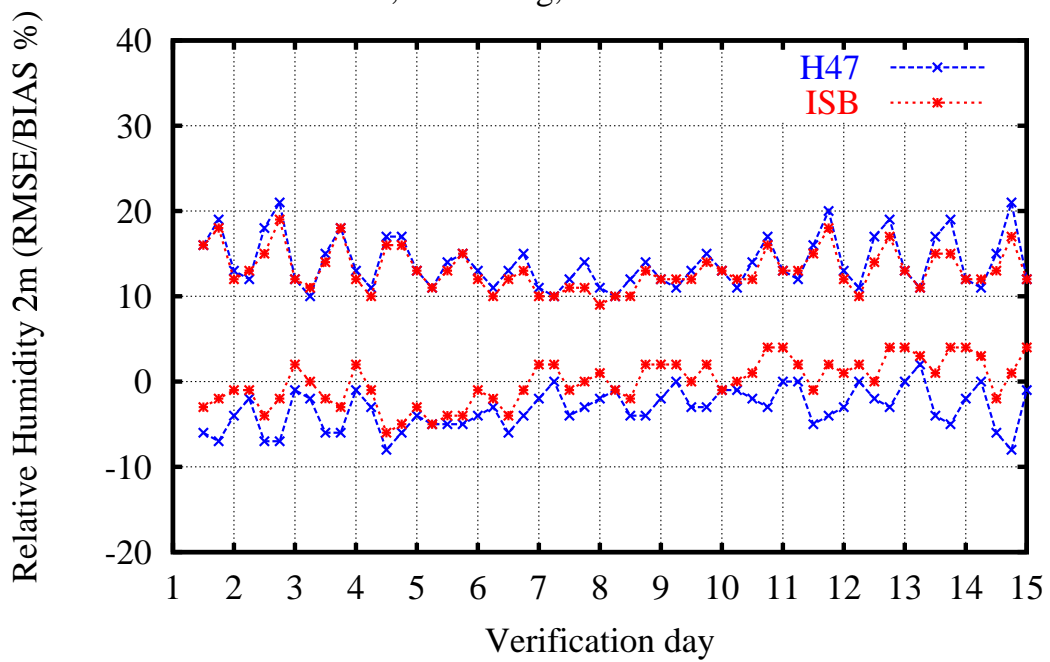
## 2.- Summary of verification

The bigger impact of the new system appears to be in the summer period, both for T2m and RH2m. Damping of the diurnal cycle is noticeable, possibly due to the averaging of T2m over all fractions (water included) in the postprocessed fields. The control of T2m and RH2m bias in "summer" periods (namely with screen variables mainly forced by soil water content) is relatively good. Some slightly positive impact on T2m of the new system is also noticeable in the winter period, possibly due to the soil temperature correction every cycle. The impact in spring and fall is approximately neutral, being better for T2m than for RH2m. The evolution of soil wetness index is smooth, not showing overcorrection of the soil water content during the assimilation process. Other set of parallel runs were also conducted using the operational area at FMI with 0.2 degrees resolution. Winter and spring simulations showed results not very much different from those shown below. However, summer simulations showed some exaggerated damping of T2m diurnal cycle and too low RH2m. Further investigation suggests that the algorithm computing the postprocessed T2m averaging from variables defined over subgrid fractions is a crucial issue in this Nordic implementation. Results from this last set of simulations will be object of a separate contribution.

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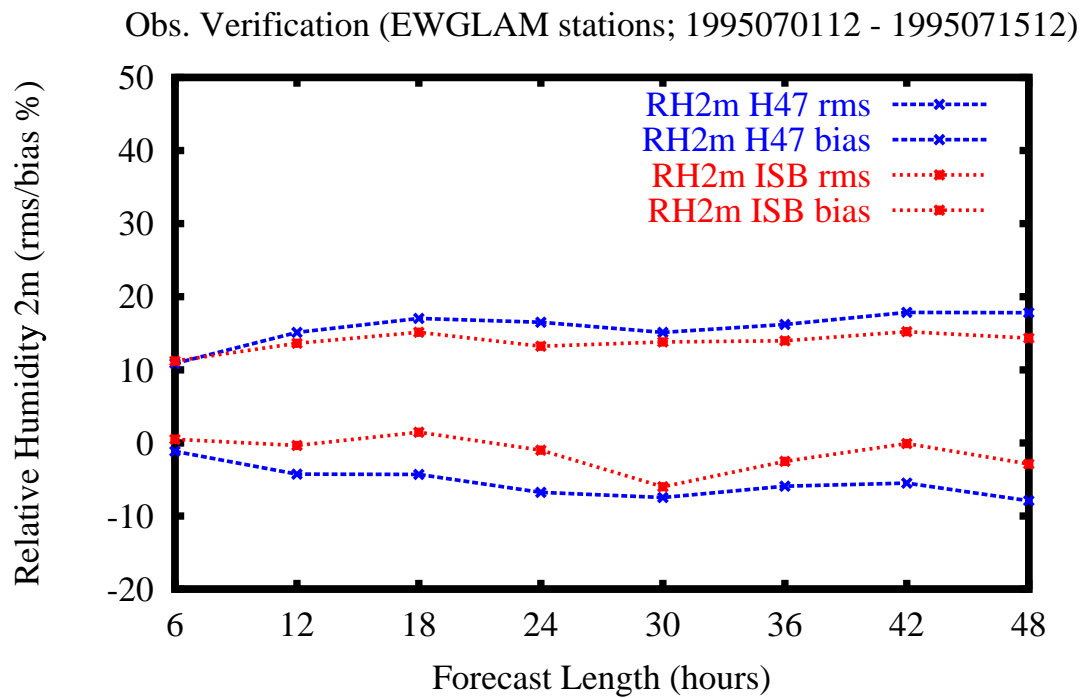
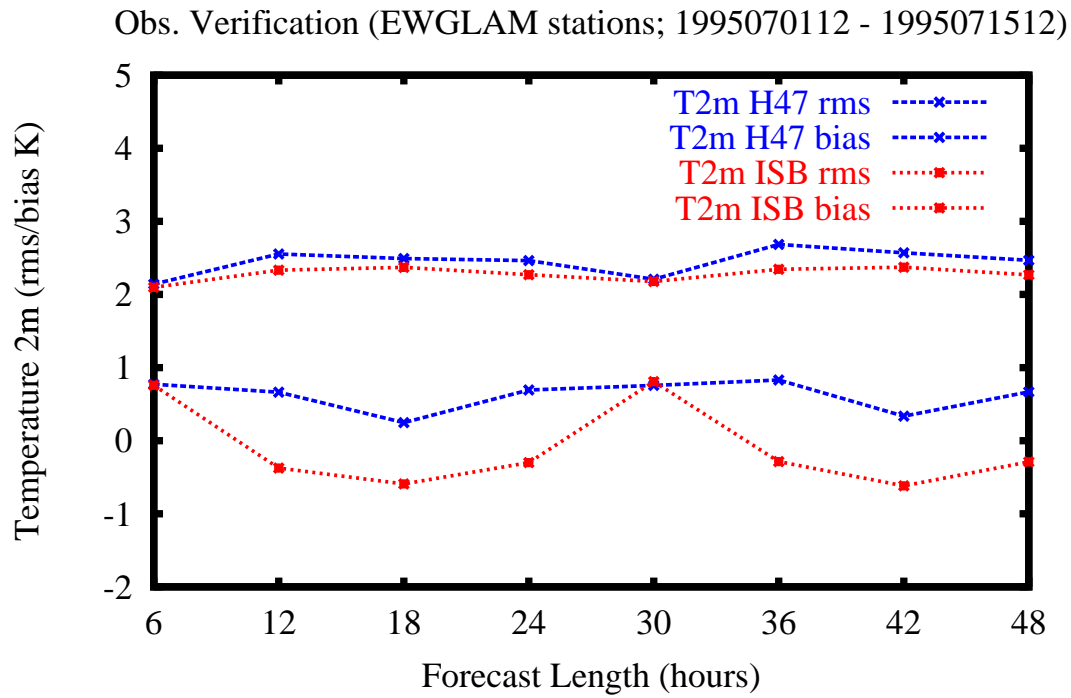
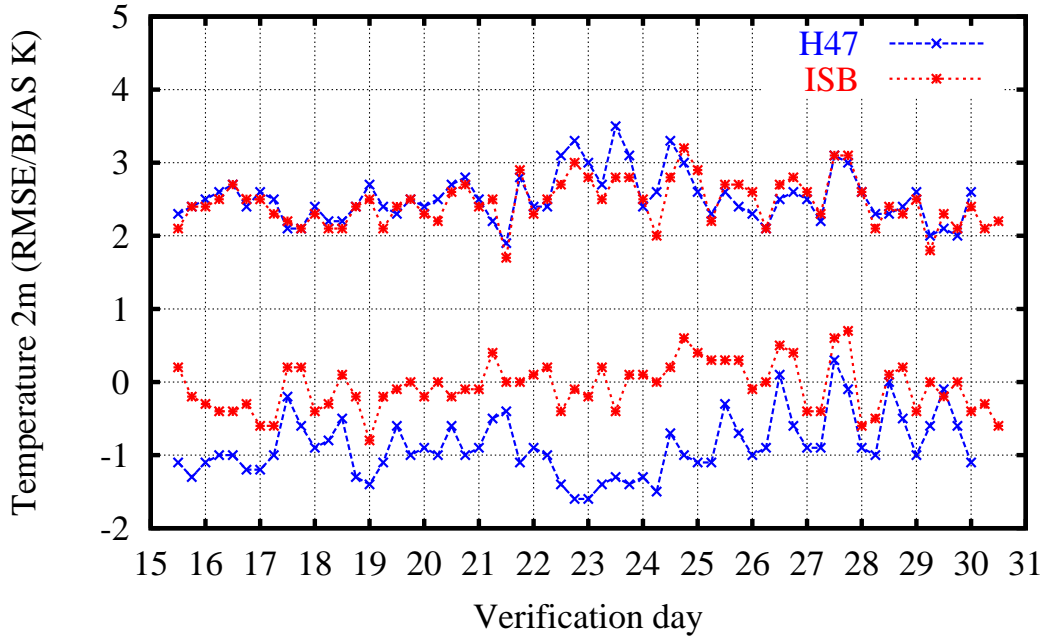
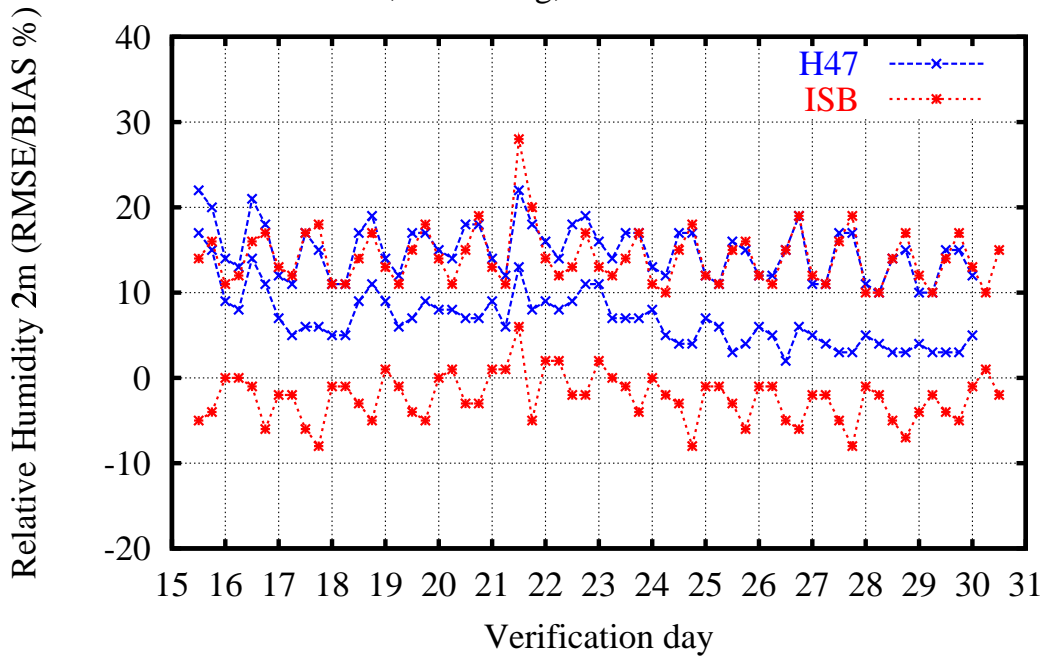


Figure 1: H+6 bias and rms error, averaged for EWGLAM stations: T2m (top, previous page), RH2m (bottom, previous page); Bias and rms error as a function of integration range averaged for EWGLAM stations. All integrations start at 00UT: T2m (top), RH2m (bottom). Experiment H47 refers to version 4.7.4 and ISB refers to the new surface package. Summer period: 1-15 July 1995

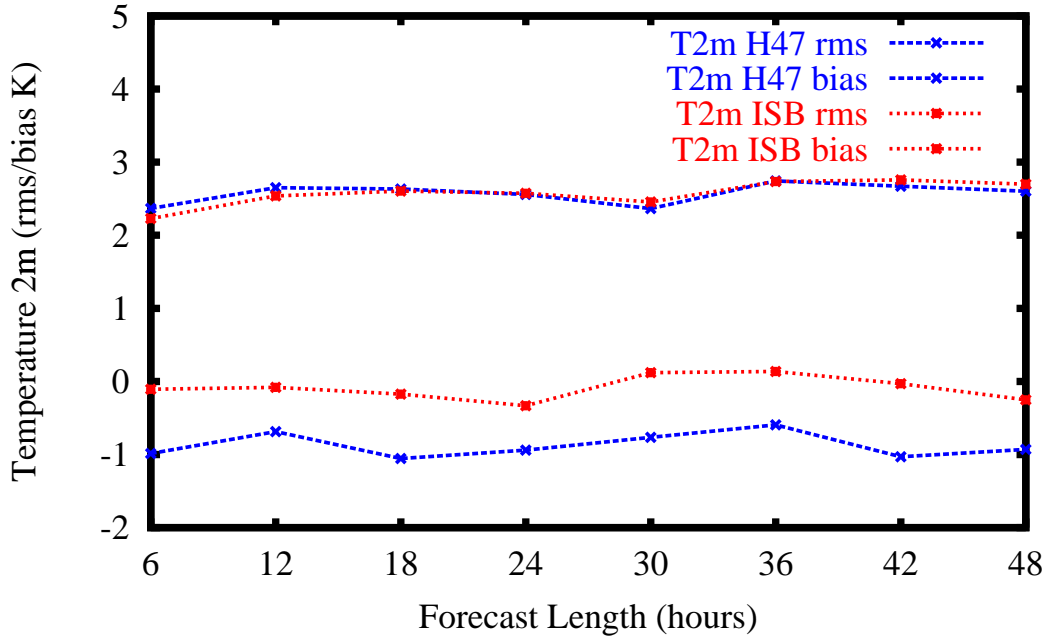
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Ver.obs.: HH+ 06, Area:ewg, Period: 1995041512 / 1995043012



Obs. Verification (EWGLAM stations; 1995041512 - 1995043012)



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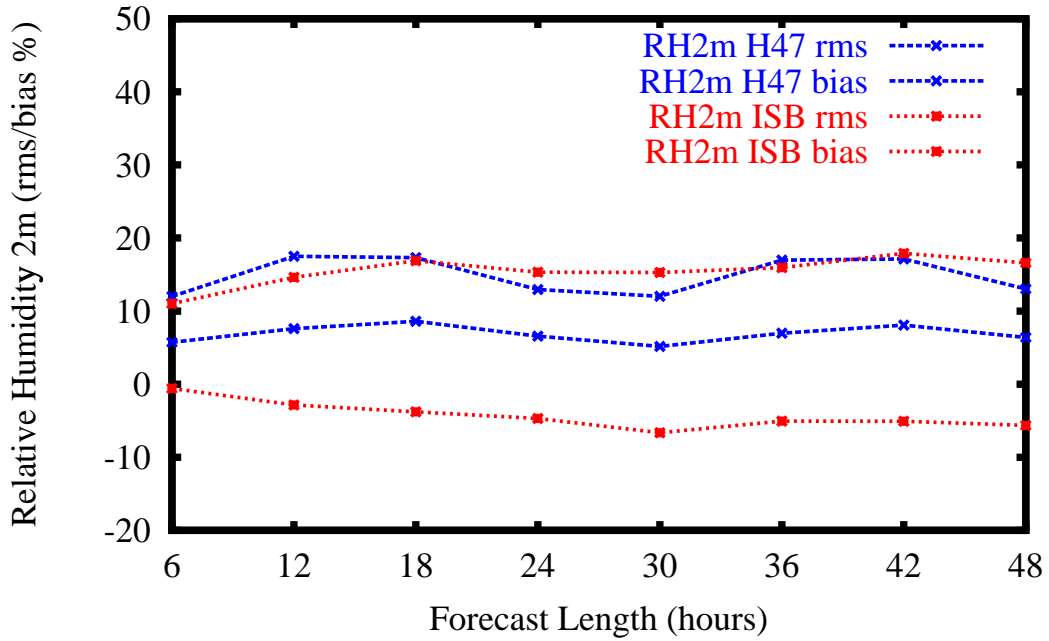
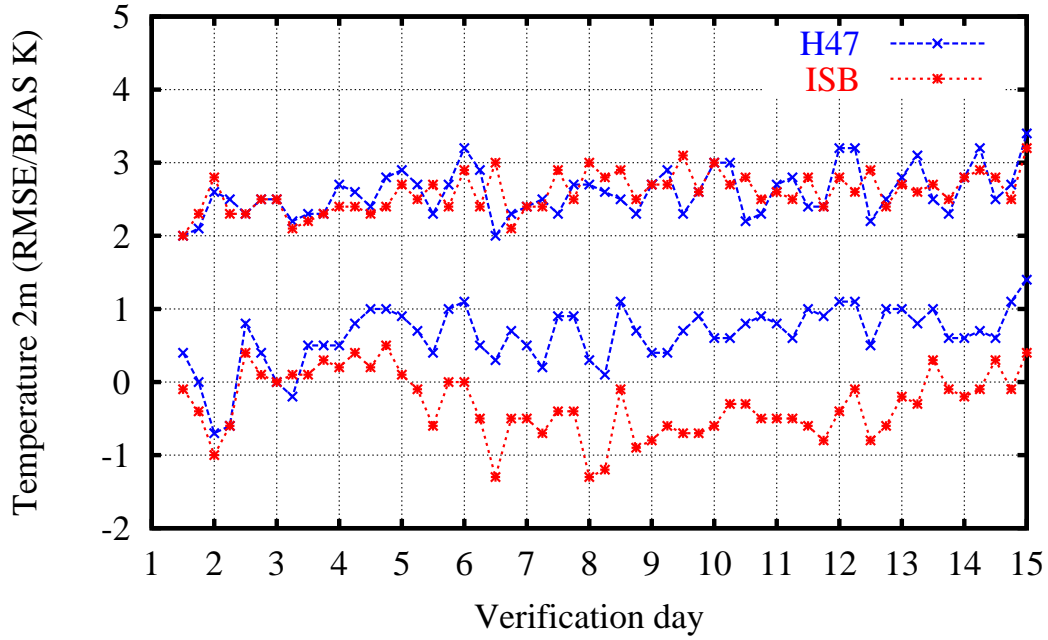
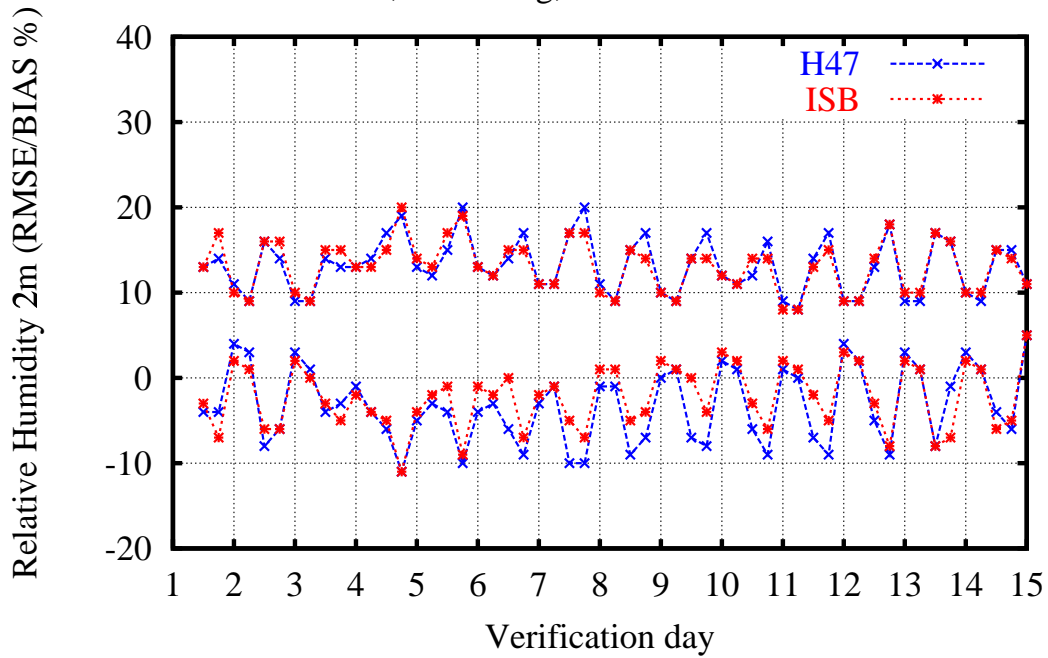


Figure 2: Same as fig. 1 but for spring period: 15-30 April 1995

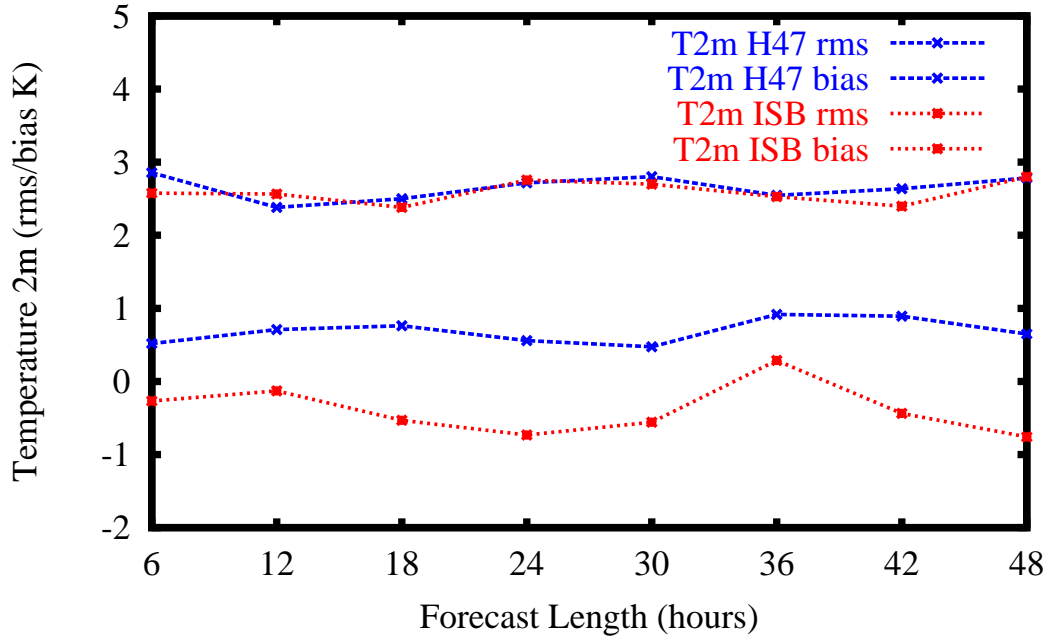
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Ver.obs.: HH+ 06, Area:ewg, Period: 1994100112 / 1994101512



Obs. Verification (EWGLAM stations; 1994100112 - 1994101512)



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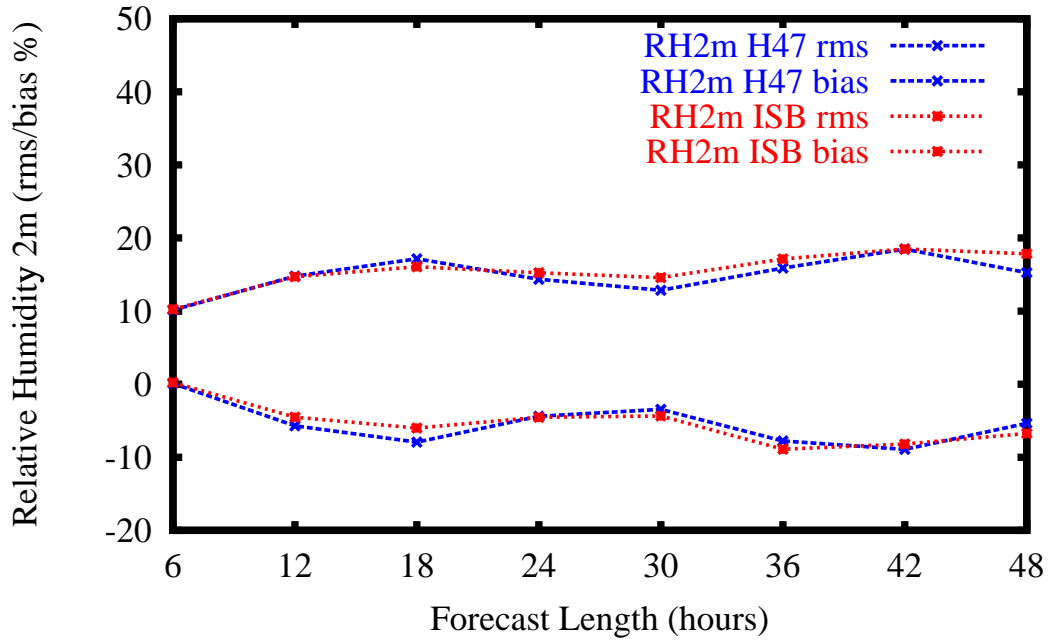
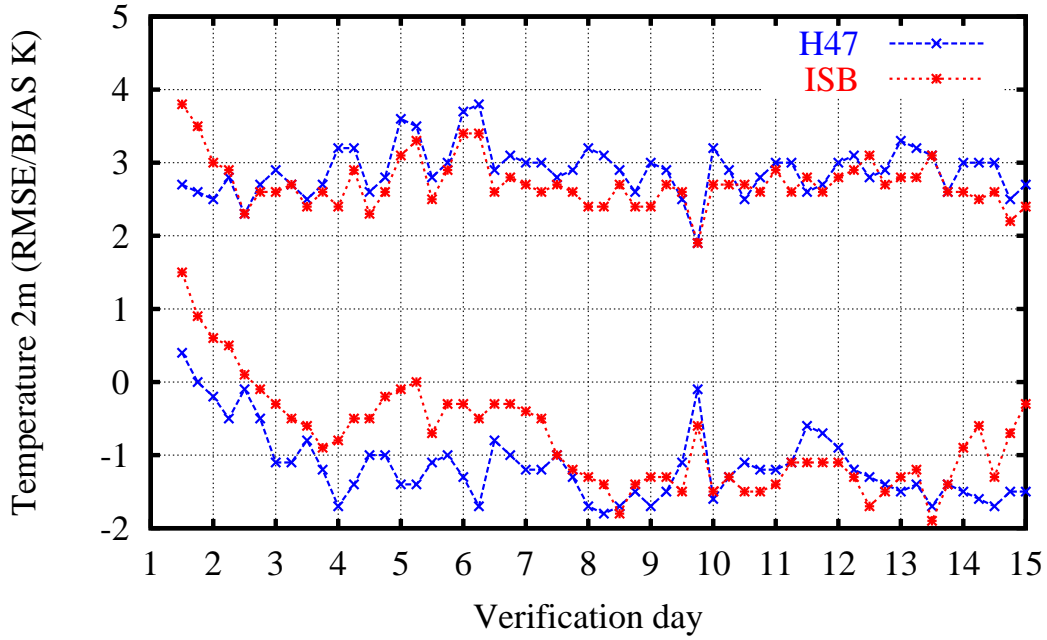
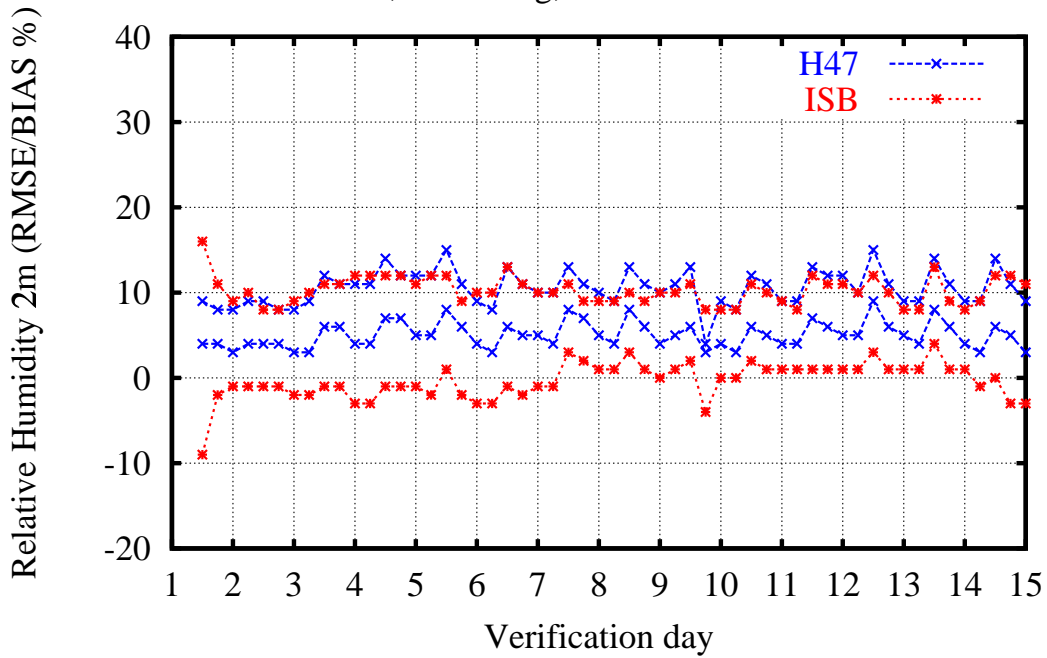


Figure 3: Same as fig. 1 but for fall period: 1-15 October 1994

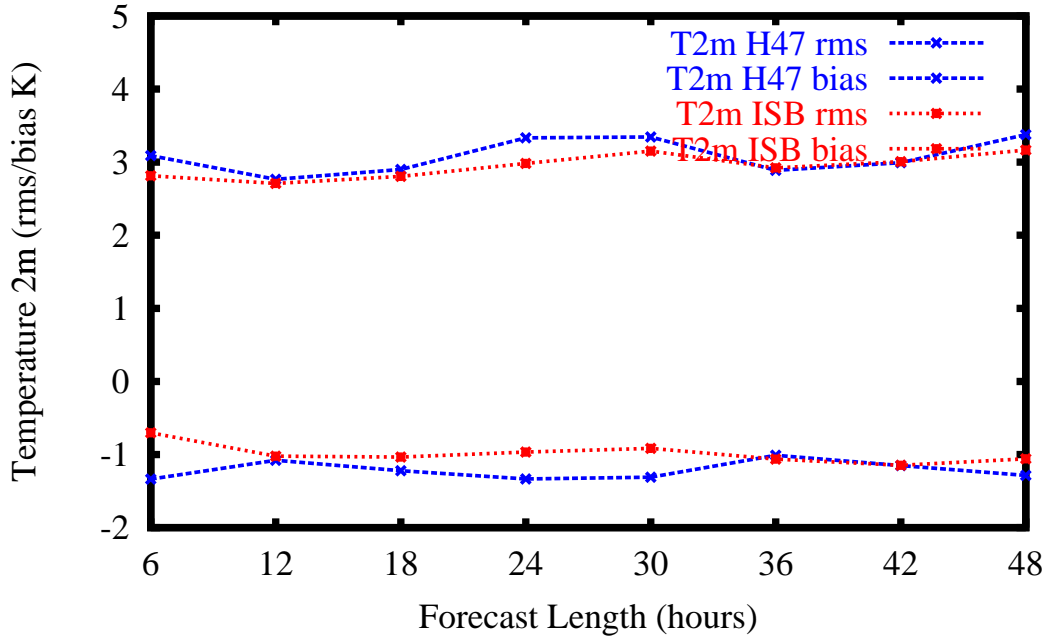
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Ver.obs.: HH+ 06, Area:ewg, Period: 1996010112 / 1996011512



Obs. Verification (EWGLAM stations; 1996010112 - 1996011512)



Obs. Verification (EWGLAM stations; 1996010112 - 1996011512)

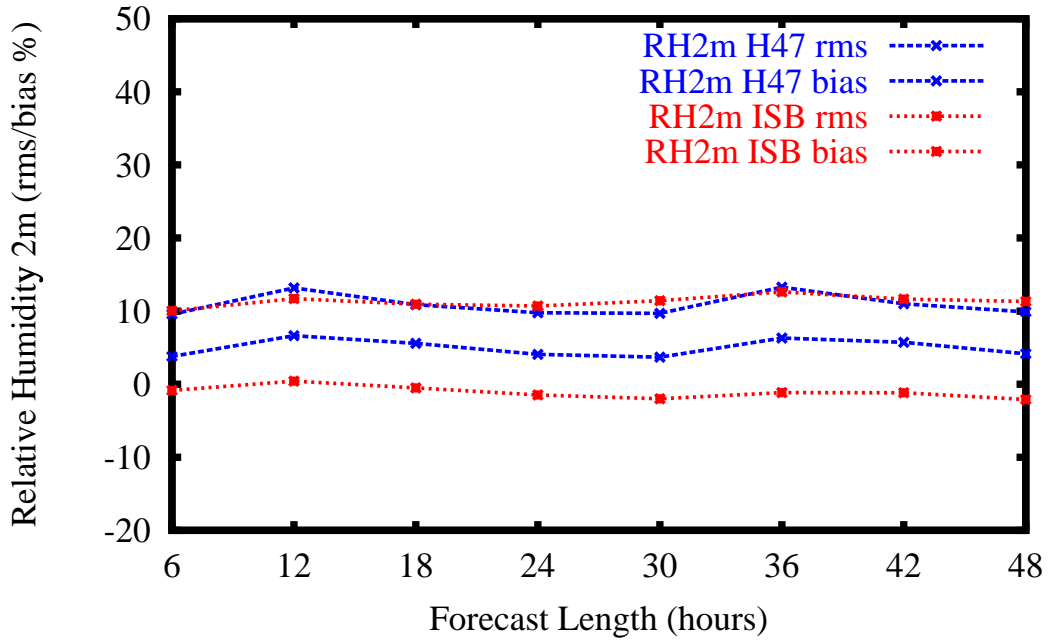


Figure 4: Same as fig. 1 but for winter period: 1-15 January 1996