Stratus clouds in wintertime anticyclones in Hungary. ECMWF model performance in last (2016-2017) winter compared to the previous years.

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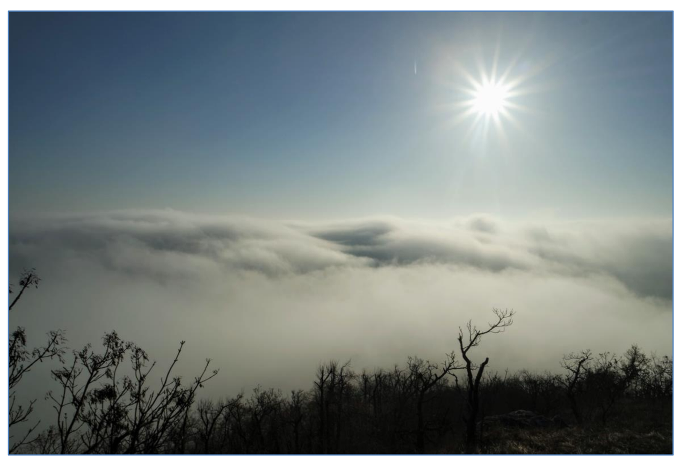
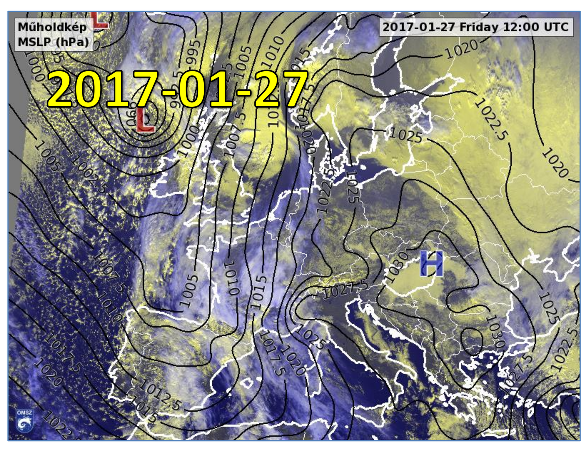
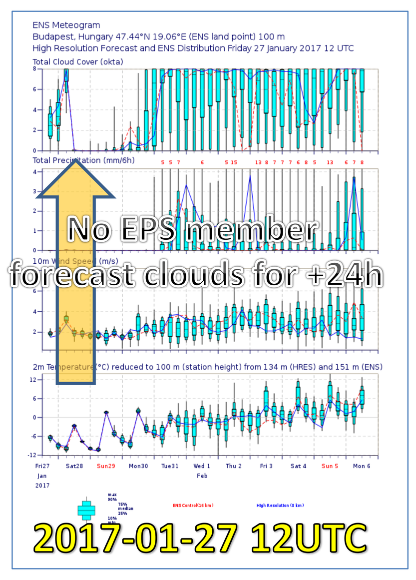
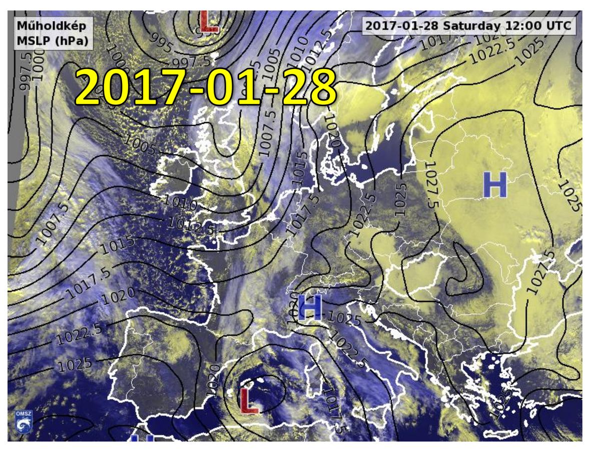


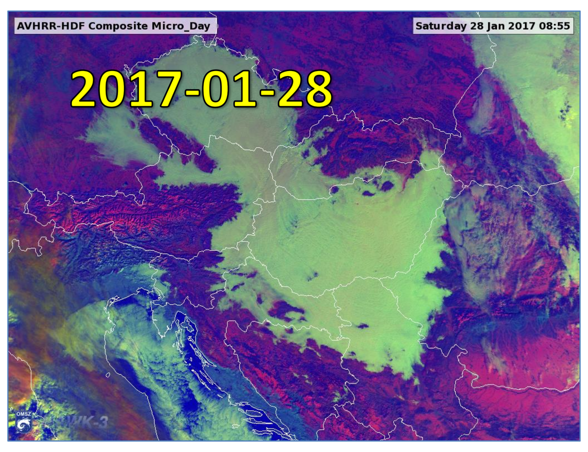
Persistent low-level stratiform clouds are frequent in wintertime anticyclones in the Carpathian Basin. Under- or overestimation of fog and stratus cloudiness in the weather prediction could cause large errors in temperature forecast both daytime and nighttime. Cloudless weather and overcast sky with possible freezing drizzle or light snowfall mean a huge difference for the customers and the general public. We find that representation of low-level planetary boundary layer clouds is still a big challenge for the ECMWF and also for our local models running with ECMWF boundary conditions.

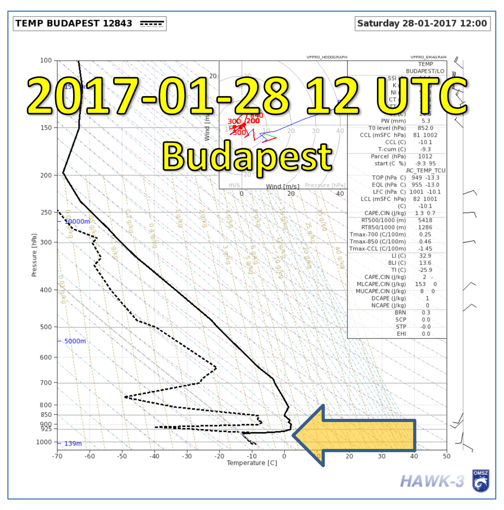
In the winter of 2016–2017, which were dominated by cold anticyclonic weather regimes, ECMWF (both HRES and ENS) underrepresented fog and low clouds in many cases. Conditional occurrences of large forecast errors were investigated according to airmass characteristics, flow regimes to find reasons for particularly high number of days with serious underestimation of low level cloudiness in 2016-2017 winter.

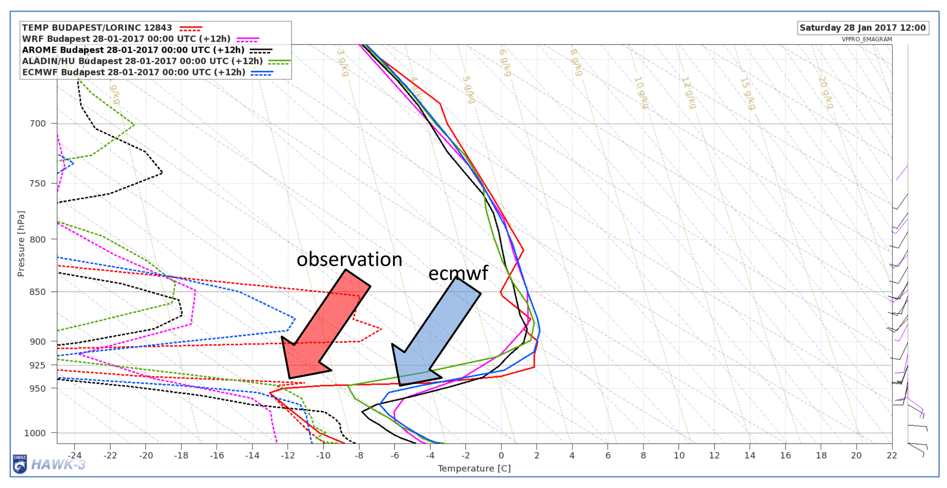




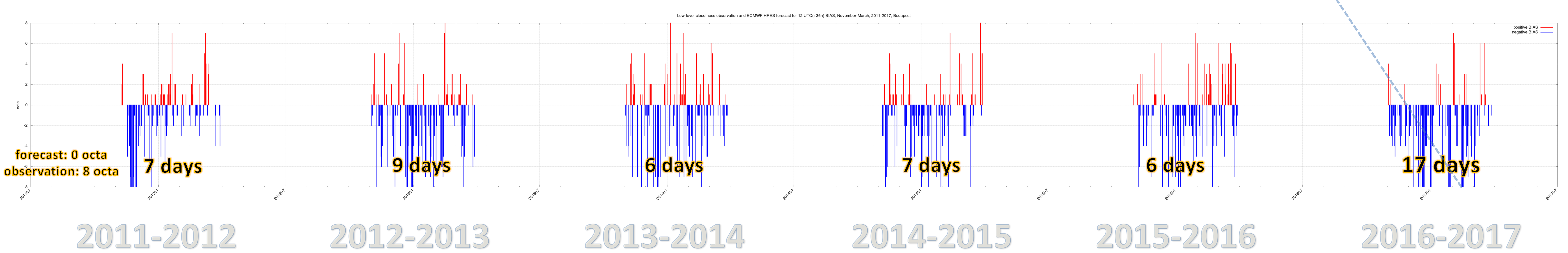




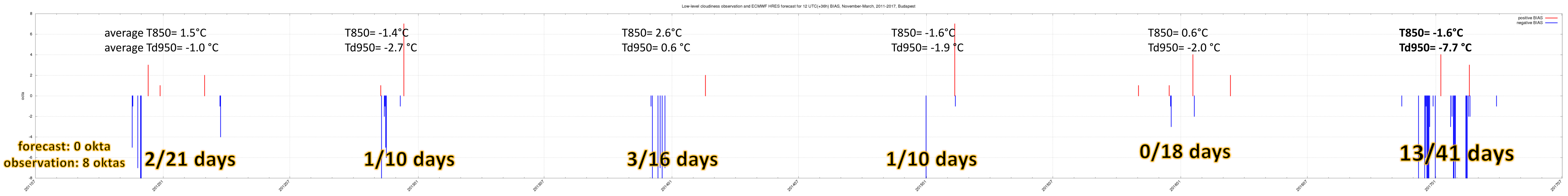




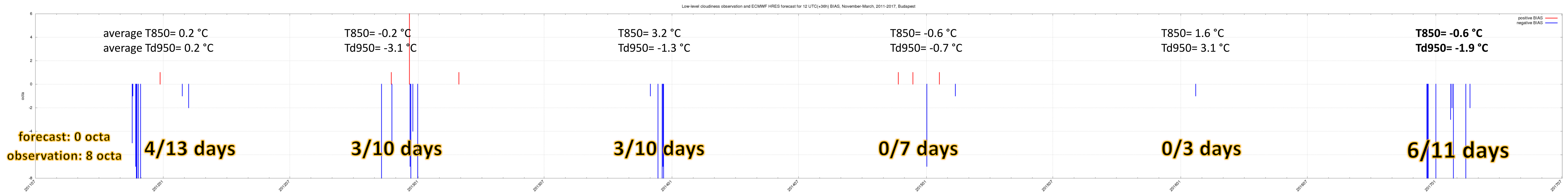
BIAS in low-level cloudiness forecast at 12 UTC (HRES +36h) for Budapest (November - March)



Anticyclone center over Hungary. 41 days in 2016-2017, but the rate of large error days (13/41) still the highest in last winter



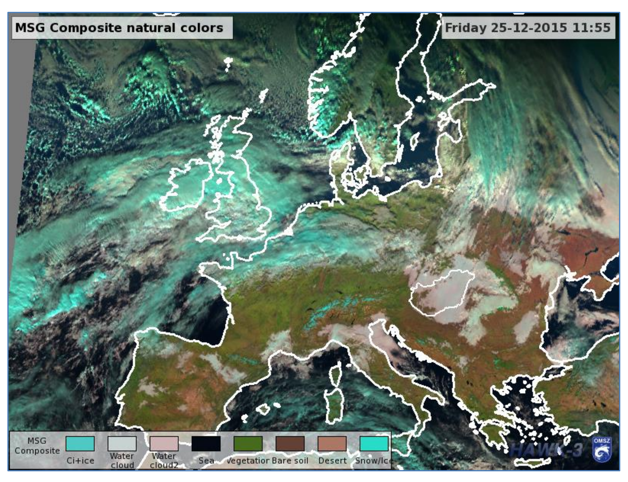
BIAS in cases with RH800hPa < 40% and RH950hPa > 85% at 12 UTC (dry mid-troposphere but high relative humidity in low levels in analysis)

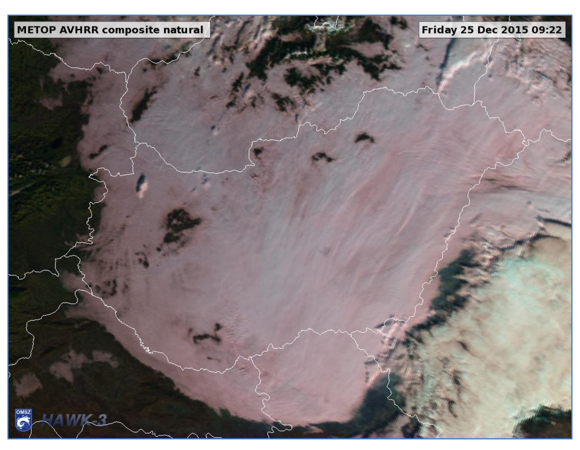


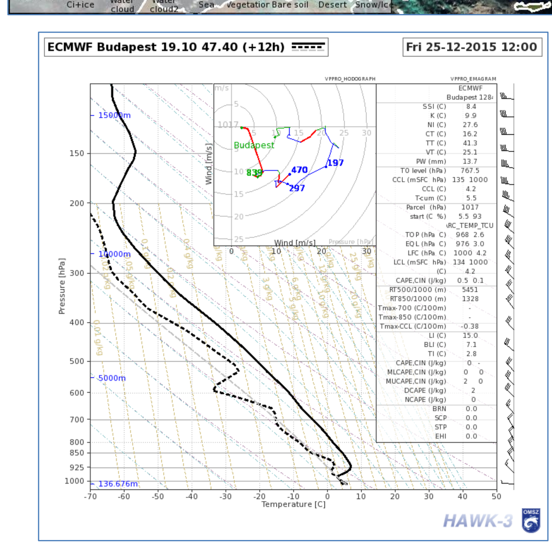
The question remains: What was different in 2016-2017 winter in Central-Europe?

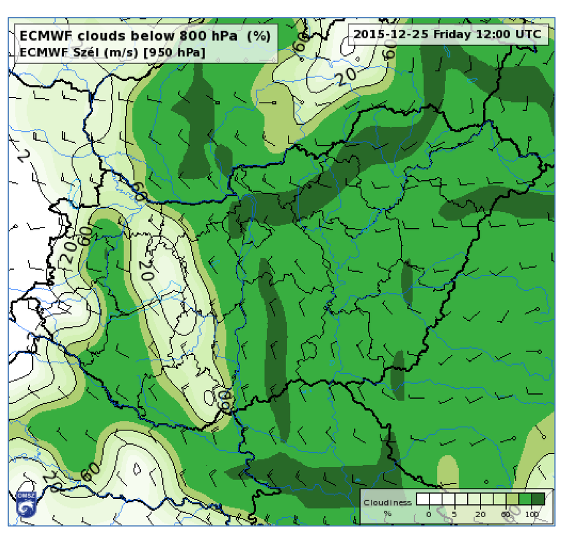
- **Different flow regimes and airmass characteristics which were difficult to handle by ECMWF ?**
- **Recent changes in the physical parametrization in ECMWF ?**

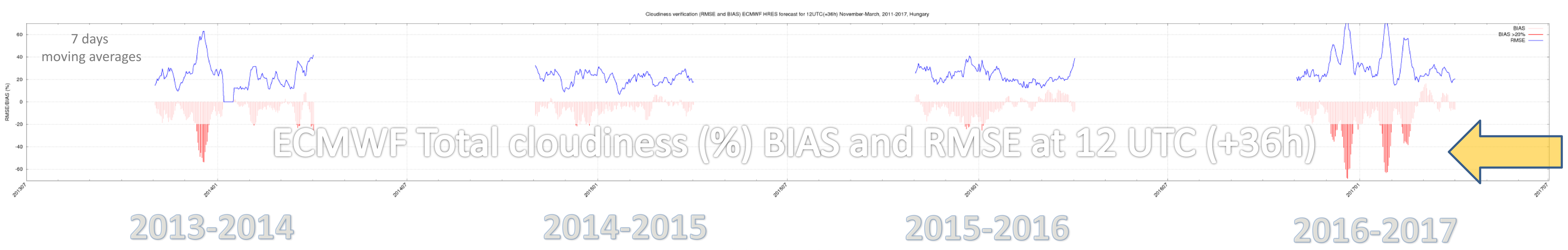
a successful forecast from 2015

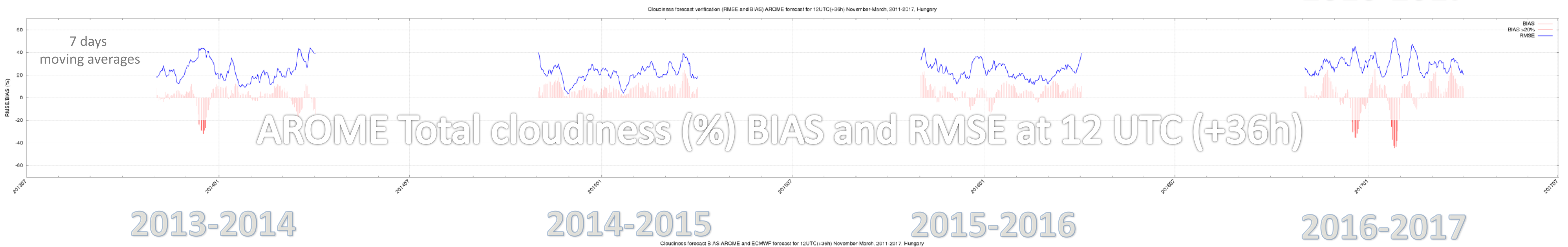


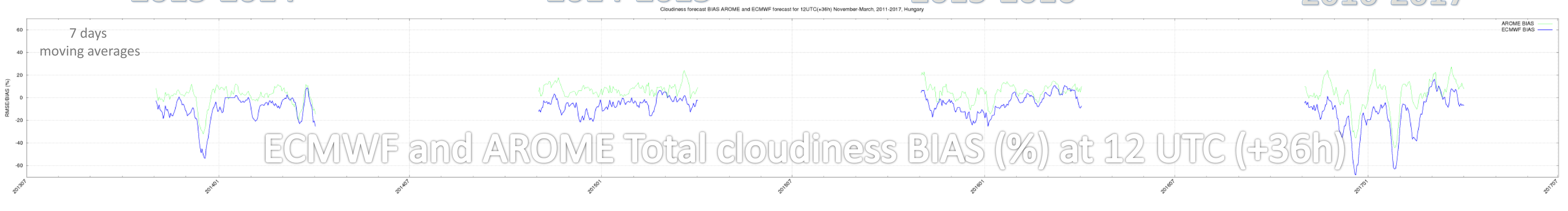












ECMWF/ALADIN/AROME Total cloudiness BIAS (%) in the first 48h (from 00UTC)