Verification of 2m Temperature in the Emilia-Romagna region

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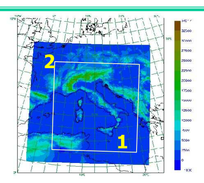
COSMO-I7 configuration

Forecast range: 72 hours

Horizontal resolution: 7 Km

Initial time of model run: 00 UTC - 12 UTC

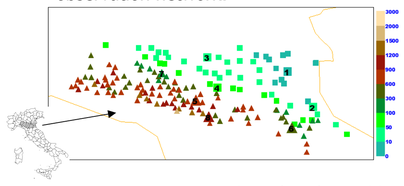


Integration domain
(1 previous – 2 actual)

	OPERATIVE NAME (ARPA-SIM)	MODEL VERSION		LEVELS	I.C. & B.C.	INTEGRATION DOMAIN
2005 ↓	2031	3.9	NUDGING	35	GME	234x272 points (1)
26/01/2006 ↓	3032	3.16	NUDGING & PROG.PREC.	40	GME	234x272 points (1)
25/01/2007 ↓	4032	3.16	NUDGING & PROG.PREC.	40	GME	297x313 points (2)
02/04/2007 ↓	4034	3.16	NUDGING & PROG.PREC.	40	ECMWF	297x313 points (2)

Observations dataset

Emilia-Romagna ARPA-SIM observation network:



170 temperature sensors: 56 at altitude ≤ 100 m; 114 at altitude > 100 m

The numbered stations are used as example of the different behaviour of the forecasted temperature respect to the height :

#	name	heigth
1	OSTELLATO	0
2	S.ZACCARIA	10
3	ROLO	24
4	VIGNOLA	96
7	PANNOCCHIA	181
6	CIVITELLA	450
5	POLINAGO	755
8	MONTEACUTO	915

Methodology

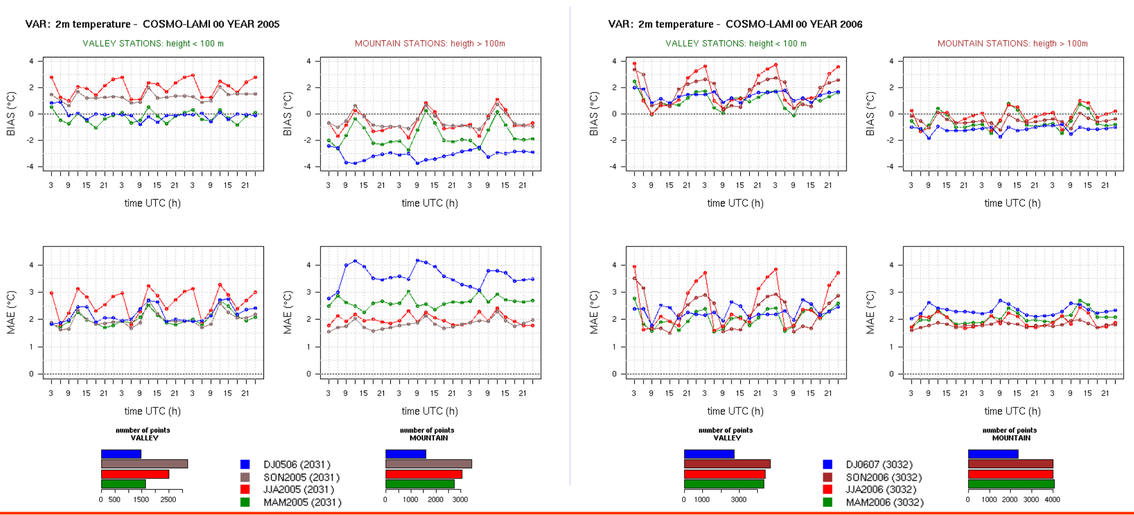
- Nearest grid-point comparison
- No corrections for the differences in height between station point and grid point. When this difference exceeds 50 m, the point has not been considered in the computation
- Land-sea mask is used
- Stratification depending on the altitude of the station : plain (below 100 m) mountains (above 100 m)
- Verification step: 3h

Indices used:

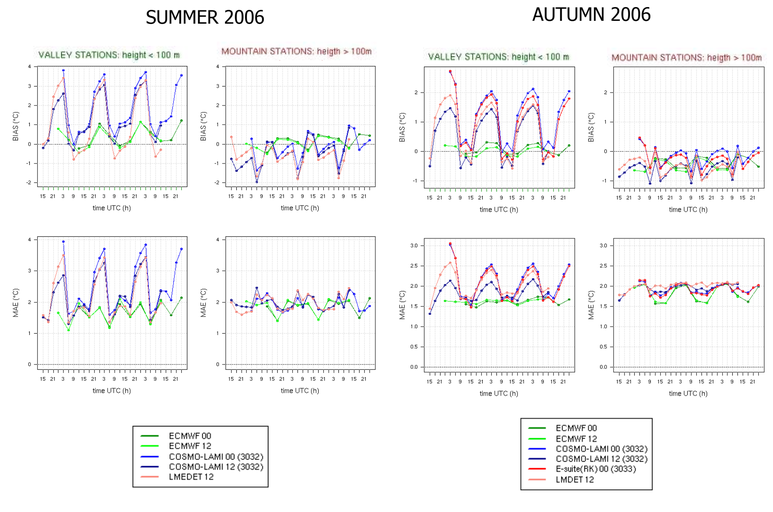
$$bias = \frac{1}{n}\sum (f_i - o_i)$$

$$mae = \frac{1}{n}\sum \left| f_i - o_i \right|$$

Summary verification results for years 2005 and 2006



Comparison with other models

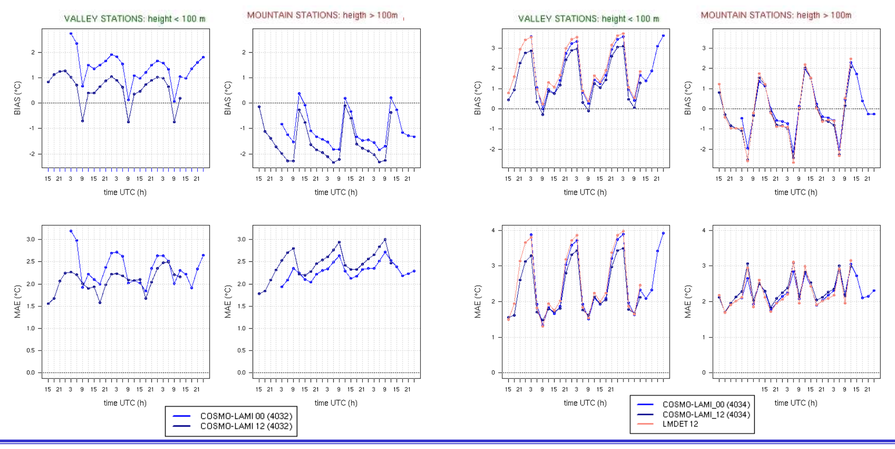


OPERATIVE NAME (ARPA-SIM)	FEATURES
E-suite(RK) (3033)	as COSMO-I7 (3032) with Runge-Kutta scheme run starting time:00 UTC
LMDET (reference version of COSMO-LEPS)	~ 10 Km HORIZONTAL RES. 40 VERTICAL LEVELS I.C.&B.C.: ECMWF NO NUDGING COSMO-LEPS INTEGRETATION DOMAIN run starting time:12 UTC
ECMWF	GLOBAL MODEL ~ 50 Km HORIZONTAL RES. run starting time: 00 & 12 UTC

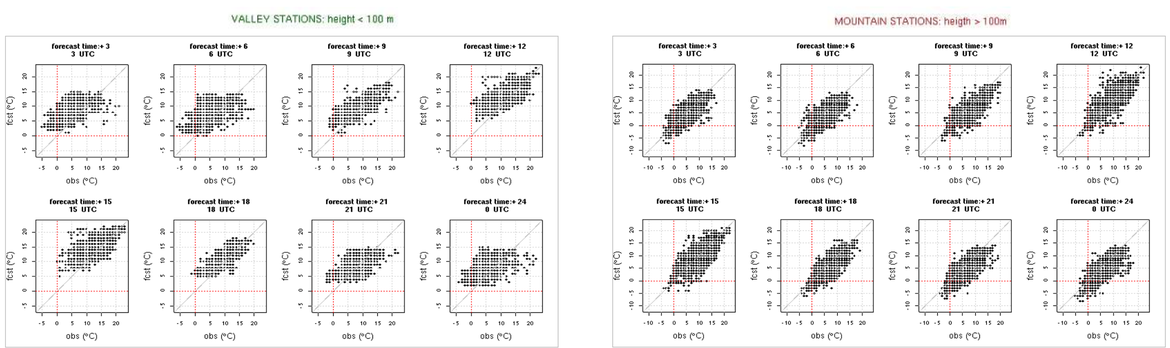
TO NOTE:

- great difference between +3h forecast of the COSMO I-7 00 UTC and 12 UTC runs
- strong positive bias during nigh time of all the COSMO models in valley stations

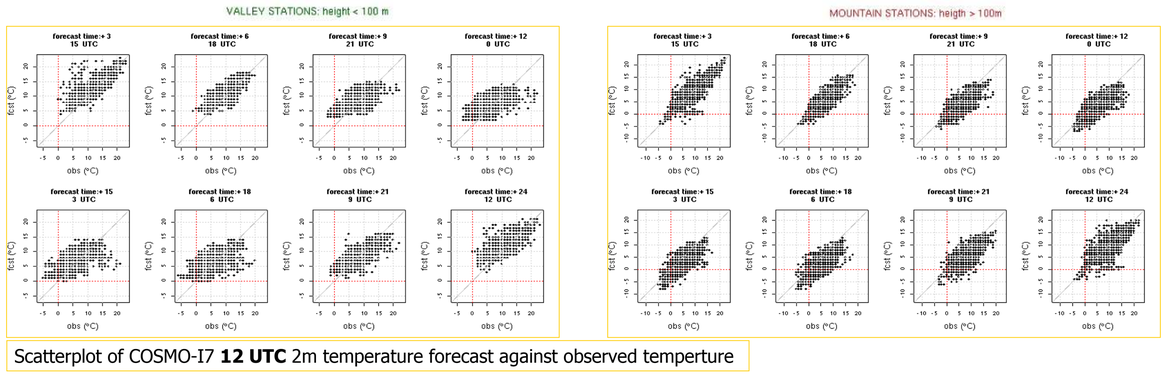
Verification results for year 2007



February – March 2007: qualitative analysis



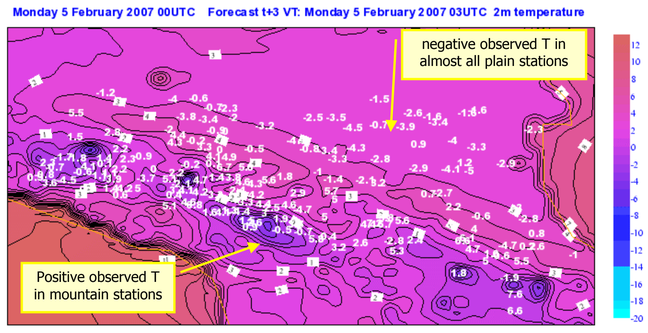
Scatterplot of COSMO-I7 **00 UTC** 2m temperature forecast against observed temperture



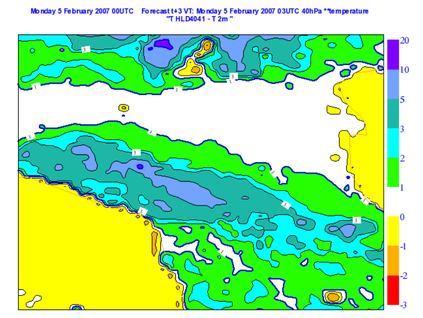
Scatterplot of COSMO-I7 **12 UTC** 2m temperature forecast against observed temperture

Remark upon COSMO-I7 2m temperature in plain region:

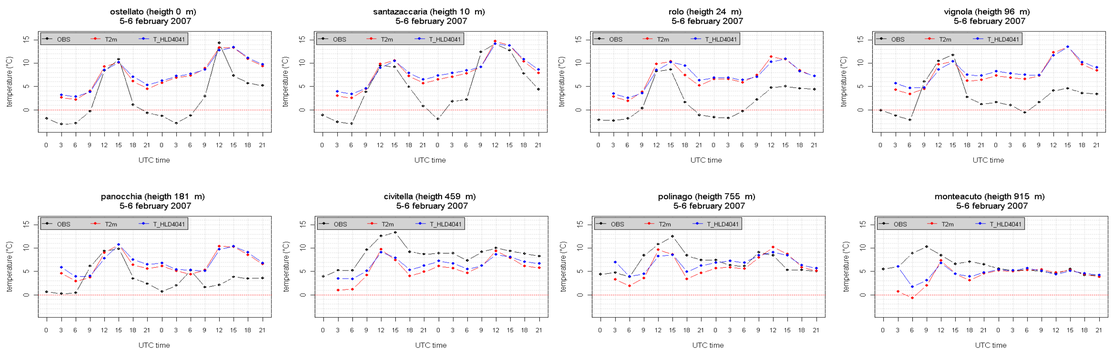
- **tendency to overestimate 2m T in particular during night time**
- **no negative temperature below zero were forcasted in the period February-March 2007 despite some observed frosts**
- **example: 5 FEBRUARY 2007**



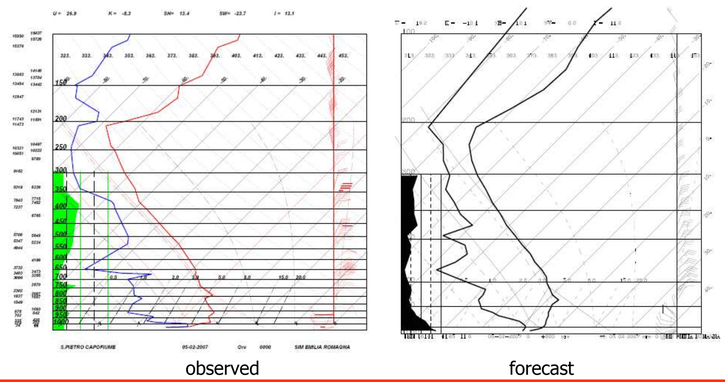
COSMO-I7 2m temperure (+3h) - Observed value in yellow



Difference between lowermost level tempeature and 2m T of COSMO-I7 +3 forecast (20070205 0300UTC)



Forecast 2m T and lowermost T (HLD4041) of COSMO-I7 00 UTC and observed temperature in 10 stations at different altitude (see dataset map for the geographical position)



observed

forecast

Sounding Diagrams at S.Pietro Capofiume [16144] of 20070205 00 UTC (the sounding stations is located in the plain near Bologna)