



Upper Air and surface parameter verification in Italy: general remarks and specific studies

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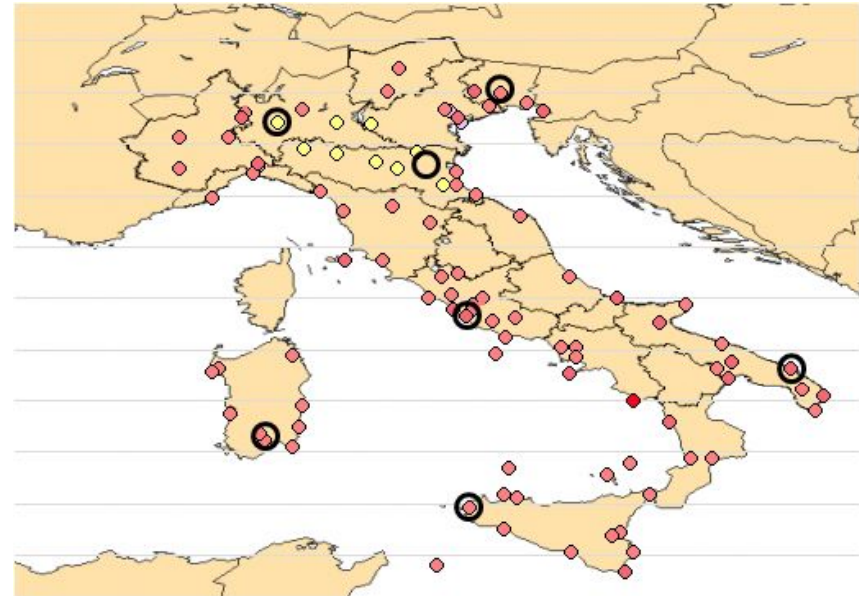
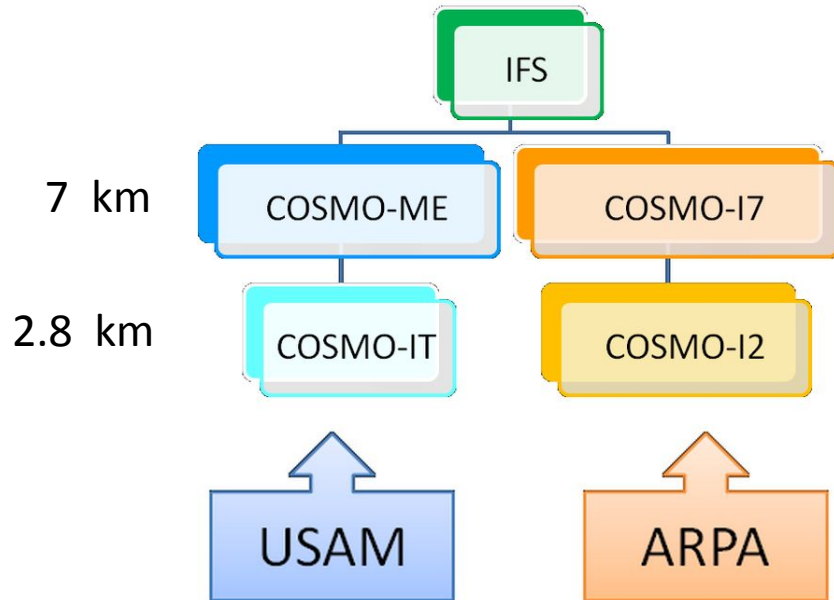
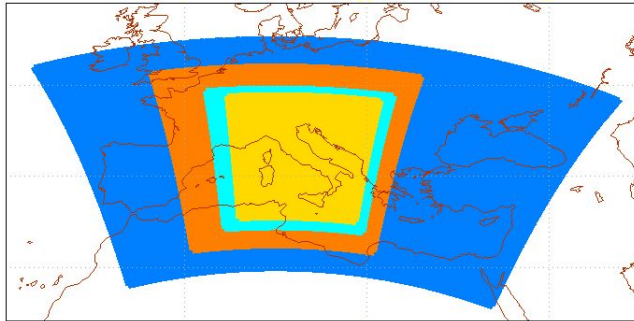


Outline

- **Operational Verification in Italy:**
 - with VERSUS (Standard, Upper Air, Conditional of T, Td, TCC, TP, WS) by CNMCA/ARPA-ER
 - with High Resolution rain-gauges (TP) by ARPA-Piemonte /ARPA-ER (see Elena Oberto presentations)
- **Very interesting results but in this presentation will focus on:**
 - **Upper air verification of TEMPERATURE and WIND SPEED**
 - Comparison of COSMO-I7 and COSMO-ME
 - Investigation on the connection between vertical profile temperature and surface parameters errors (namely 2m Temperature and MSLP)
 - This interest arise from particular situation noticed during operational forecast work at Arpa-ER , such as too high maximum temperature of COSMO-I2 or missing temperature inversion during nighttime both from COSMO-I2 and I7 ...
 - **Specific studies about some “peculiarity” of COSMO models in the Po Valley**
 - Differences between 7 Km and 2.8 Km models
 - Cosmo-I7 /Cosmo-I2
 - Cosmo-ME Cosmo-IT
 - » Cosmo-2 (thanks to CH colleagues)



Datasets

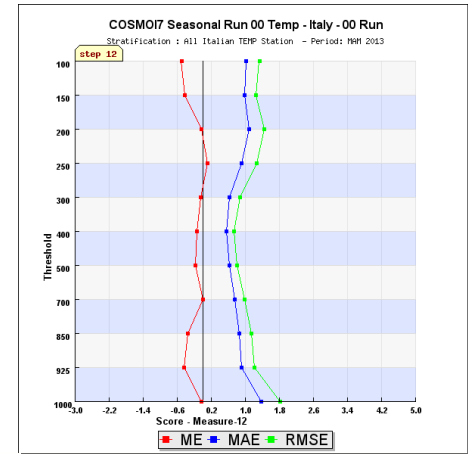
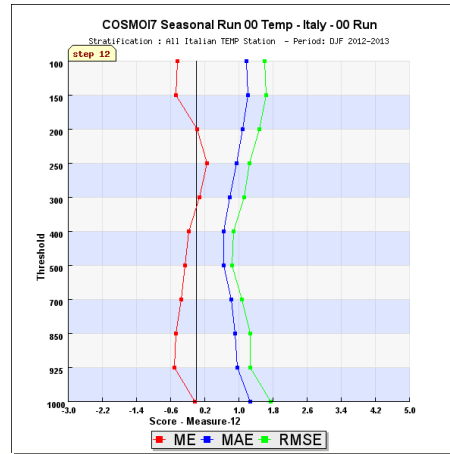
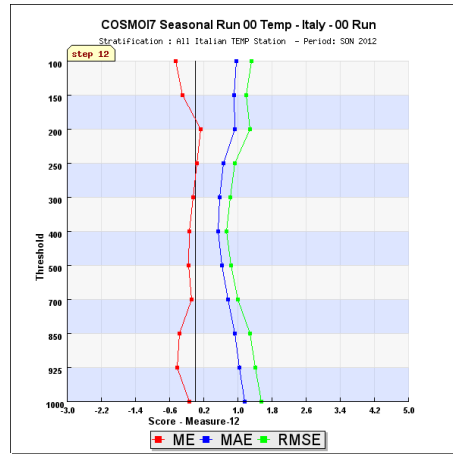
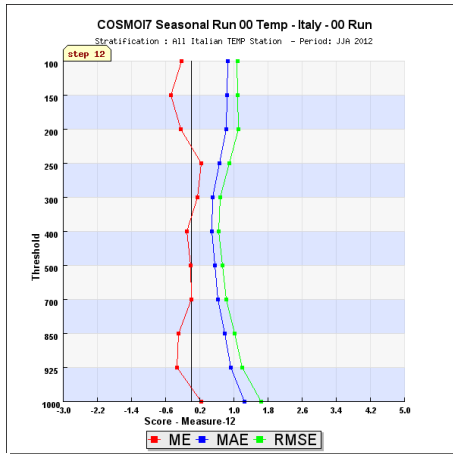


Surface stations:

- All Italian Stations (~130)
- Po valley Stations (9)
- Sounding Stations (7)
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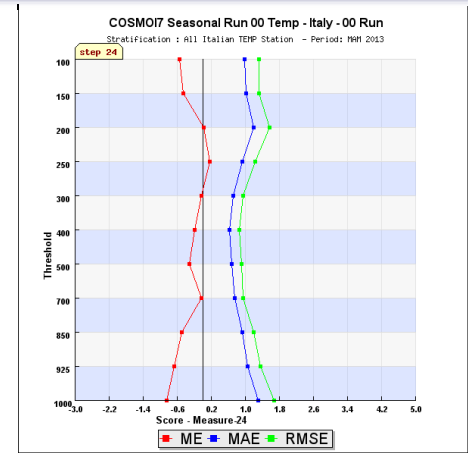
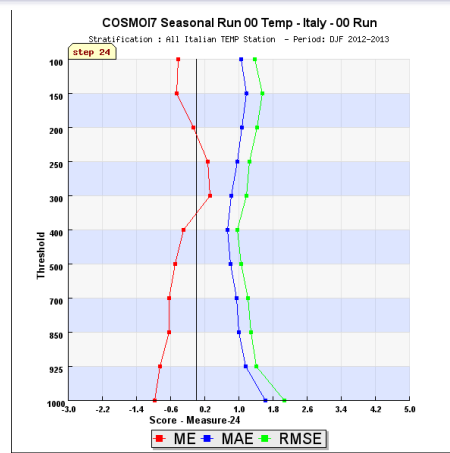
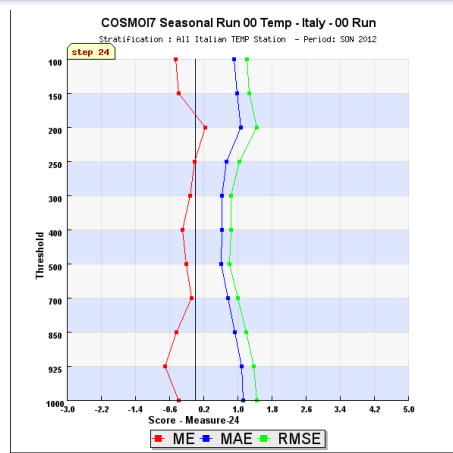
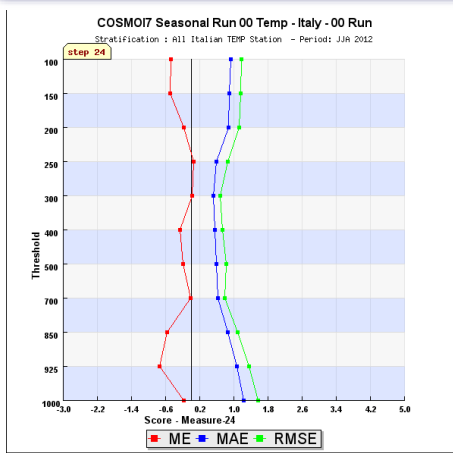
Upper air: Temperature cosmo-17



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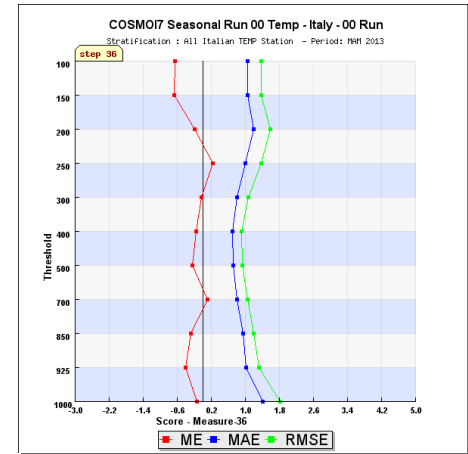
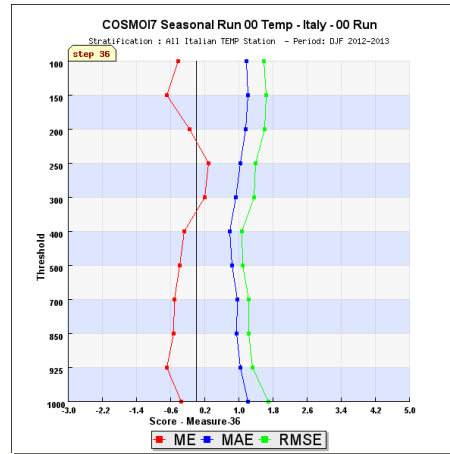
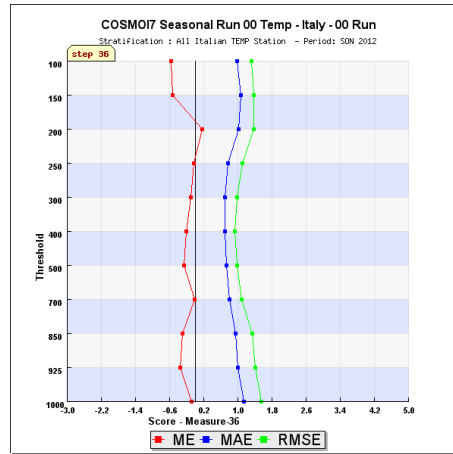
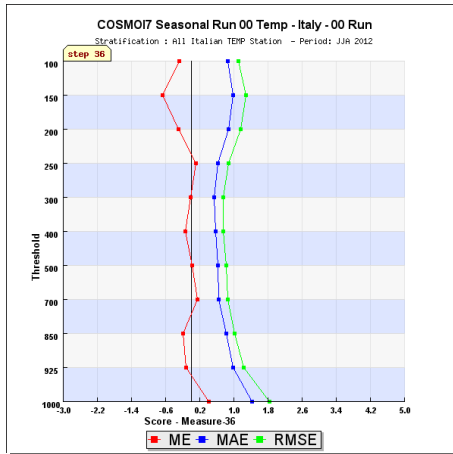


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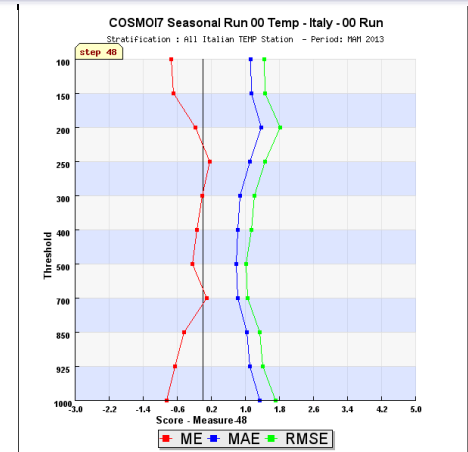
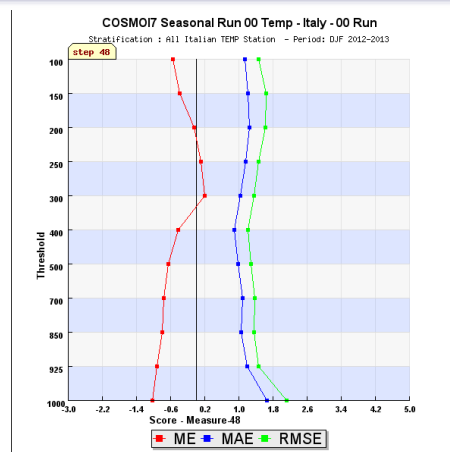
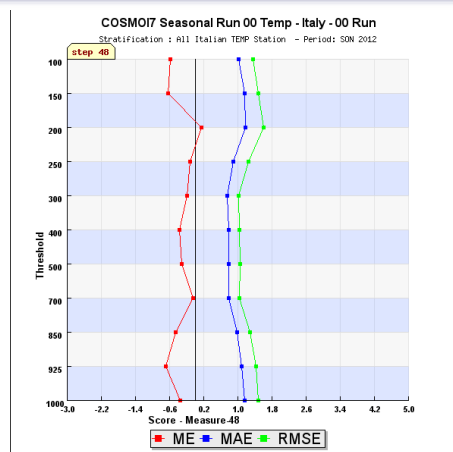
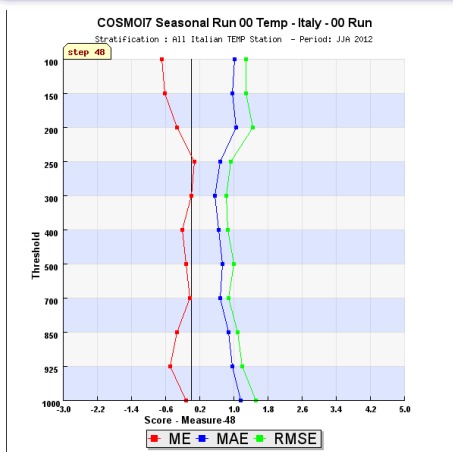
Upper air: Temperature cosmo-17



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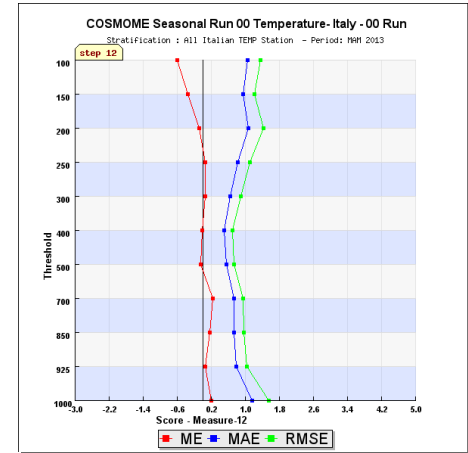
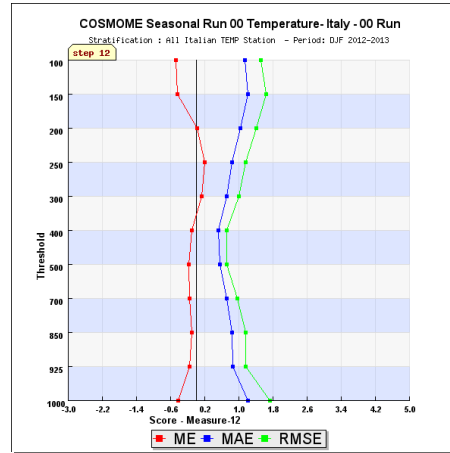
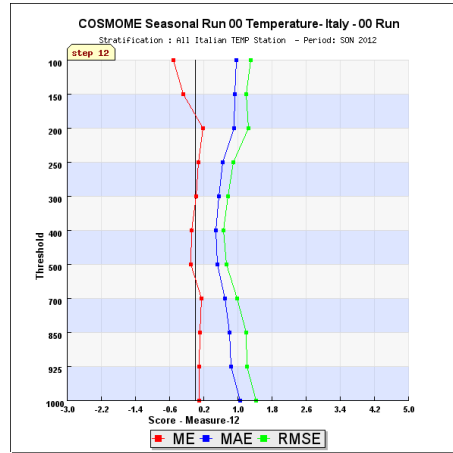
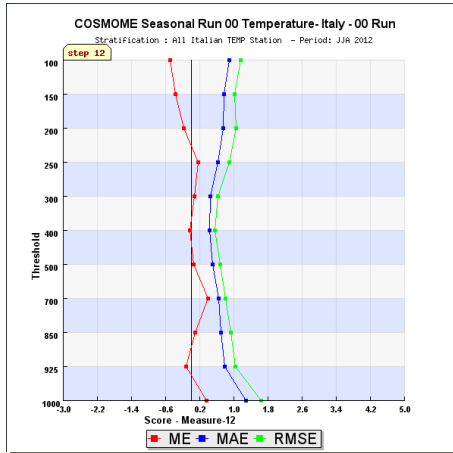
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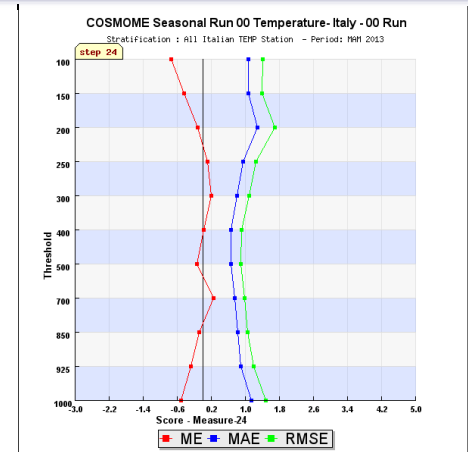
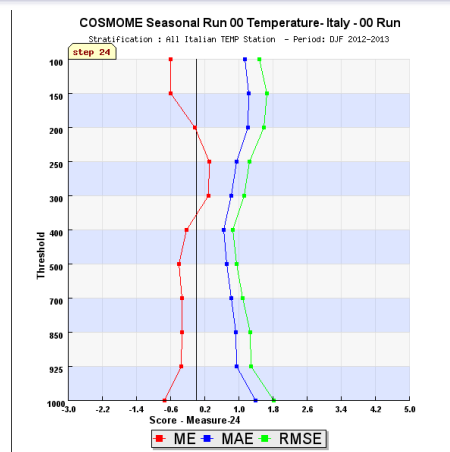
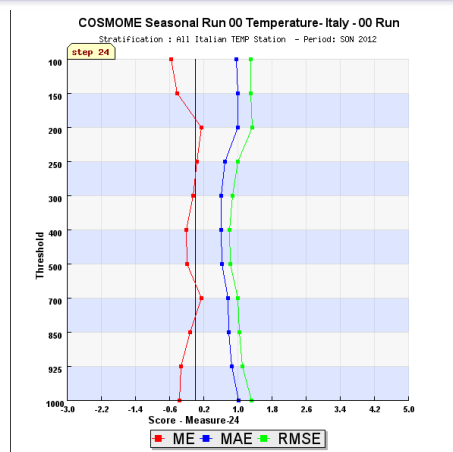
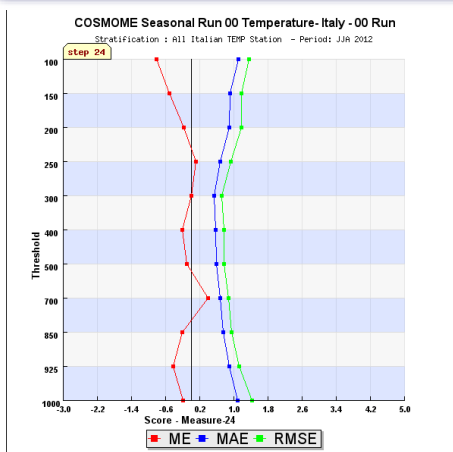
Upper air: Temperature cosmo-ME



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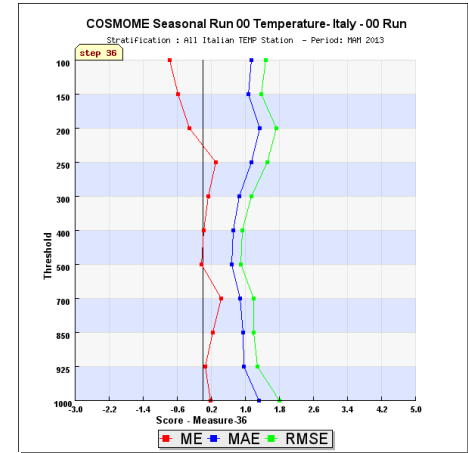
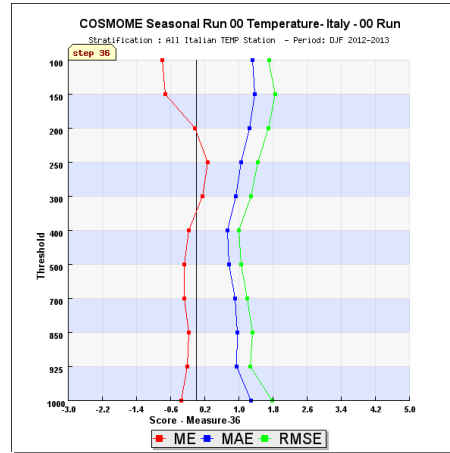
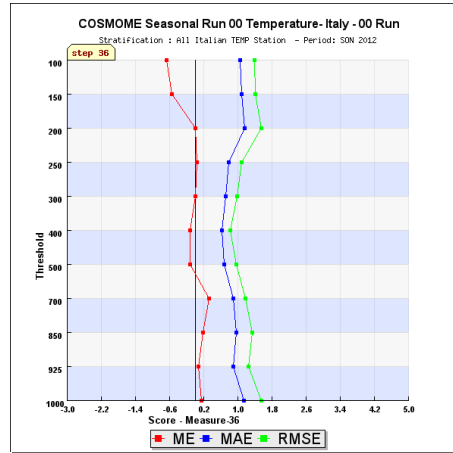
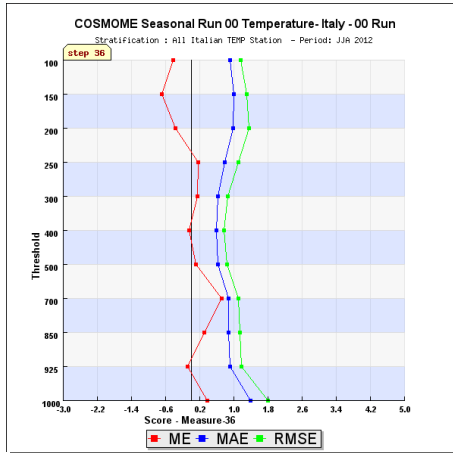


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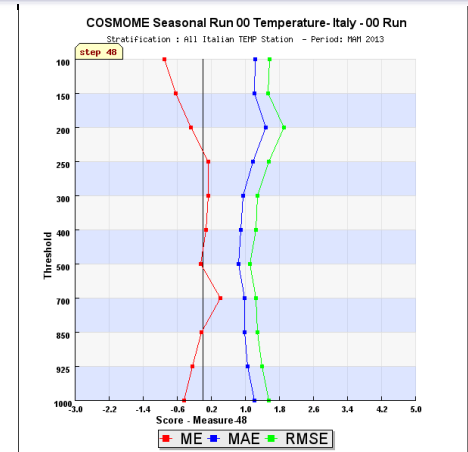
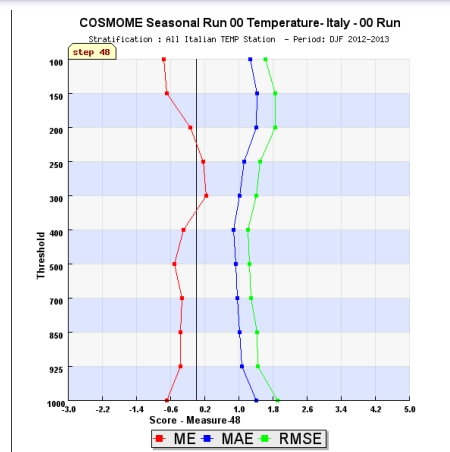
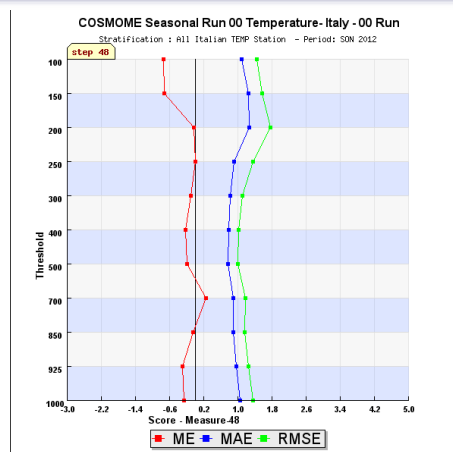
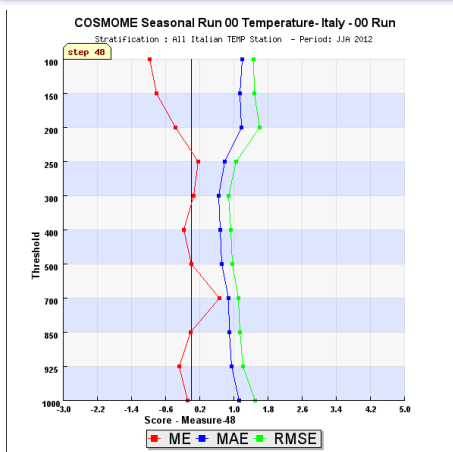
Upper air: Temperature cosmo-ME



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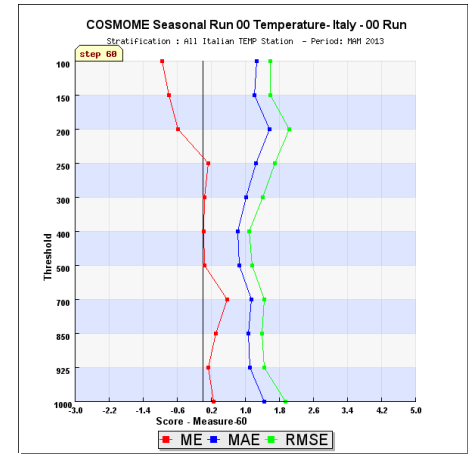
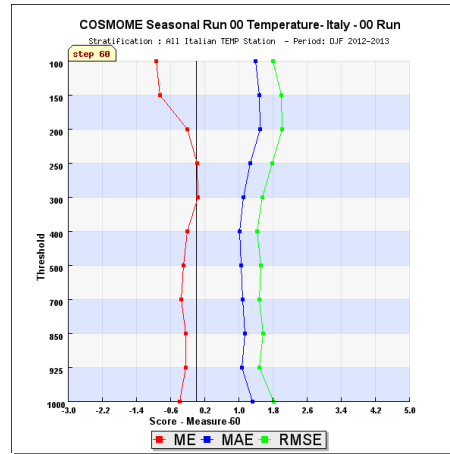
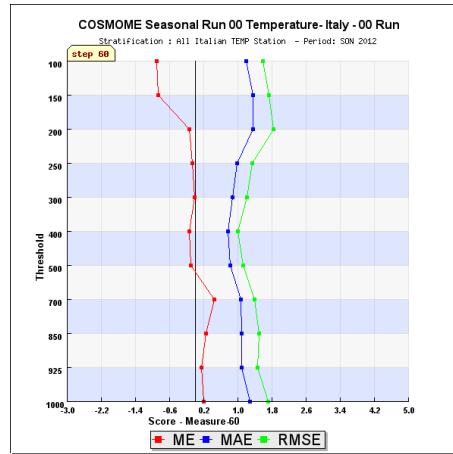
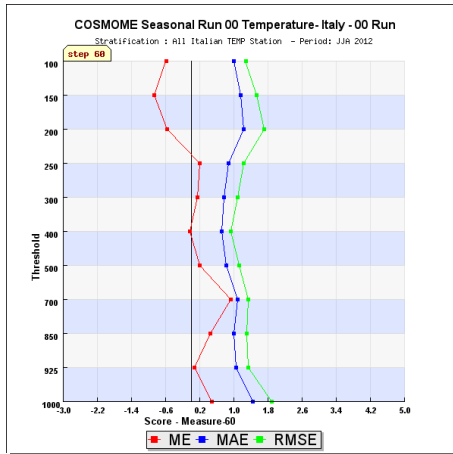


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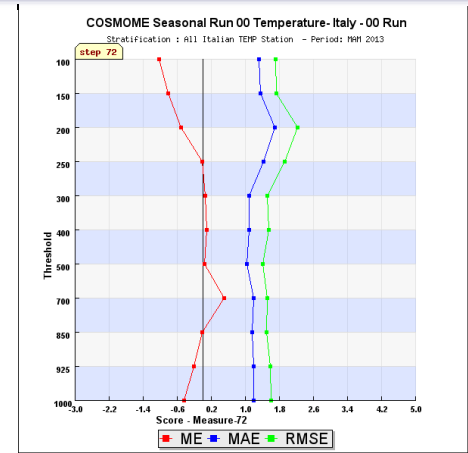
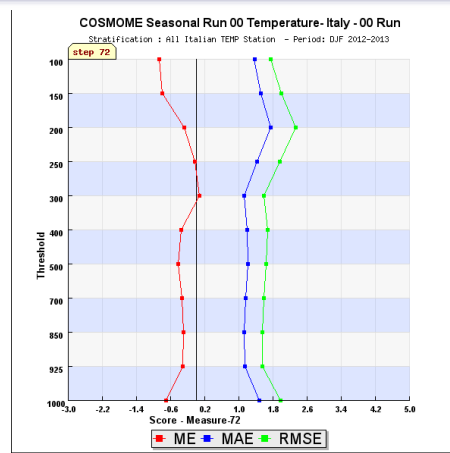
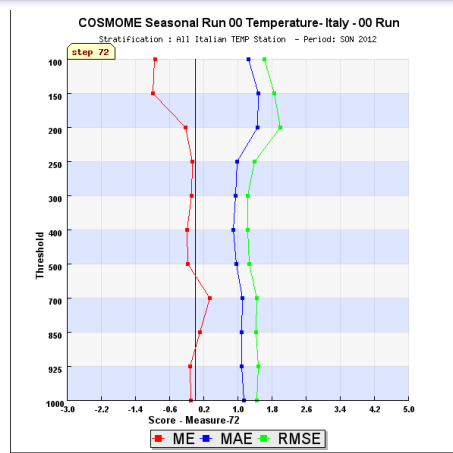
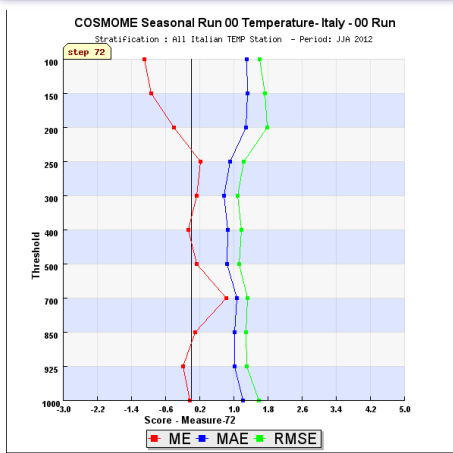
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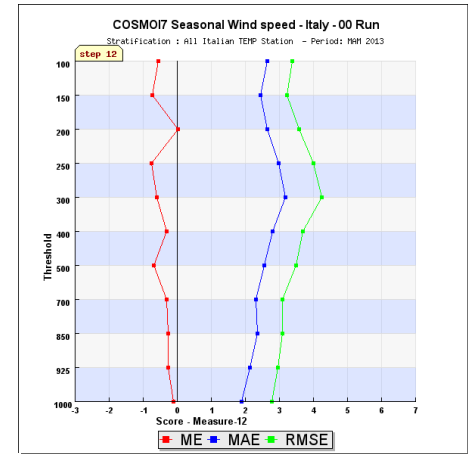
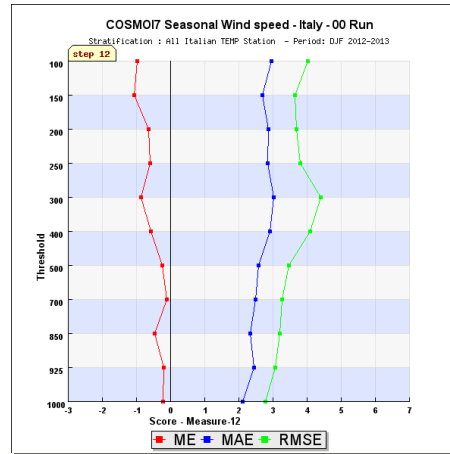
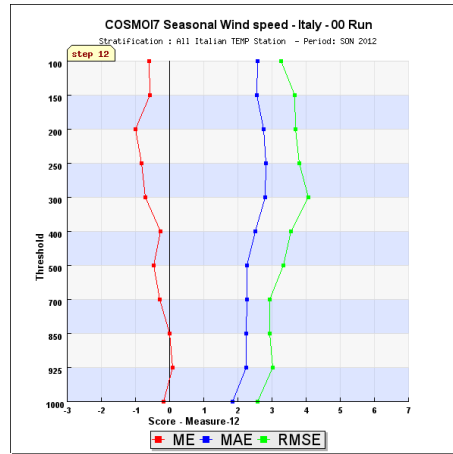
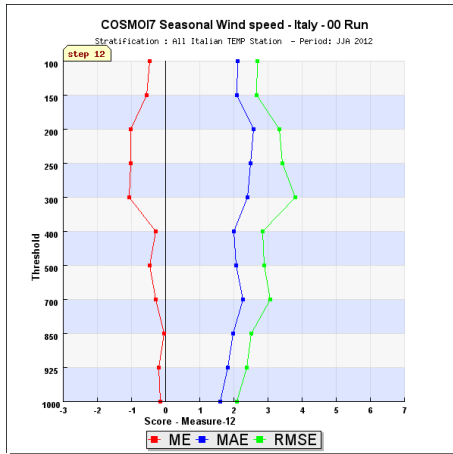


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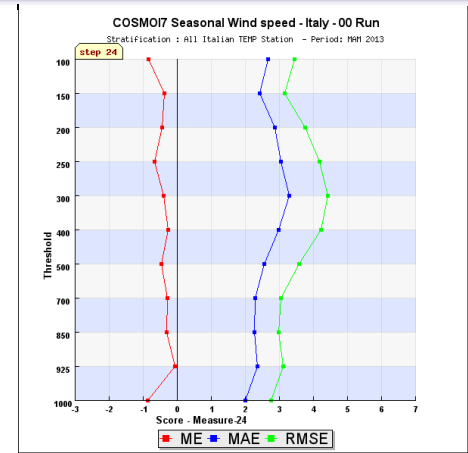
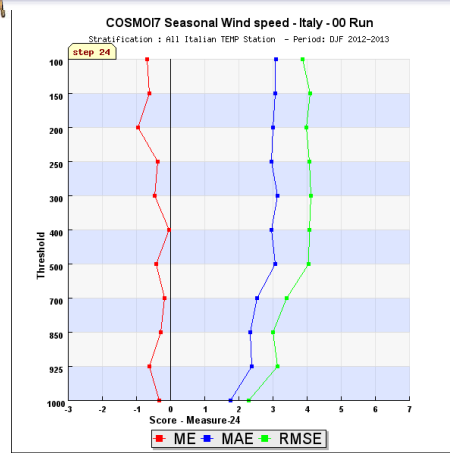
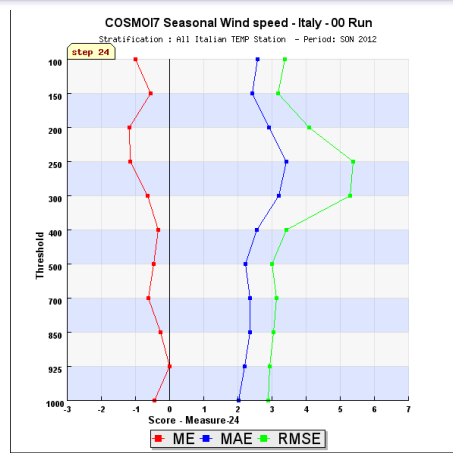
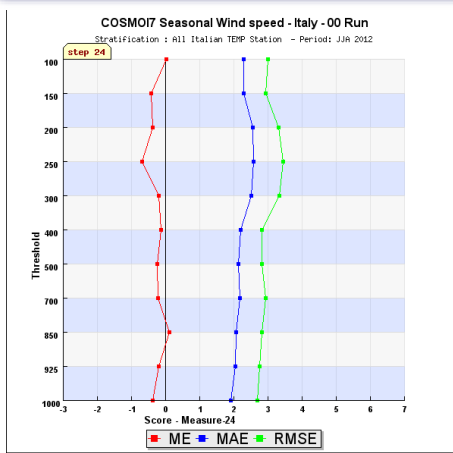
Upper air: Wind Speed cosmo-17



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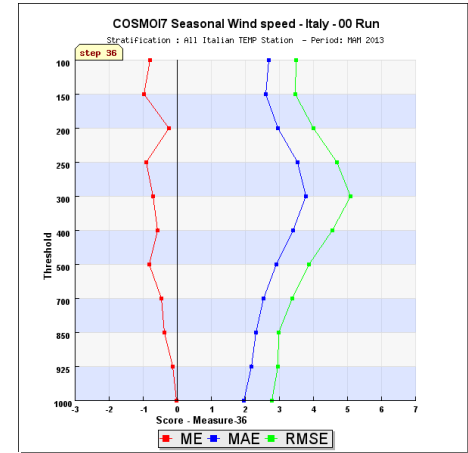
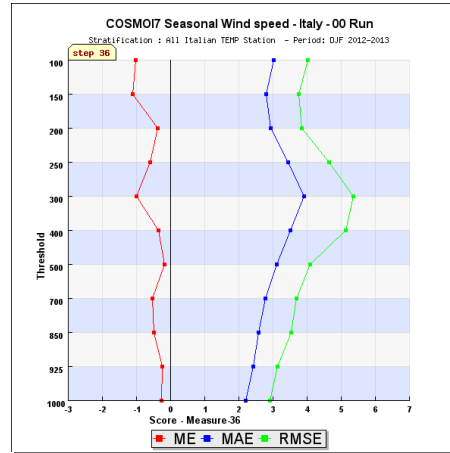
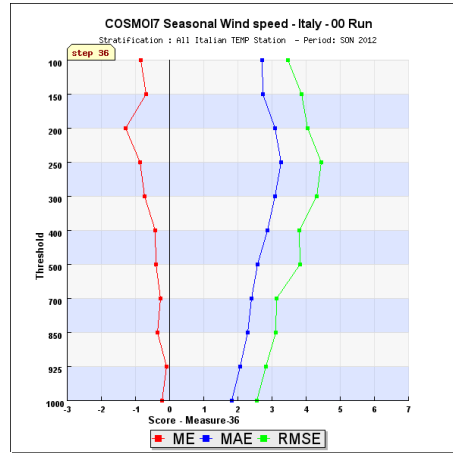
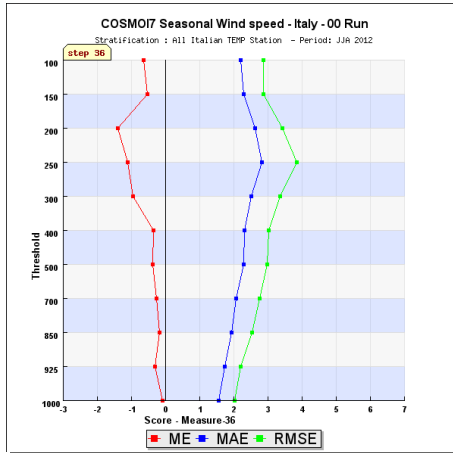


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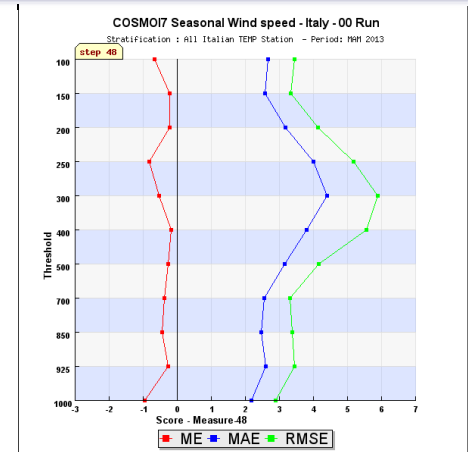
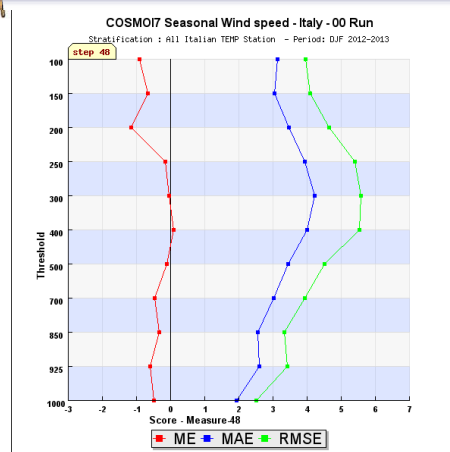
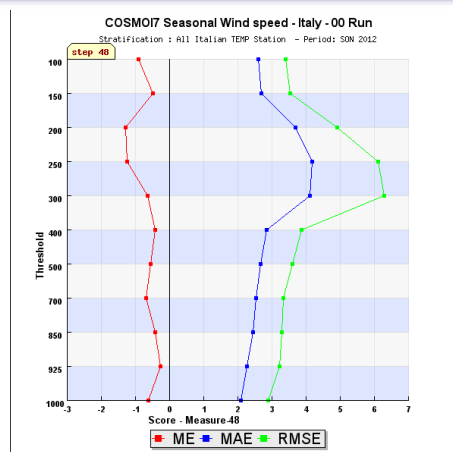
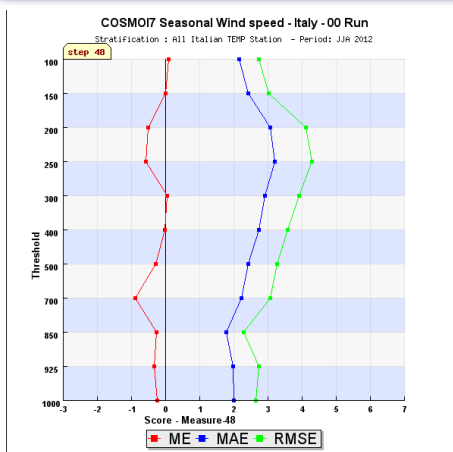
Upper air: Wind Speed cosmo-17



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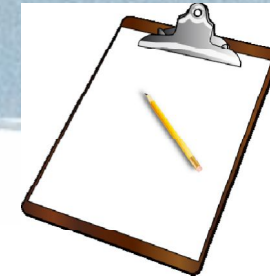


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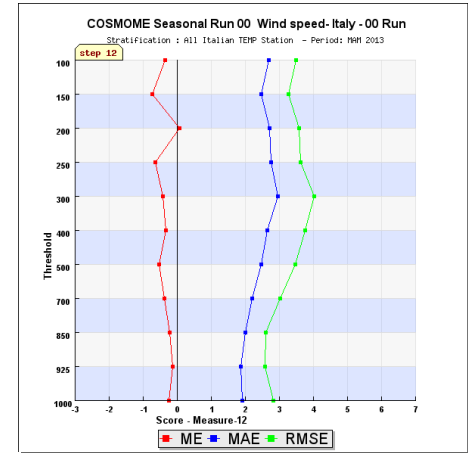
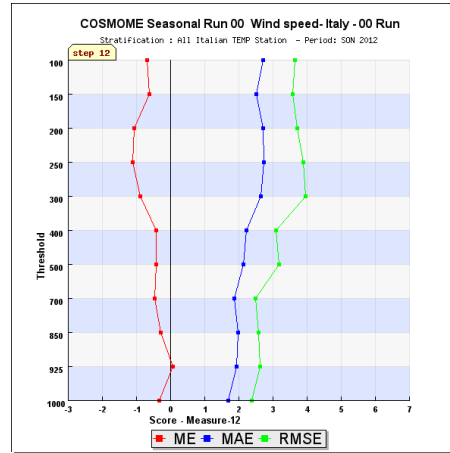
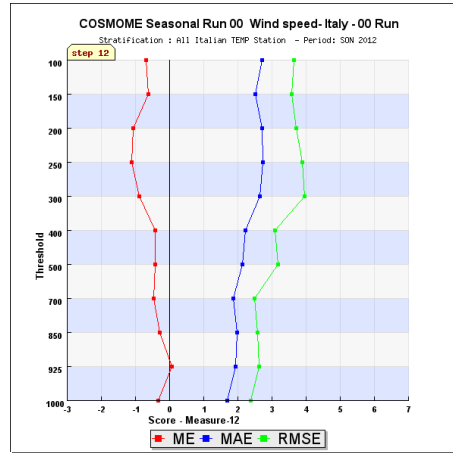
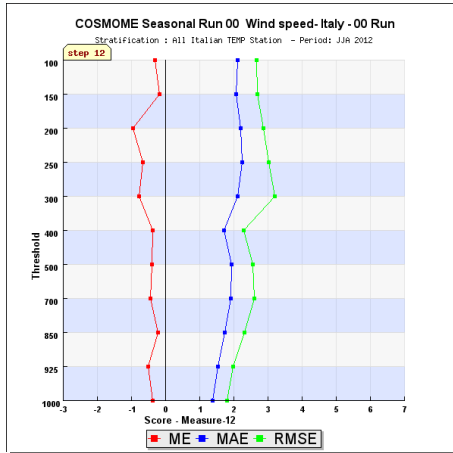
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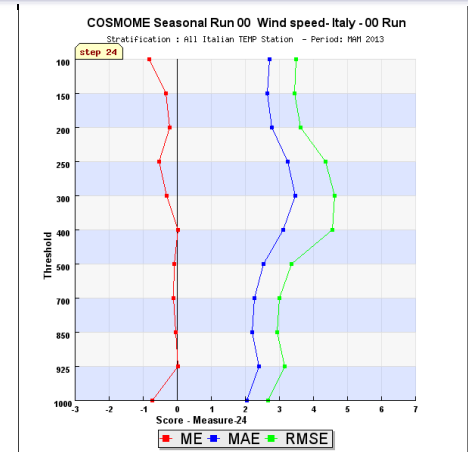
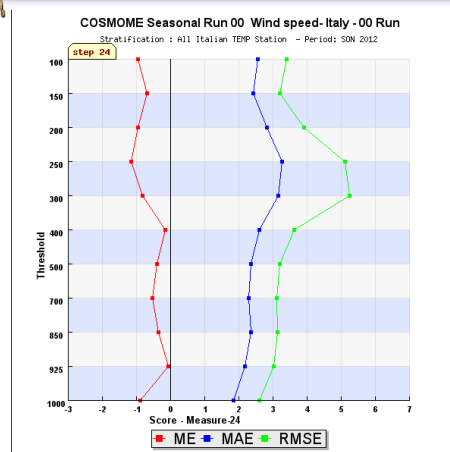
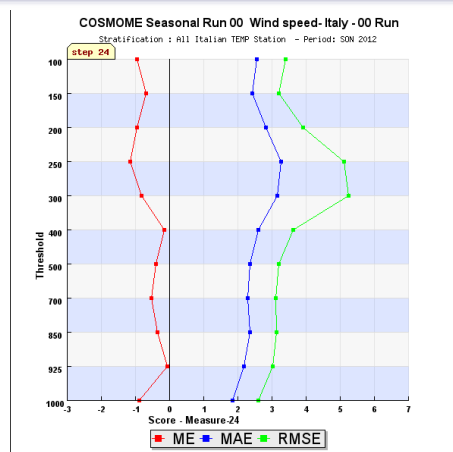
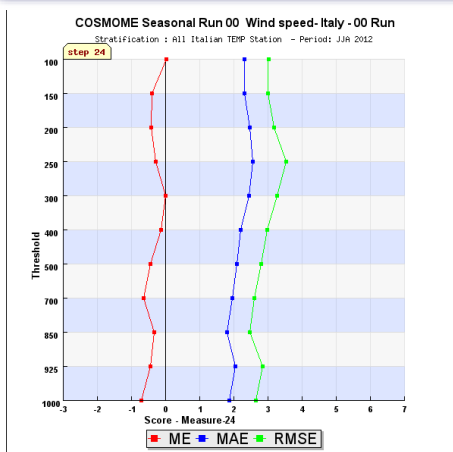
Upper air: Wind Speed cosmo-ME



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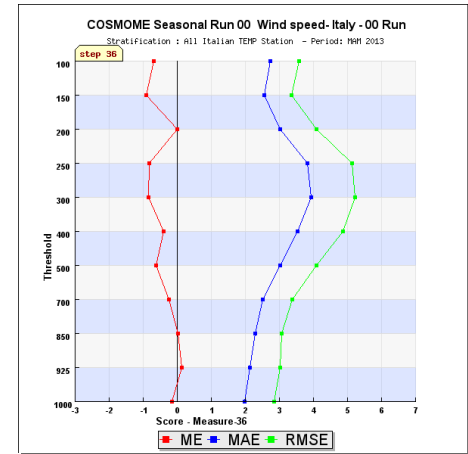
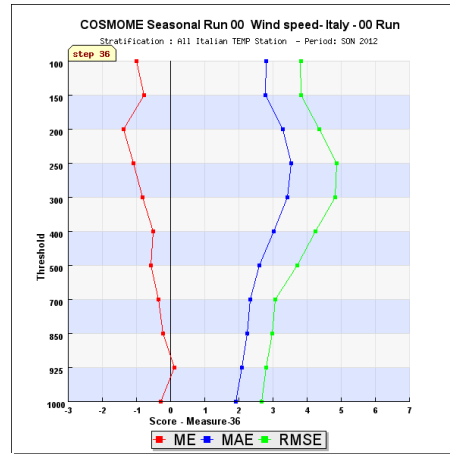
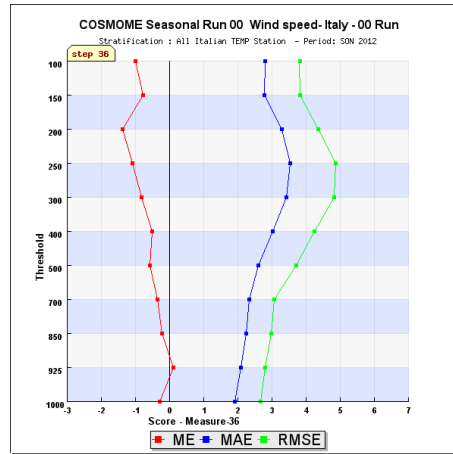
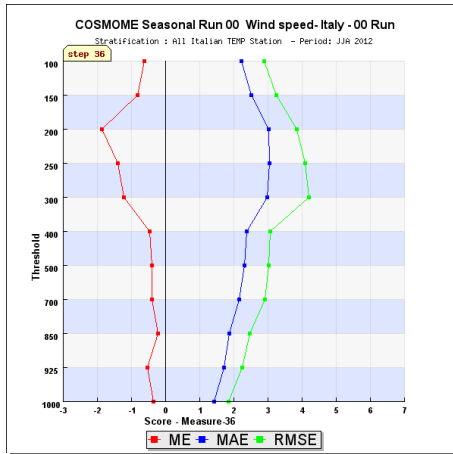


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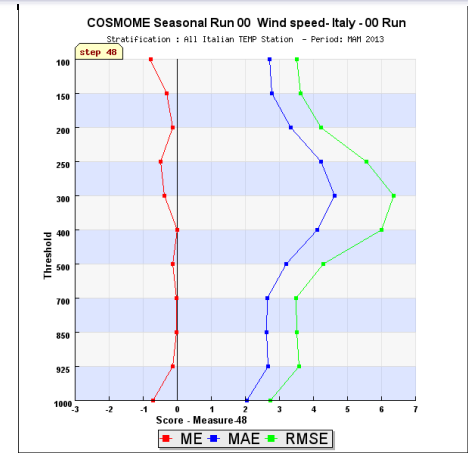
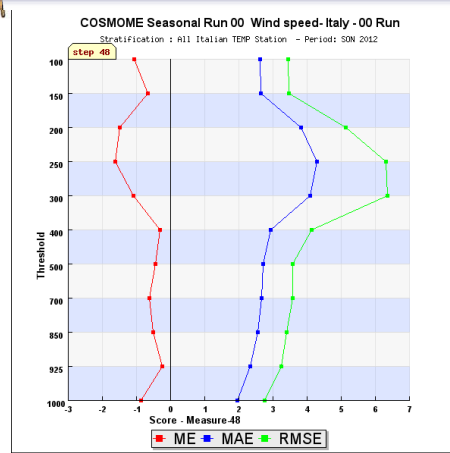
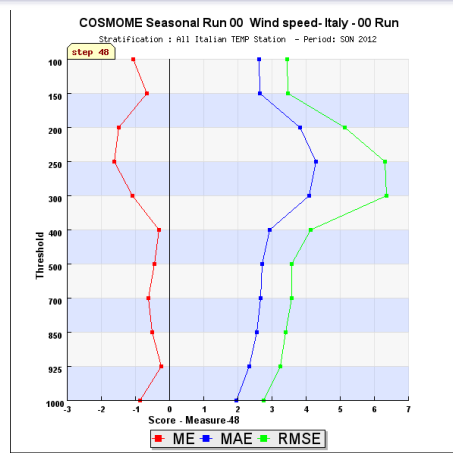
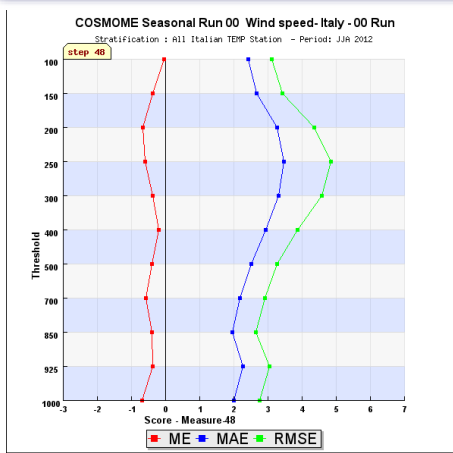
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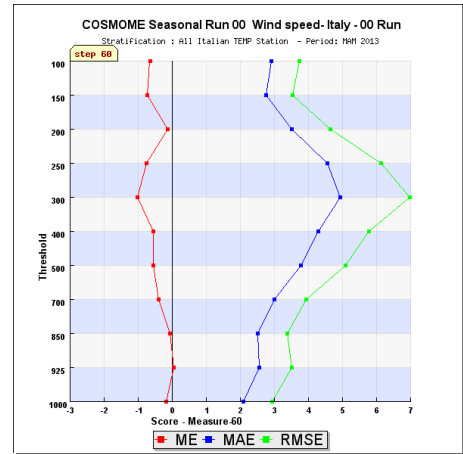
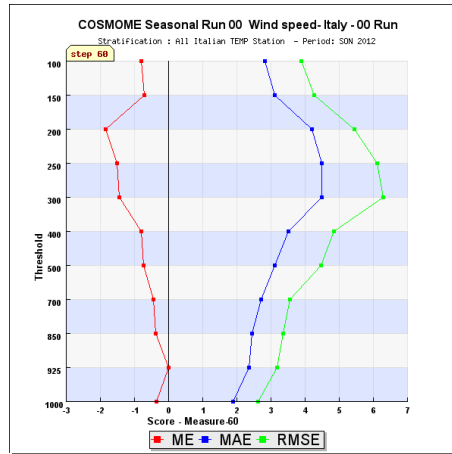
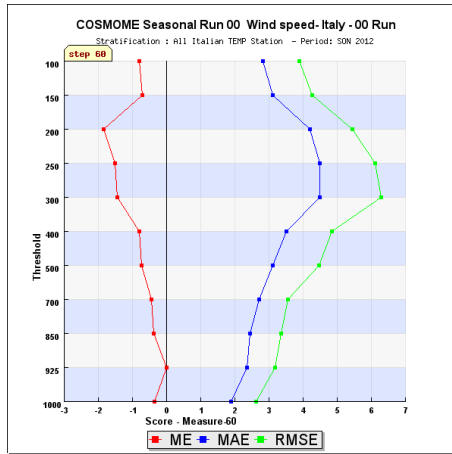
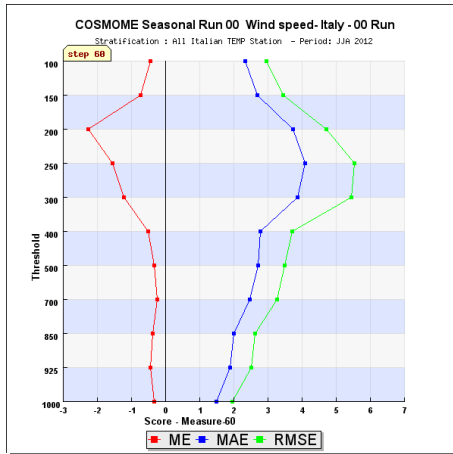


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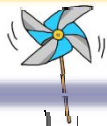




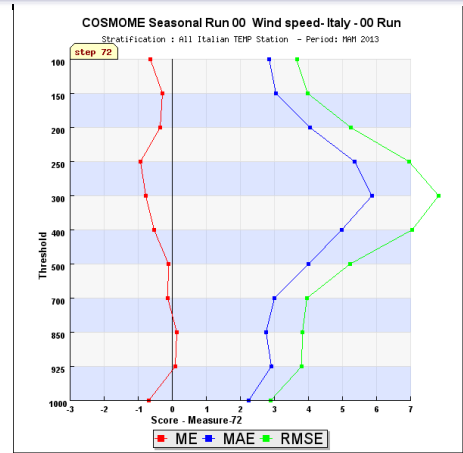
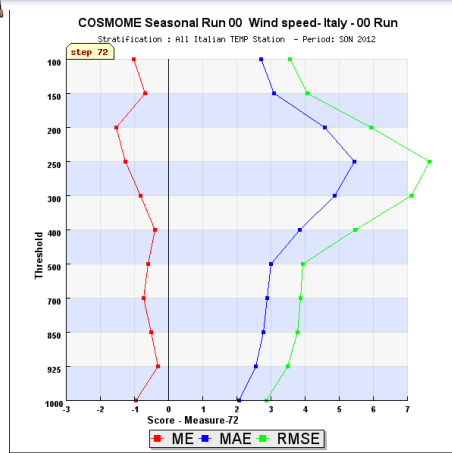
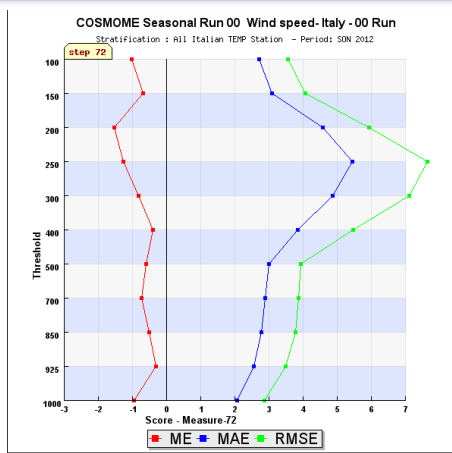
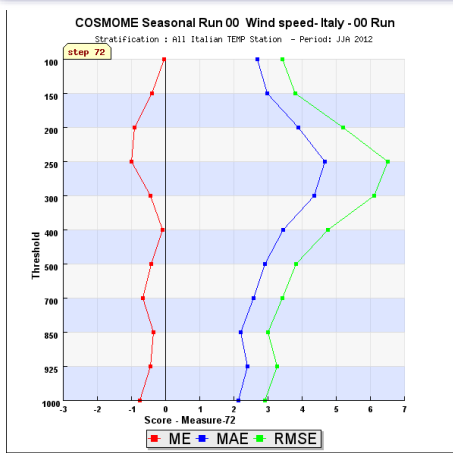
Upper air: Wind Speed cosmo-ME



00 UTC



12 UTC





notes



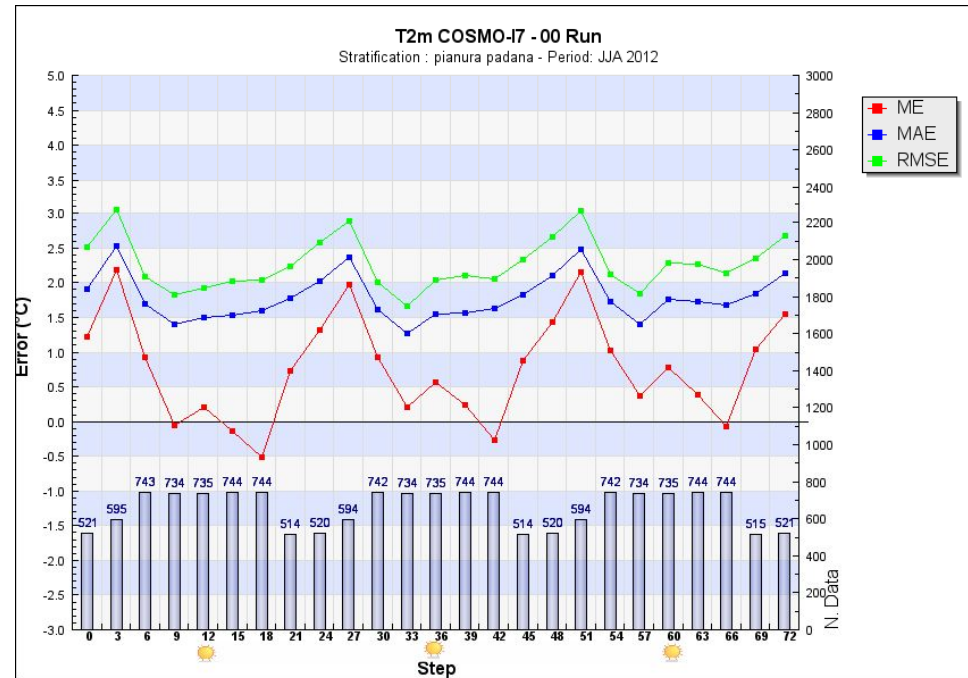
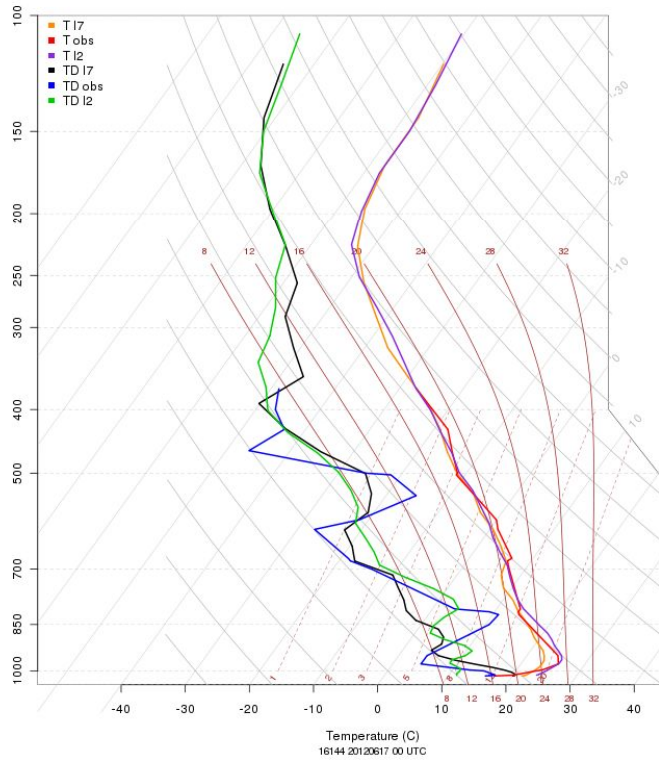
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A typical situation

Example of sounding at 00 UTC in San P. Capofiume (near Bologna)

COSMO-I7 T2m verification in the Po Valley

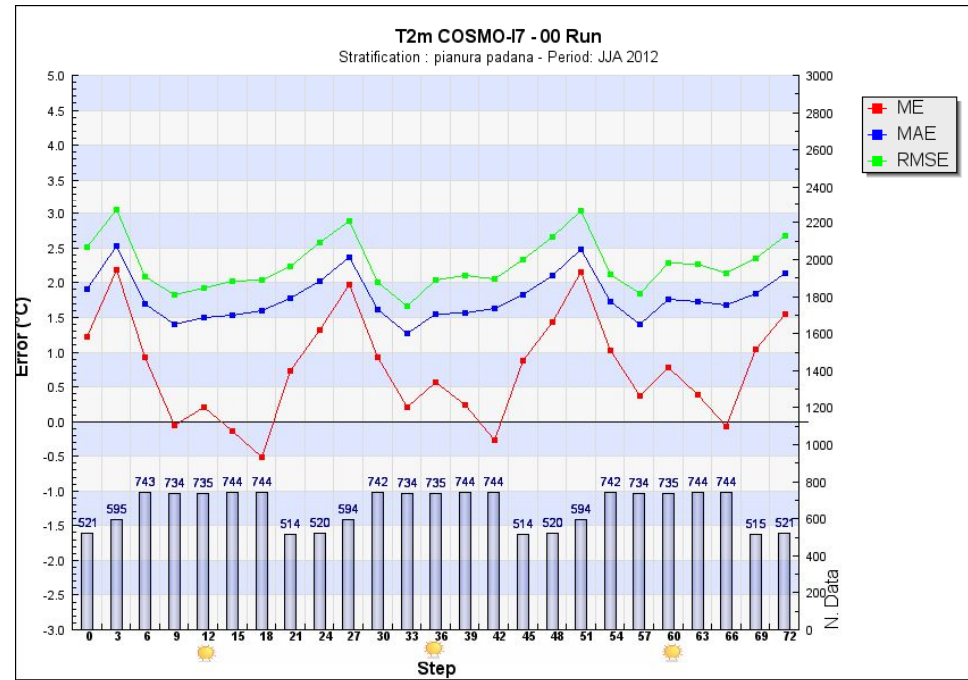
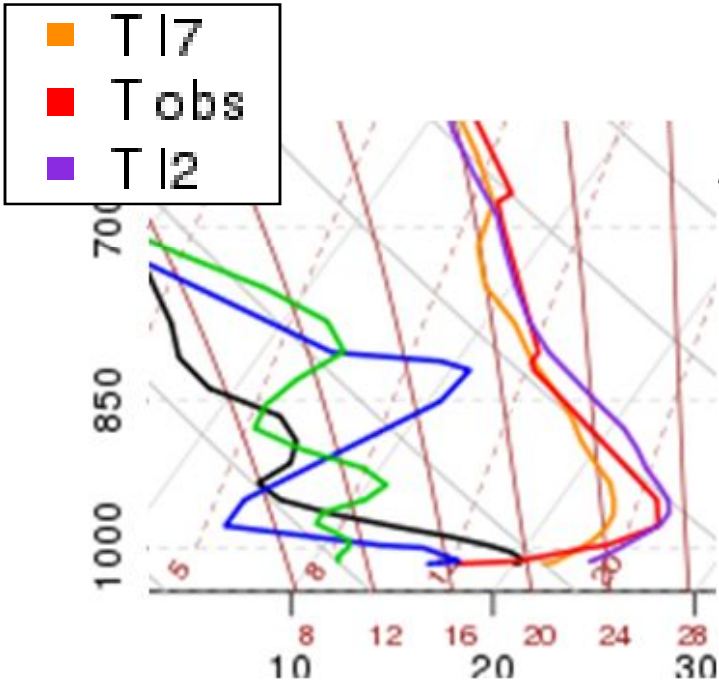




A typical situation

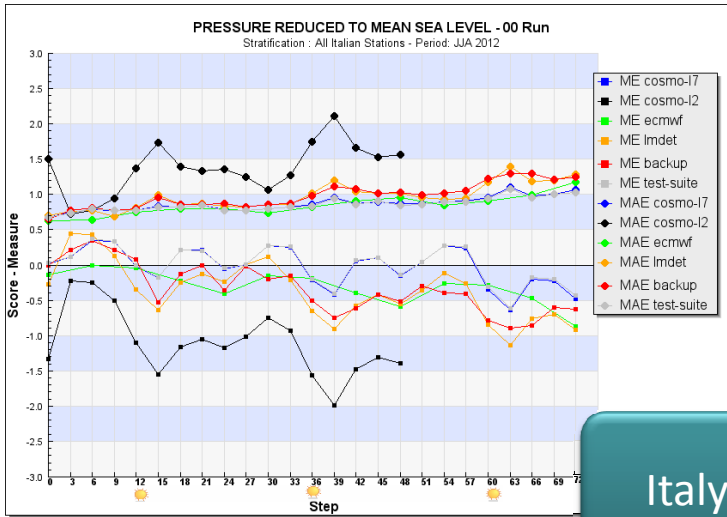
Example of sounding at 00 UTC in San P. Capofiume (near Bologna)

COSMO-I7 T2m verification in the Po Valley



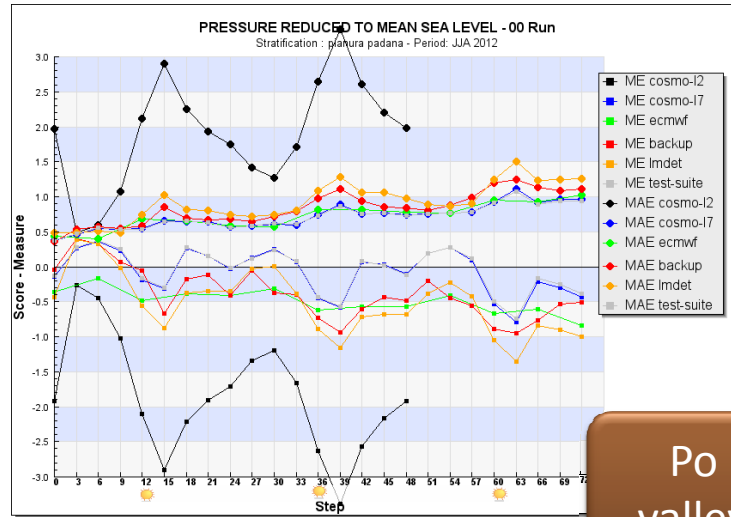


JJA2012: strange behavior of COSMO-I2

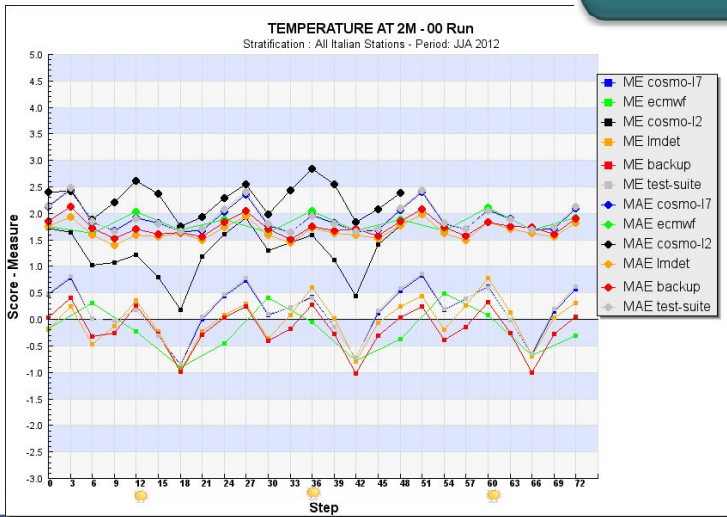


MSLP

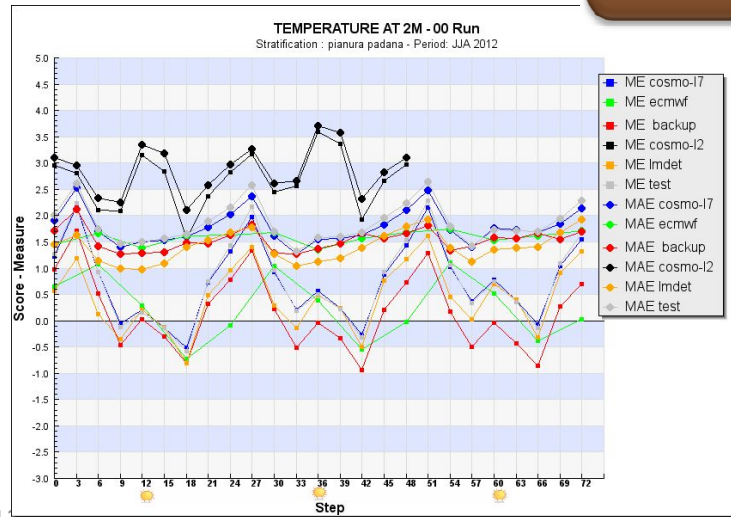
Italy



Po valley

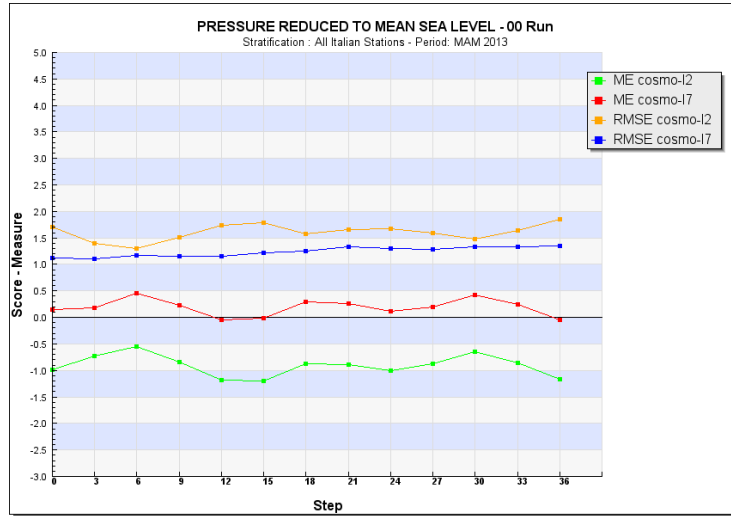
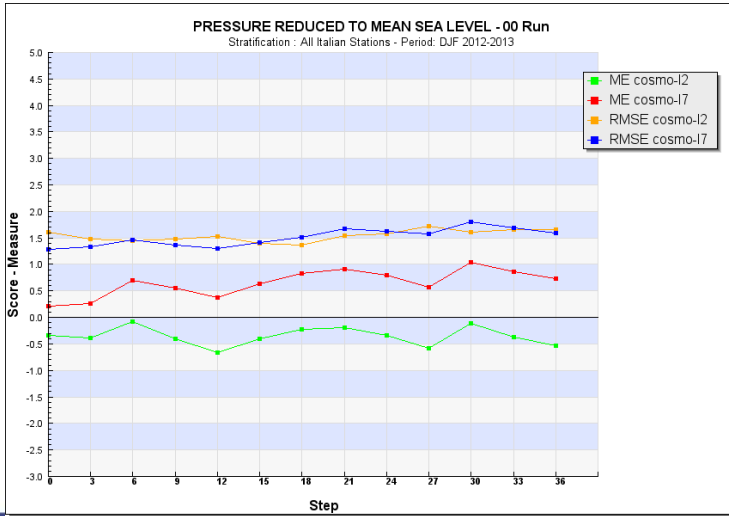
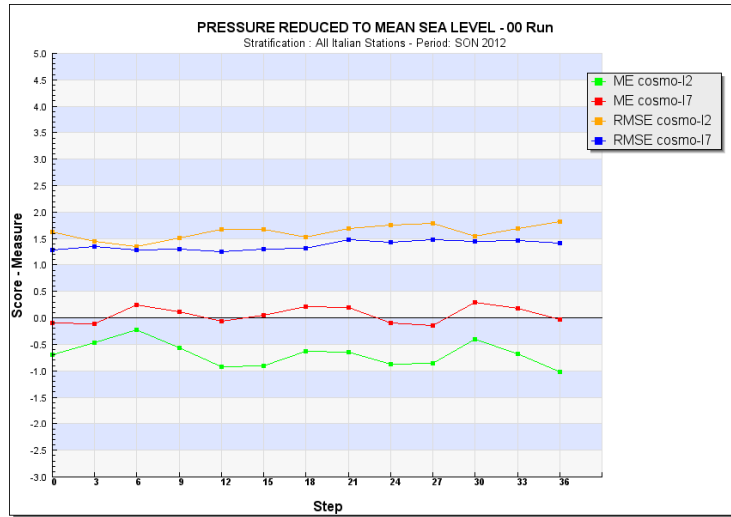
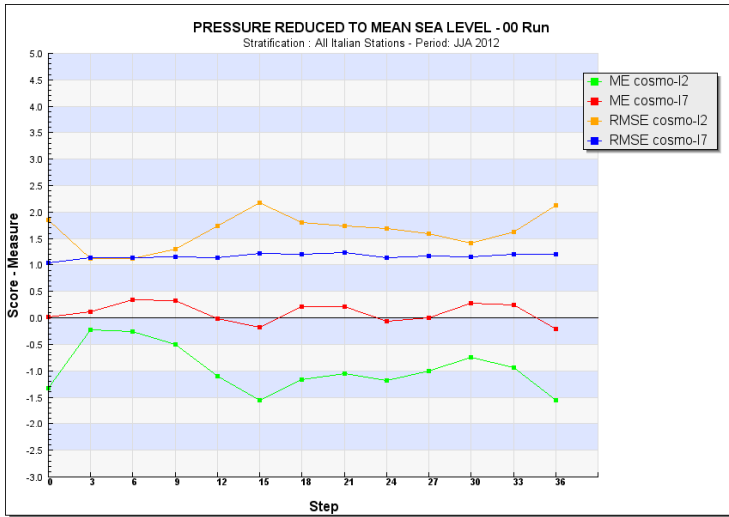


2mT



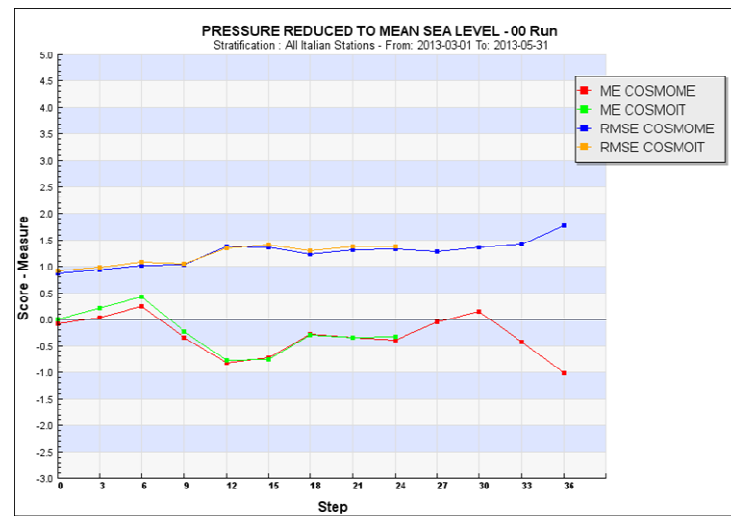
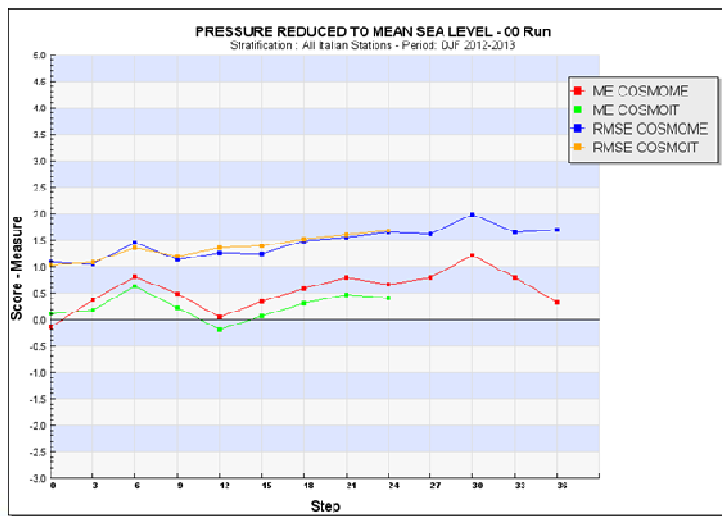
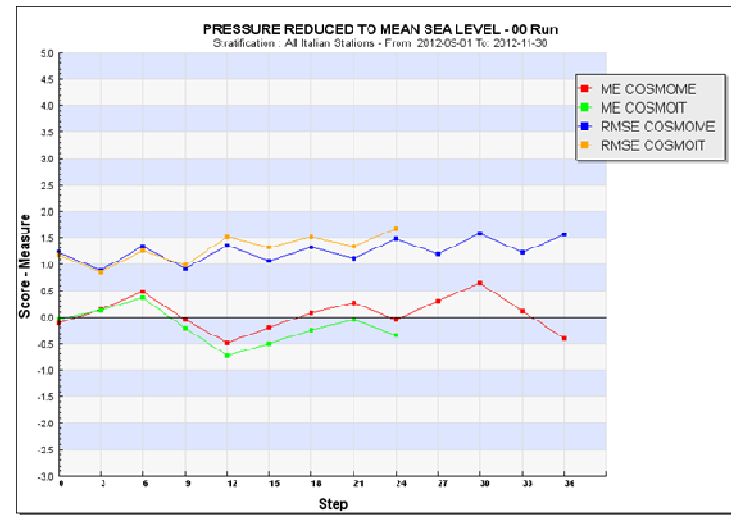
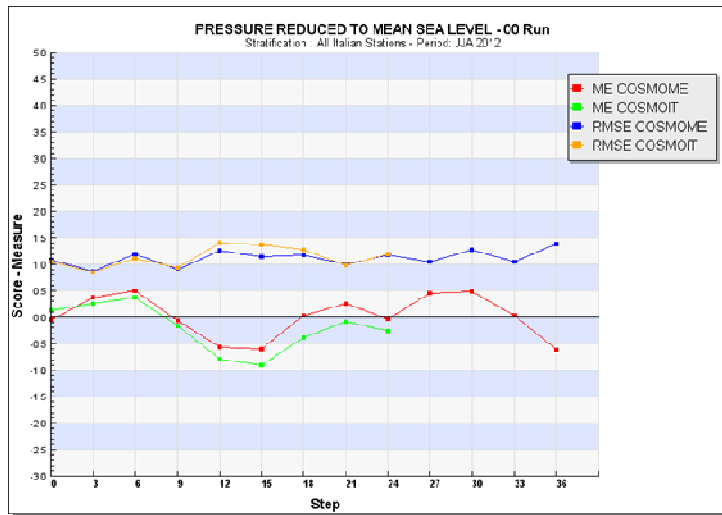


MSLP: Cosmo-17/I2



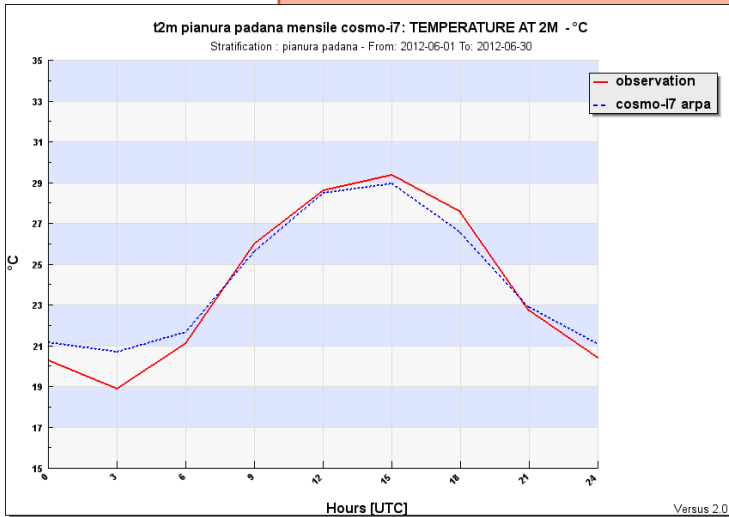


MSLP: Cosmo-ME/IT

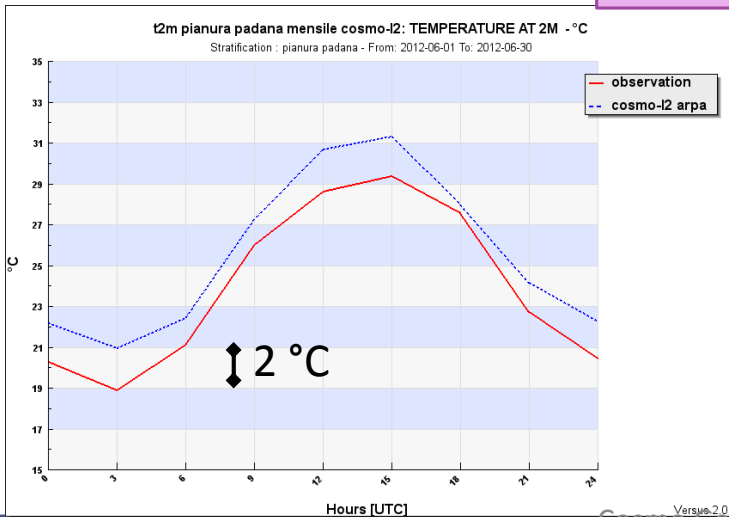
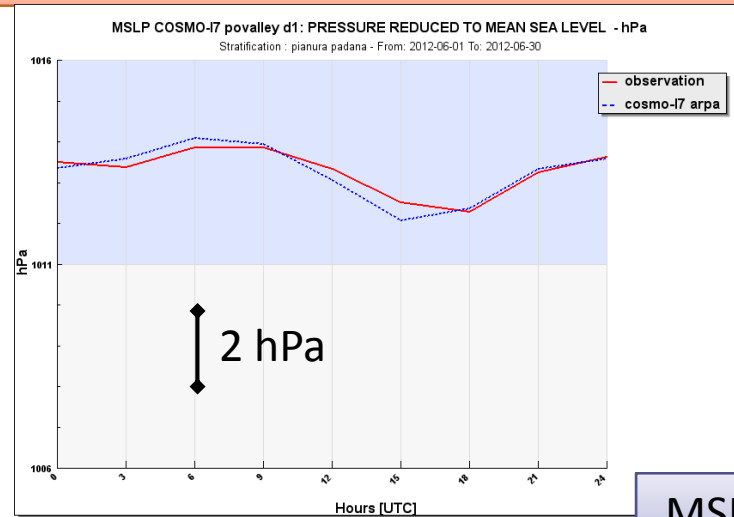




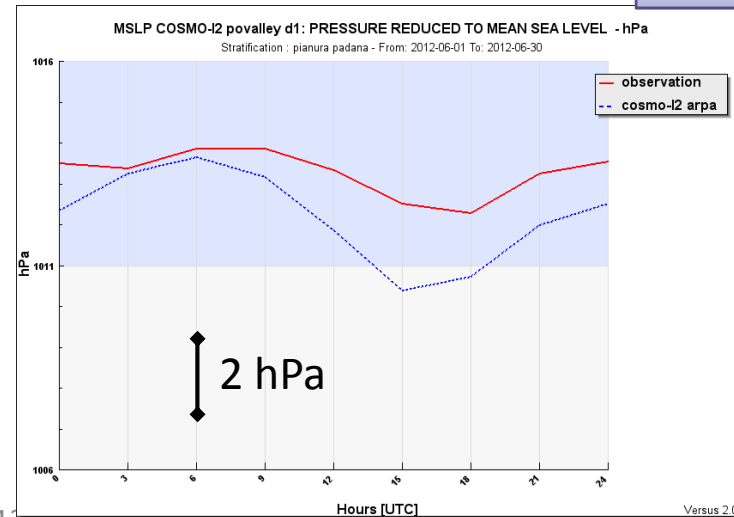
Daily Cycle: COSMO-I7/I2 Po Valley June 2012



7 Km



2.8 Km



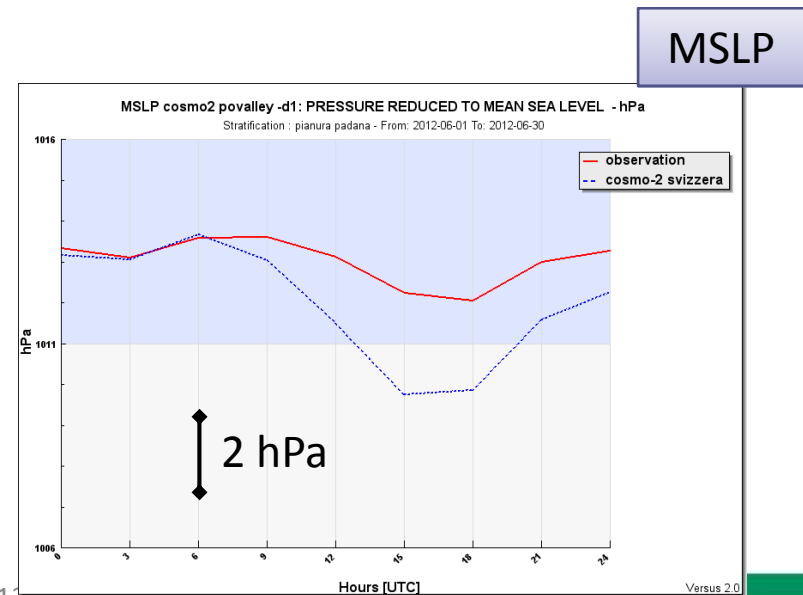
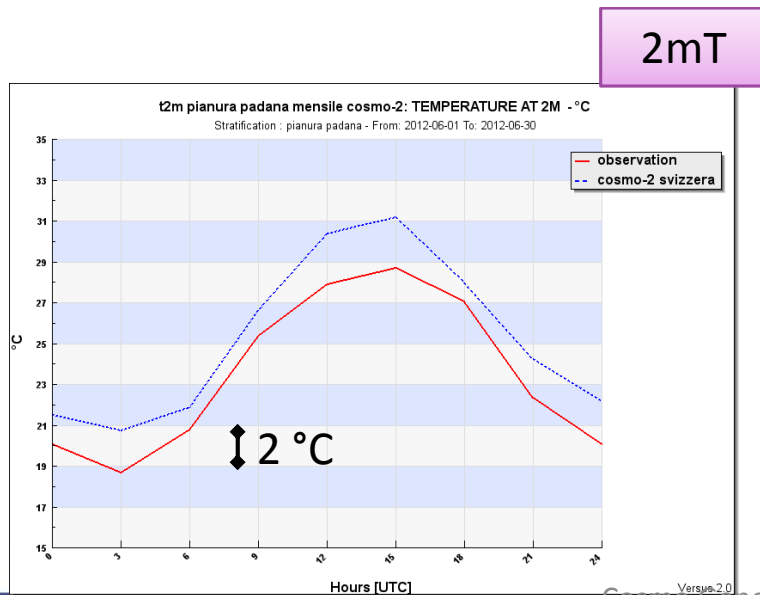


Daily Cycle: COSMO-2 Po Valley June 2012

sorry
not available
at this time

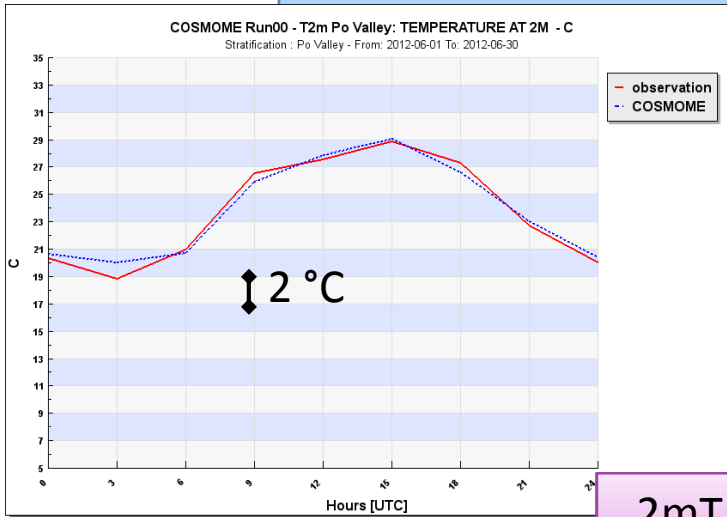
7 Km

sorry
not available
at this time

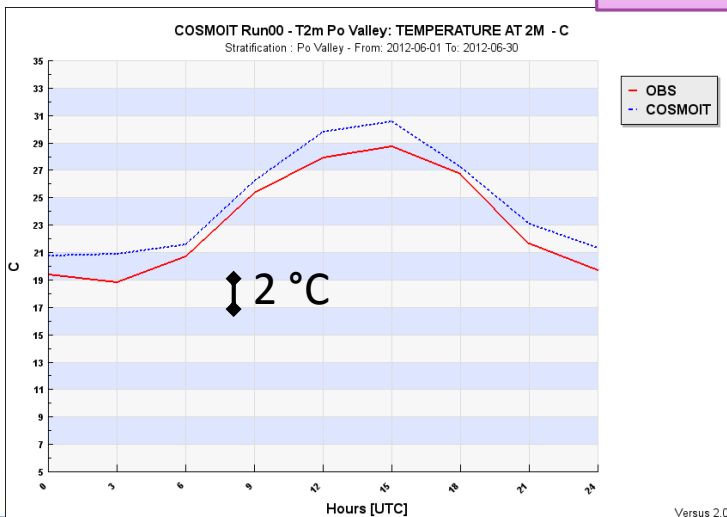
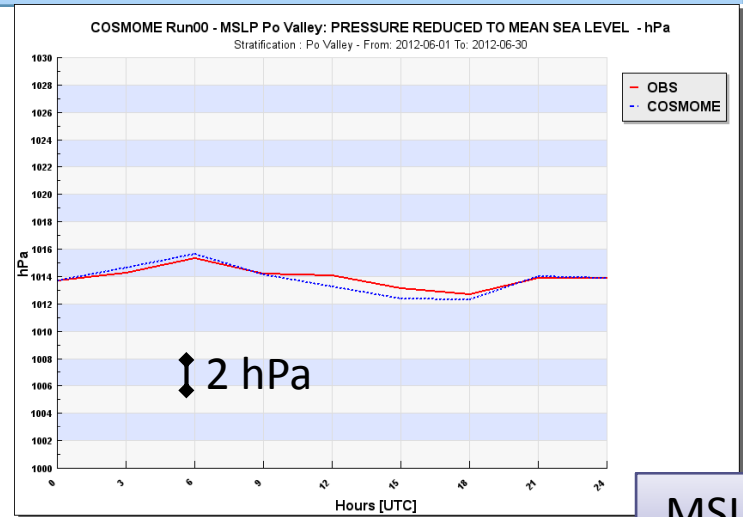




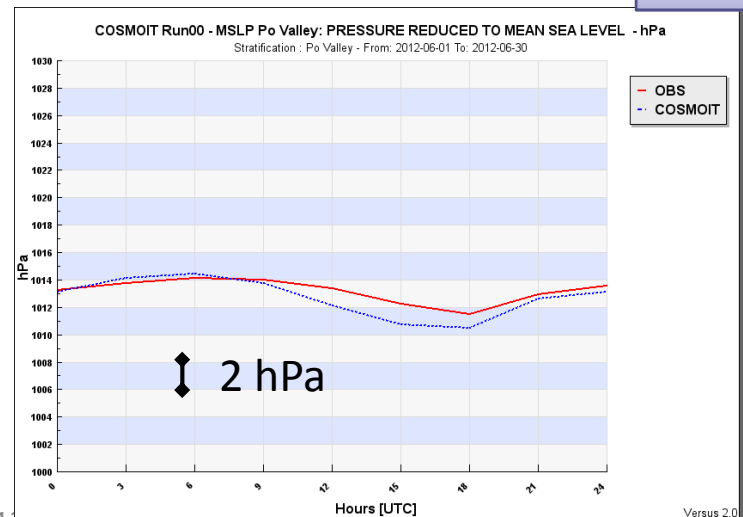
Daily Cycle: COSMO-ME/IT Po Valley June 2012



7 Km



2.8 Km





notes



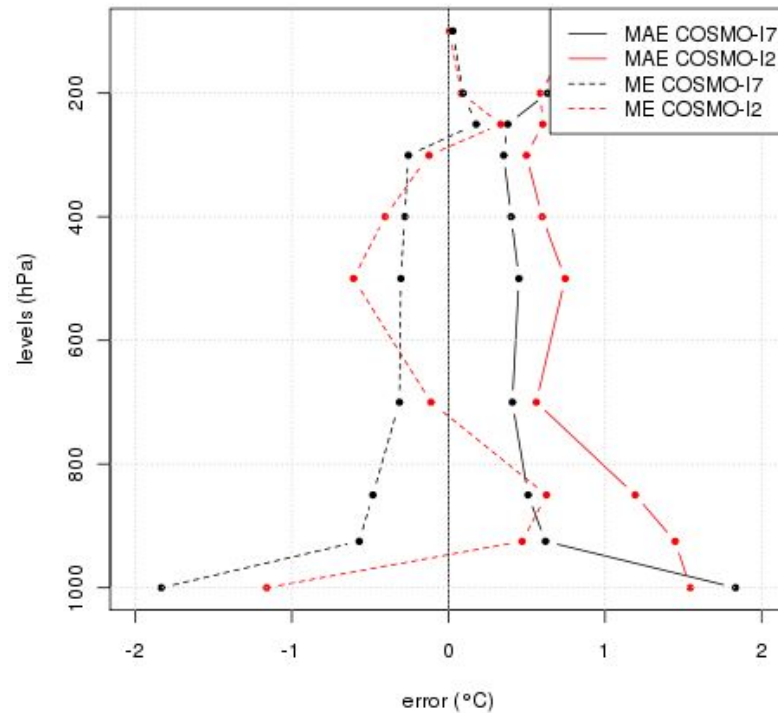
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Upper Air Temperature verification: June 2012 – 00UTC

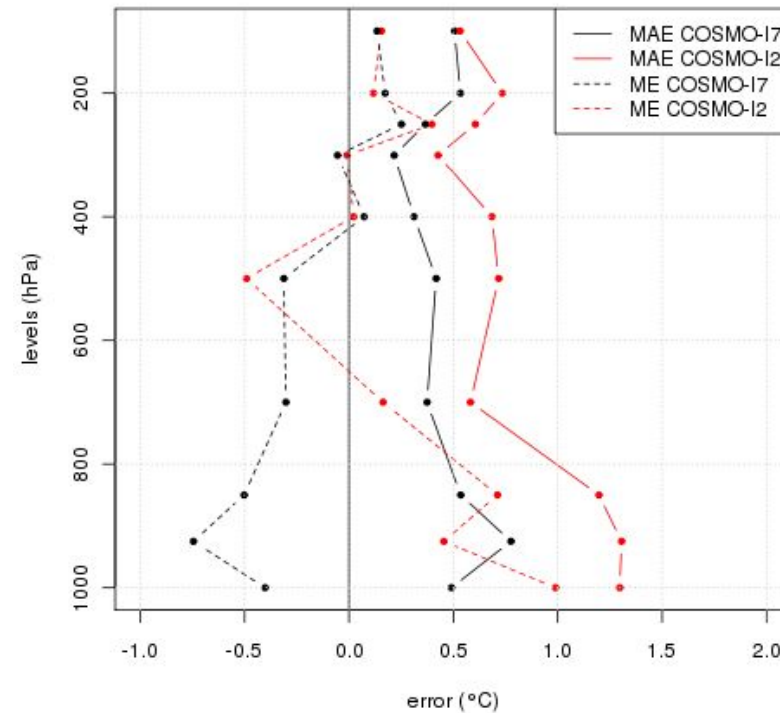
Milano – FC +00h 00UTC

2012-06-07 - 2012-07-01 16080 FC: 00 h



S.P. Capofiume – FC +00h 00UTC

2012-06-07 - 2012-07-01 16144 FC: 00 h





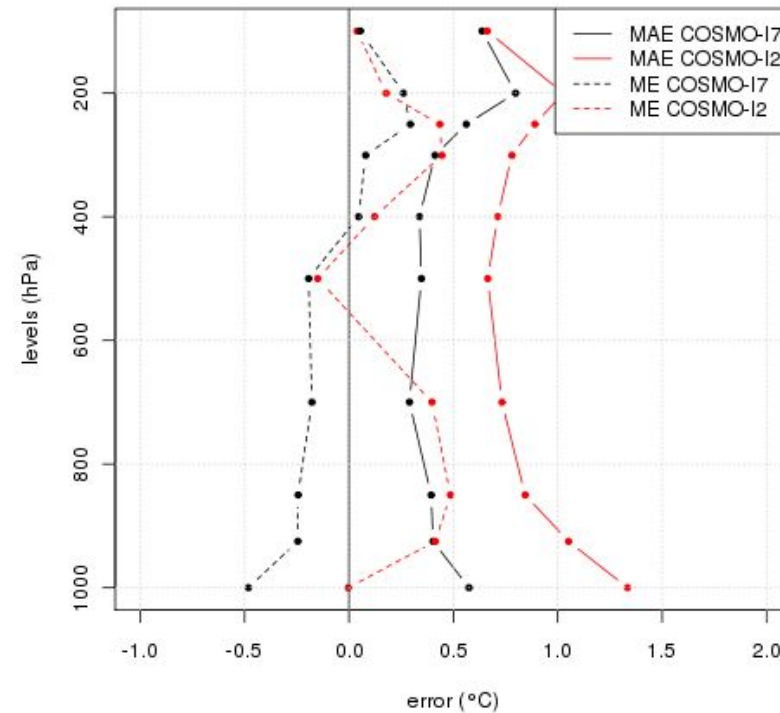
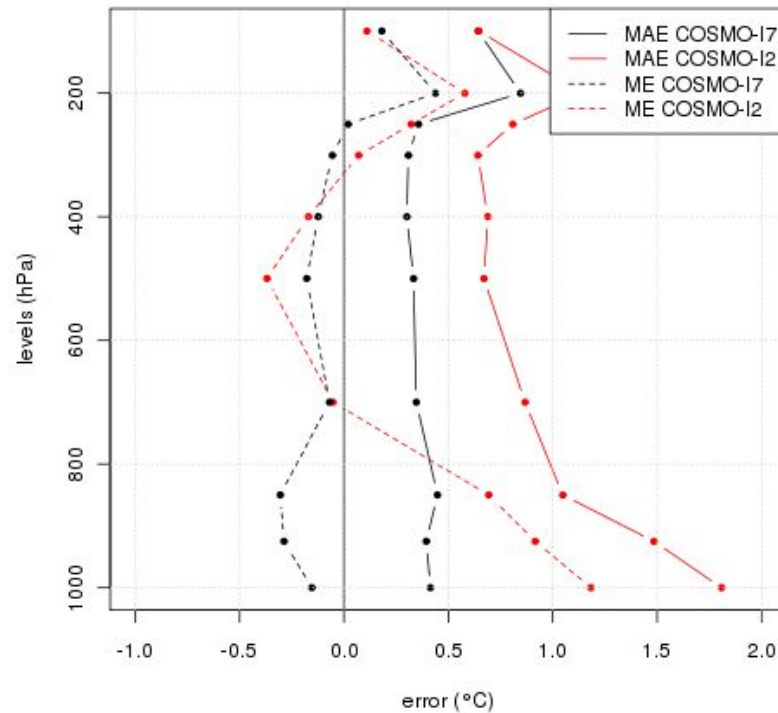
Upper Air Temperature verification: San Pietro Capofiume

SON 2012 – FC +00h 00UTC

MAM 2013 – FC +00h 00 UTC

2012-09-01 - 2012-12-02 16144 FC: 00 h

2013-03-01 - 2013-06-01 16144 FC: 00 h



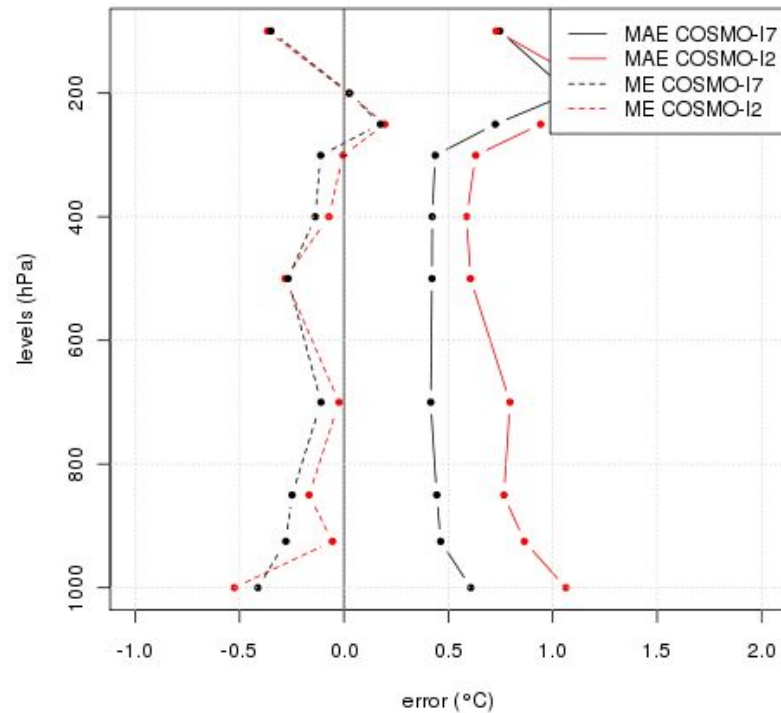


Upper Air Temperature verification: Pratica di Mare

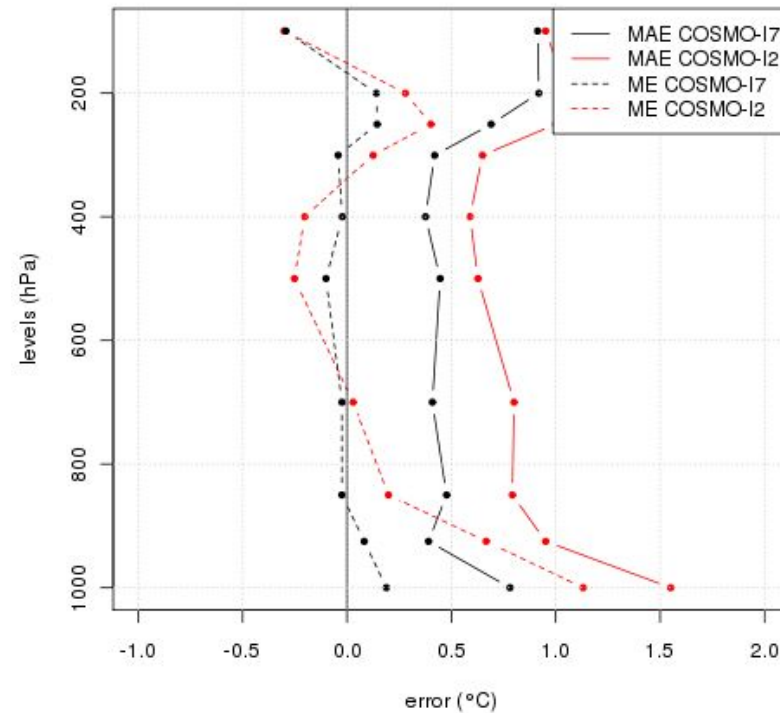
MAM 2013 – FC +00 h 00 UTC

MAM 2013 – FC +00 h 12 UTC

2013-03-01 - 2013-06-01 16245 FC: 00 h



2013-03-01 - 2013-06-01 16245 FC: 12 h



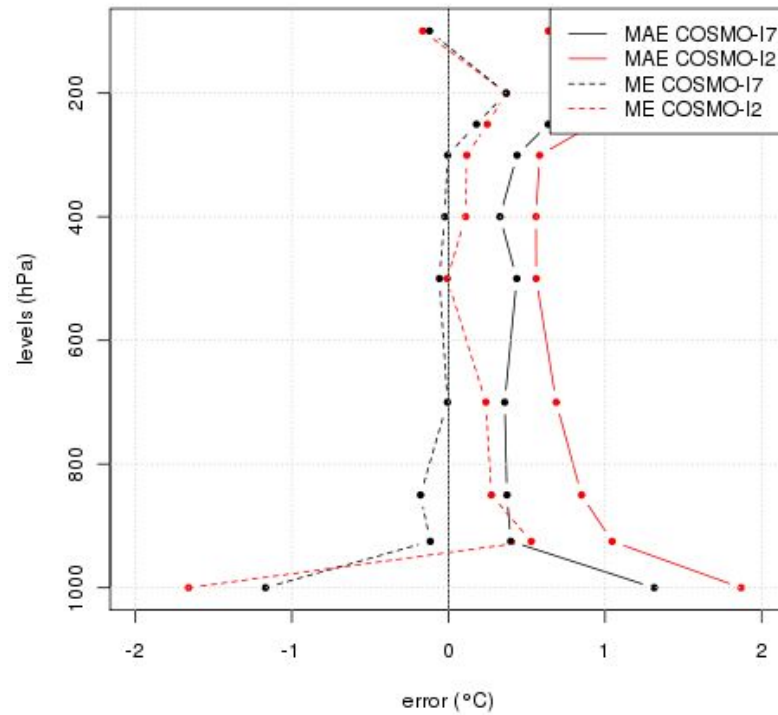


Upper Air Temperature verification: Milano

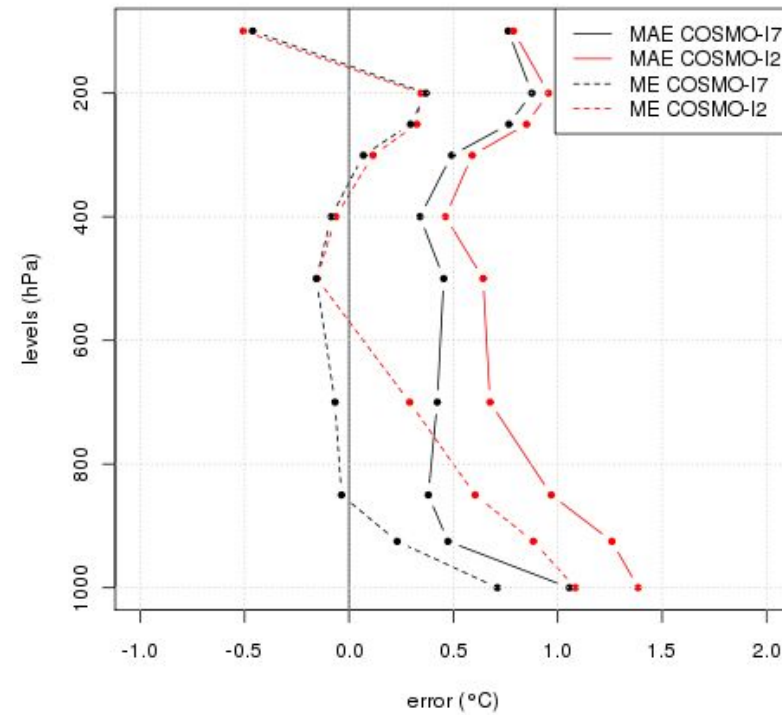
MAM 2013 – FC +00 h 00 UTC

MAM 2013 – FC +00 h 12 UTC

2013-03-01 - 2013-06-01 16080 FC: 00 h



2013-03-01 - 2013-06-01 16080 FC: 12 h





notes



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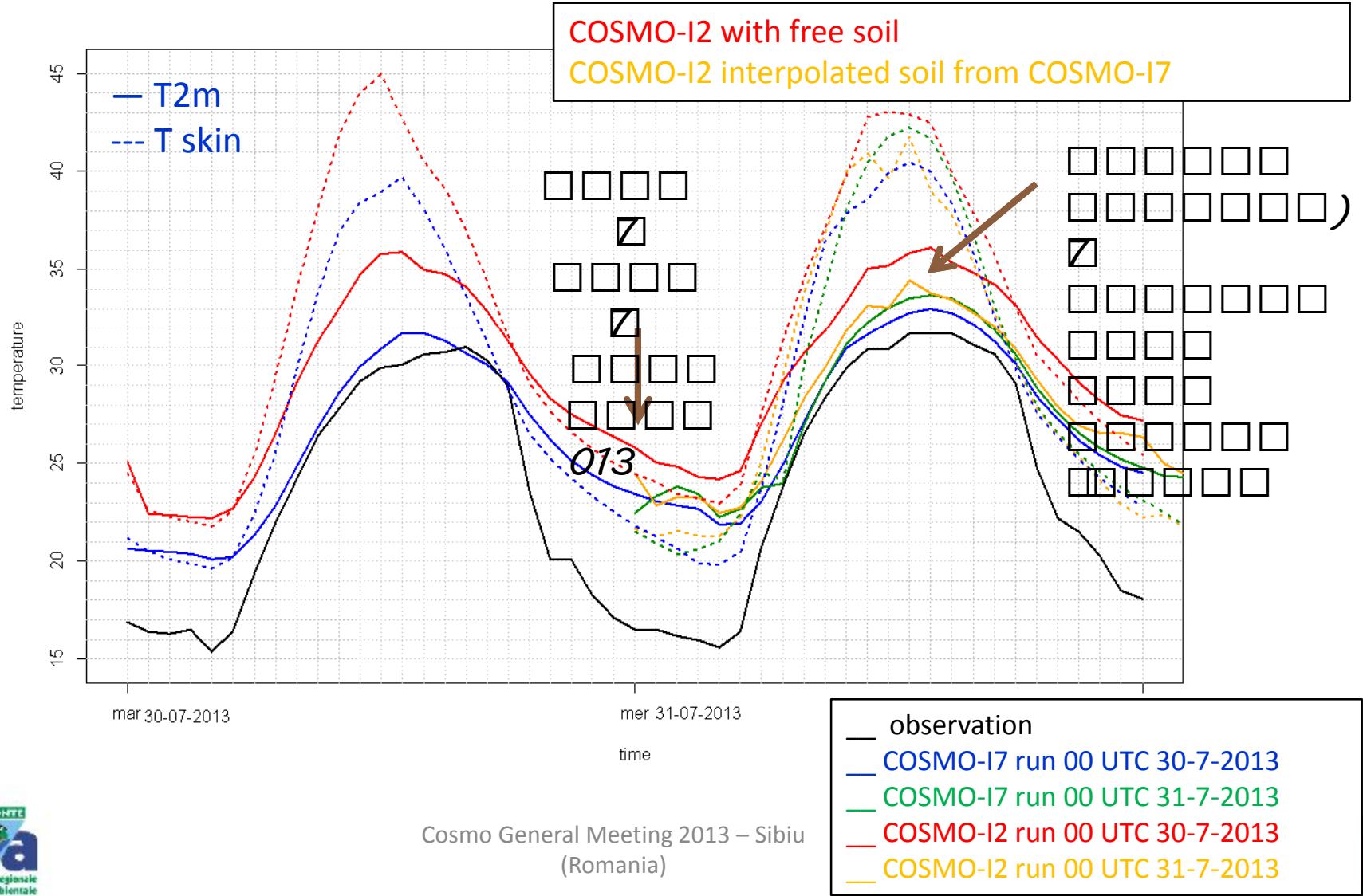
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Impact of different soil on T2m: a quick test



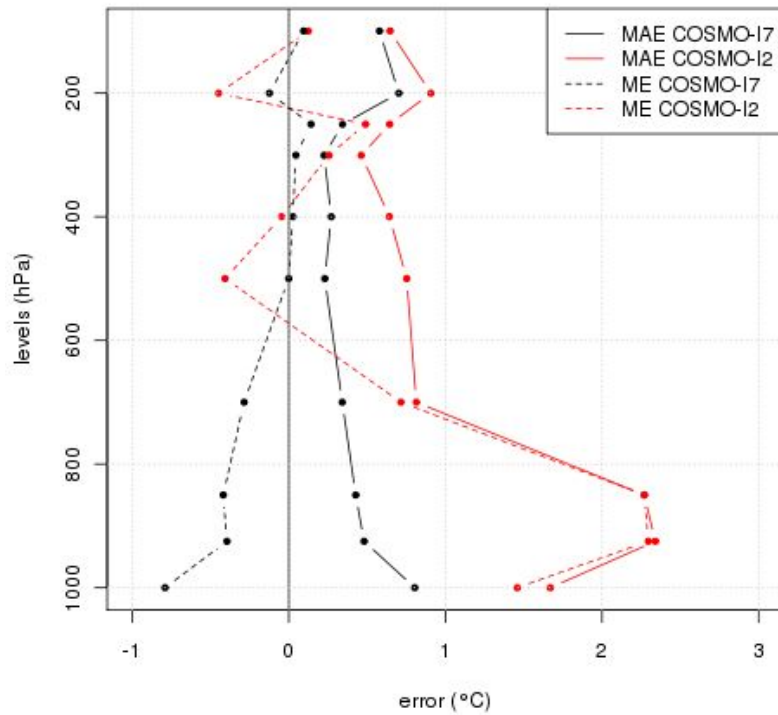


Impact of different soil on vertical temperature profile: quick verification

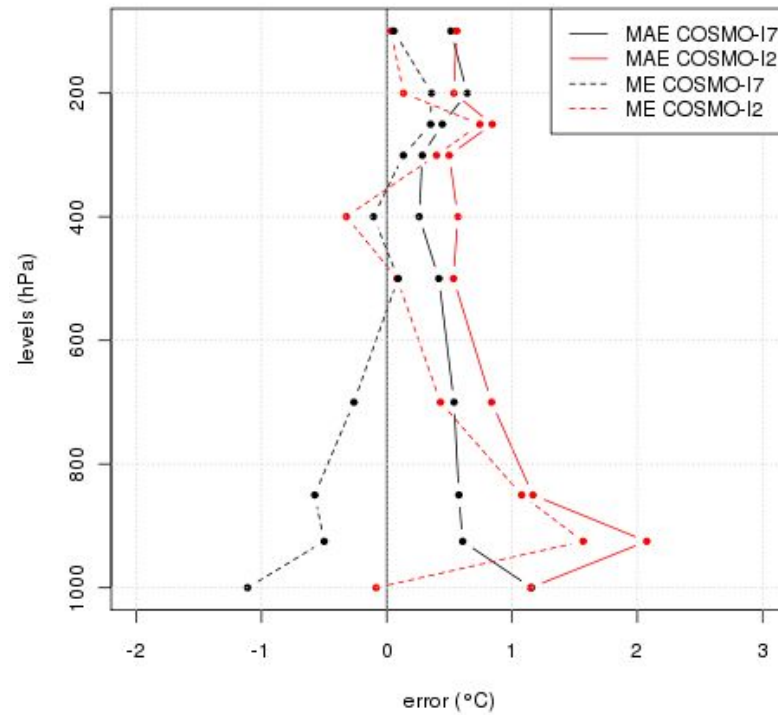
San Pietro Capofiume (16144)
COSMO-I2 free soil

San Pietro Capofiume (16144)
COSMO-I2 interpolated soil

2013-07-01 - 2013-07-31 16144 FC: 00 h



2013-07-31 - 2013-08-24 16144 FC: 00 h



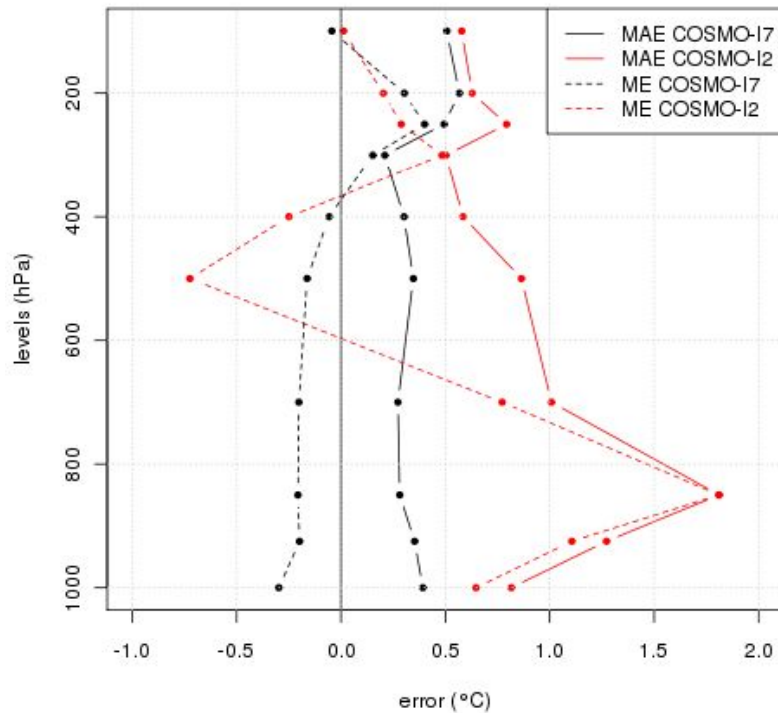


Impact of different soil on vertical temperature profile: quick verification

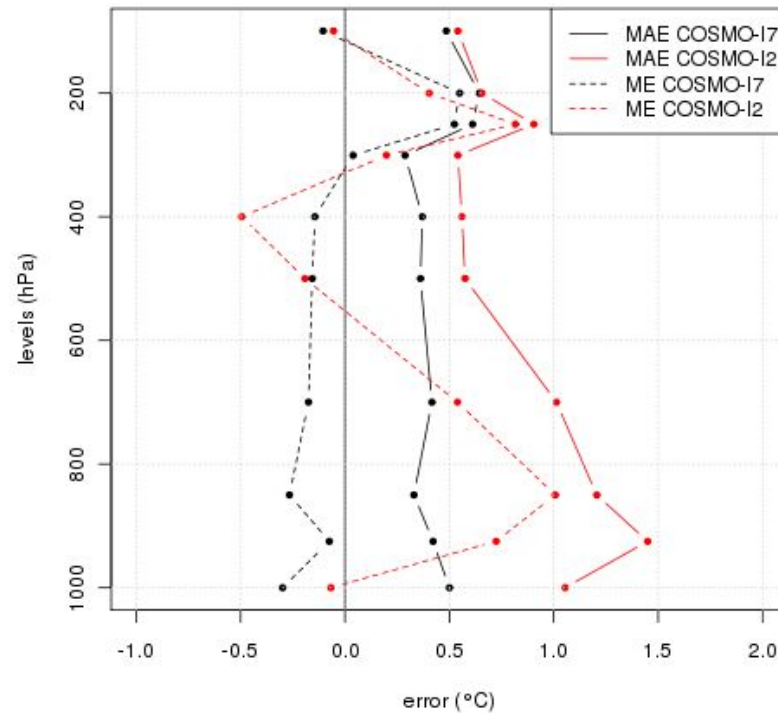
Pratica di Mare (16245)
COSMO-I2 free soil

Pratica di Mare (16245)
COSMO-I2 interpolated soil

2013-07-01 - 2013-07-31 16245 FC: 00 h



2013-07-31 - 2013-08-24 16245 FC: 00 h





notes



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- Other problems related to temperature in the Po Valley need more investigation in order to be solved...

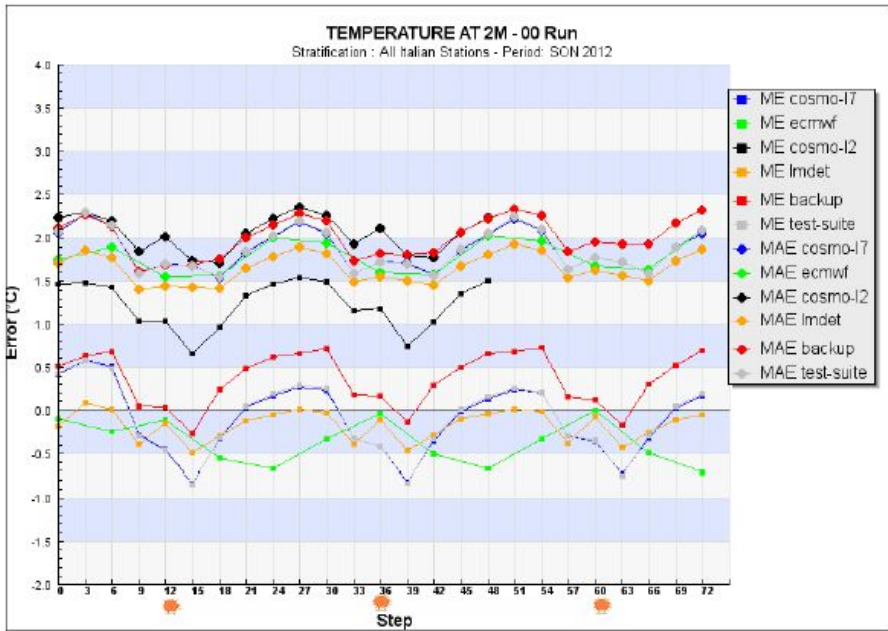


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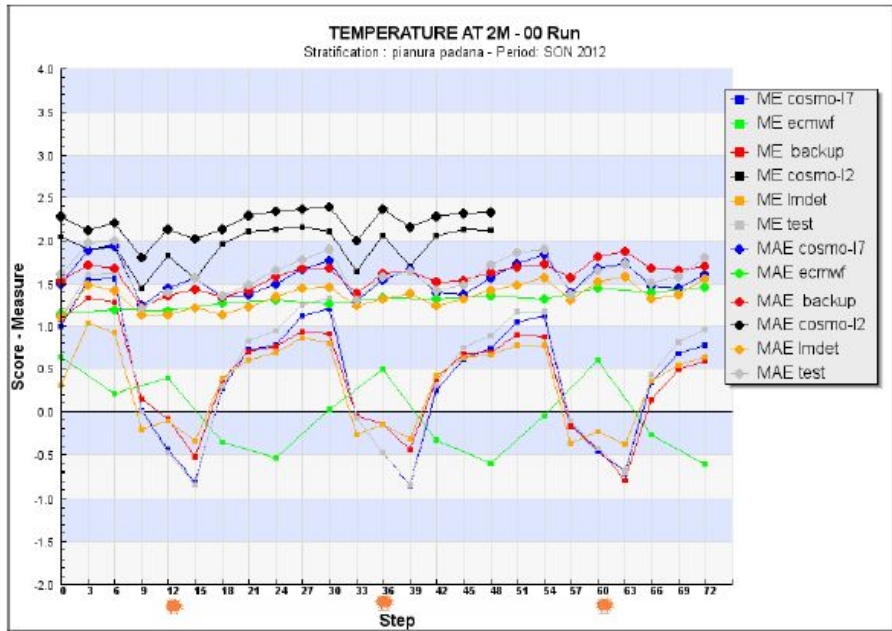
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Comparison with IFS-ECMWF



Italy



Po valley



Conclusion

- Upper air verification of the 7 km models pointed out some differences between Cosmo-I7 and Cosmo-Me, especially in Temperature
- A clear connection between the vertical profile errors and 2m temperature seems not evident if we consider Italy as the verification domain
- Considering instead the Po Valley stratification, the typical overestimation of temperature during night seems to be linked to temperature inversion that COSMO-I7 is not able to reproduce (not only in the boundary layer but up to 850 hPa)
 - Maybe this point need more investigation considering for example conditional verification with T2m with the condition of mean error of $T_{850} > 0$...
- Cosmo-I2 verification pointed out problems of 2mT general overestimation with exaggerated drop in MSLP, only partially linked to the soil definition because this behavior is common also to Cosmo-IT and Cosmo-2 at least in the Po Valley
 - The influence in the vertical profile of temperature is very evident
- Humidity was not considered in this presentation but it a crucial parameter to verify at all levels...



There's still a lot of work to do!!!



THANK YOU!