TOVS AND THE MM5 ANALYSIS OVER PORTUGAL

ITSC - XIV
Beijing - China

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SUMMARY

TOVS data retrieved from NOAA-16 satellite have been analyzed and compared with the one-way 3 nested domain integration of the NCAR/Penn State Mesoscale Modeling System - MM5. The analysis have been conducted throughout comparison with available observational data, from Lisbon radiosounding station as well as with the mesoscale model simulation data. The results show that vertical temperature profiles have small departures, compared with its humidity counterpart, with respect to both observations and model simulations. In order to figure-out the effectiveness of TOVS data in reducing the sounding data retrieval errors, particularly near surface, and to improve the precipitation forecast, the rainfall occurrence days, during October 2004 over Portugal, have been selected to simulate these events, using a weak constrained 4DVAR satellite retrieved data assimilation procedures. The results revealed that, although humidity data have retrieval errors, they contributes to improve the precipitation events forecast over Portugal.

OBSERVATIONAL DATA AND MM5 MODEL

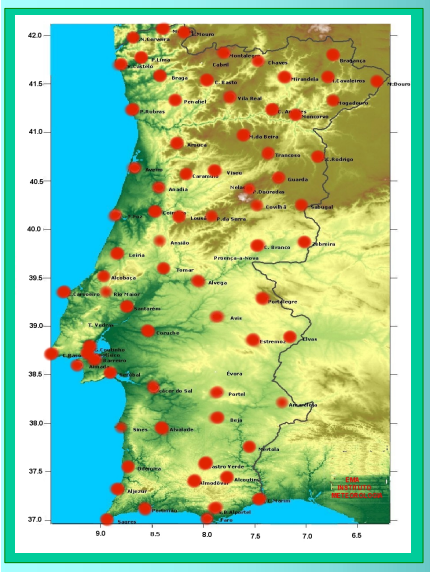


Fig. 1 : Surface Meteorological Stations (EMA)

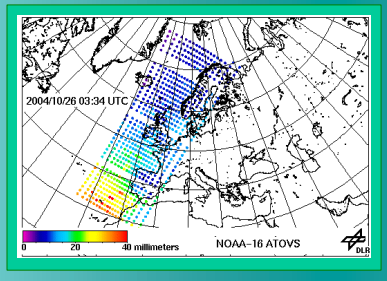


Fig. 2 : NOAA16 - Total water vapor

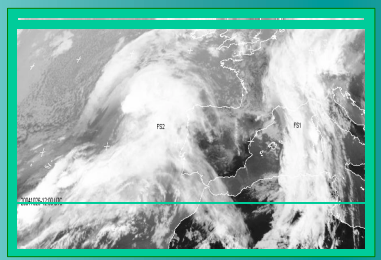


Fig. 3 : Meteosat IR 261004- 12:00 UTC

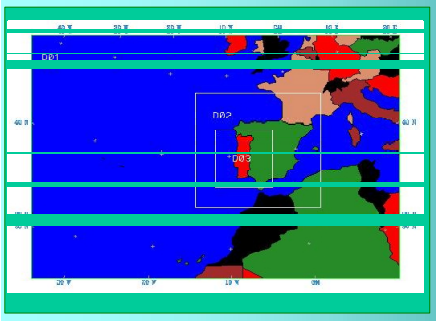


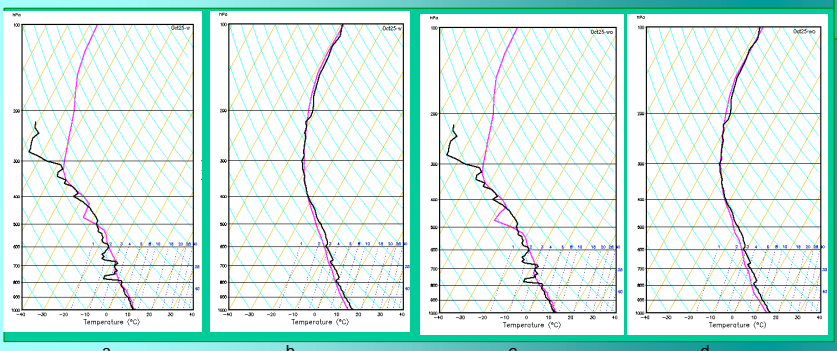
Fig. 4 : MM5 Domains

Mesoscale Model Configuration - Kain-Fritch 2 for D1 and D2 and Grell for D3. The explicit schemes of single ice of Dudhia, for D1 and D2; and Reisner mixed phase for D3.

MM5 - Model domains	D1	D2	D3
Horizontal Resolution (~ km)	81	27	9
#Grig points East-West	57	58	79
#Grid points North-South	39	55	73
Topography resolution (~ km)	56	19	9
Time step (seconds)	240	80	26,6

RESULTS

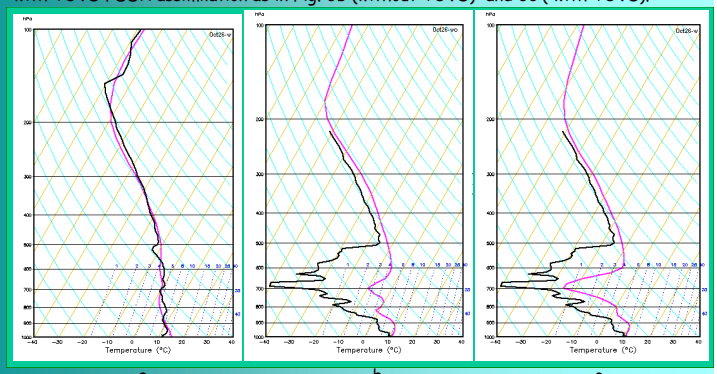
MM5 simulations have been made with surface data FDDA; with surface data and TOVS retrievd data FDDA. Fig. 5 show the profiles of radiosounding (black line) and MM5 simulated profiles (pink line). The results for October 25 : 12:00 UTC without TOVS (5.a – Temperature; 5.b – Dew Point Temperature) and the corresponding results with TOVS are in 5.c and 5.d.



a b c d

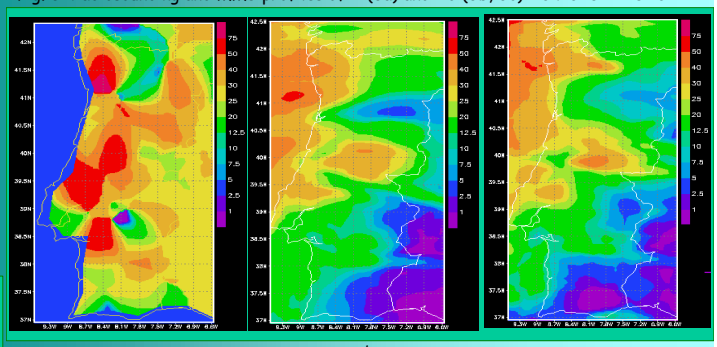
Fig. 5 : Radiosounding and MM5 profiles of T (5a, 5c) and Td (5b, 5e) – 041025: 12 UTC

Simulated Temperature profiles (MM5) present good agreement with radiosoundings as shown in Fig. 6a for 041026 – 12:00 UTC. Dew point (Td) Temperature improves with TOVS FDDA assimilation as in Fig. 6b (without TOVS) and 6c (with TOVS).

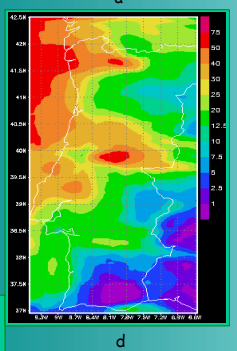


a b c

Fig. 6: Radiosounding and MM5 profiles of T (6a) and Td (6b, 6c) – 041025: 12 UTC



a b c



d

Fig. 7: Oct26 accumulated precipitation(im mm). 7a- Observed ; 7.b- MM5 without FDDA; 7.c – MM5 with surface data FDDA; 7d – MM5 with surface and TOVS data FDDA.

CONCLUSION

The comparisons of the vertical temperature profiles of MM5 simulations with the available radiosounding data of 12 :00 UTC from Lisbon presented a relatively good agreement on all cases : without surface data FDDA; with surface data FDDA; with TOVS data FDDA and with bloth surface data and TOVS data FDDA.

The breakthrough of the TOVS data assimilation using the FDDA in the MM5 have been on the dew point temperature profiles, which presented a relatively good improvement and therefore contributing for the improvement of the rainfall forecastings. Due to lack of desirable vertical resolution near surface, TOVS data does not presented a noticeable improvement in the surface parameters forecastings. However this is a subject under investigation as well as gethering of quantitative results statistics.

ACKNOWLOGMENT

The research has been supported by Science and Technology Foundation (FCT) under grant FCT/REEQ946/2001, as well all first authors' support FCT/BD/19284. The authors thank to National Meteorological Institute (IM) of Portugal and to the German Aerospace Center (DLR)/ German Remote Sensing Data Center for providing the data.

International TOVS Study Conference, 14th, ITSC-14, Beijing, China, 25-31 May 2005. Madison, WI, University of Wisconsin-Madison, Space Science and Engineering Center, Cooperative Institute for Meteorological Satellite Studies, 2005.