

EXTREME EVENT: HEAVY SNOWFALL ON THE TRENTO REGION ON 11 MARCH 2004

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Abstract: an extreme event of heavy snowfall occurred in the last 11 march 2004 in many regions of the north Italy. It was one of the most important events of snowfall in the winter season 2003-2004 and it was really unusual for the period. The possibility of snowfall at the lower levels was forecasted two days before but the quantity of the precipitation was generally underestimated by the models. This event caused many problems to the civil protection and to the public above all in the traffic and the increasing avalanche risk.

Keywords - ICAM, MAP, Croatia

1. INTRODUCTION

A heavy snowfall occurred on 11th march 2004 in many regions of the north Italy. Beginning from the first hours in the night the precipitation has interested the Trentino region above all during the morning till on the plain. At the end of the event the new snow was about 70-130 cm on mountain areas over 1000 m. In the valleys the new and very wet snow was about 10-20 cm and has interested all the region except the southern valleys (Valle dei Laghi and Val d'Adige).

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2. METEOROLOGICAL ANALYSIS

The event has been determined by a disturbance that approached the Alps yet on 10th march (Figure 1). Changeable cloudiness with some light scattered snowfalls has been observed in the morning on 10th march. Then the cloudiness increased and from the night began to fall widespread moderate precipitation with snow till the valleys. On 11th march a deep and cold trough crossed the north Italy with strong wet southwesterly flows at the lower levels. Precipitation became heavy in the morning and until the afternoon. At the end of the event the new snow was about 70-130 cm on mountain areas over 1000 m with the higher values over southwesterly areas.

3. OBSERVED VALUES

In figure 2 are reported the new snow values measured by the manual observers who survey every morning the blanket of snow on mountain sites (over 1000 m). The higher values, more than 100 cm, have been observed on southwesterly areas: 130 cm in Madonna di Campiglio (1650 m), 125 cm in Malga Bissina (1750 m) and 112 cm in Rifugio Trivena (1660 m).

In the valley stations the precipitation measured contain rain and snow. The precipitation total amount has been about 60-75 mm in 18 hours. In Trento and surrounding area the new snow observed was about 20 cm.

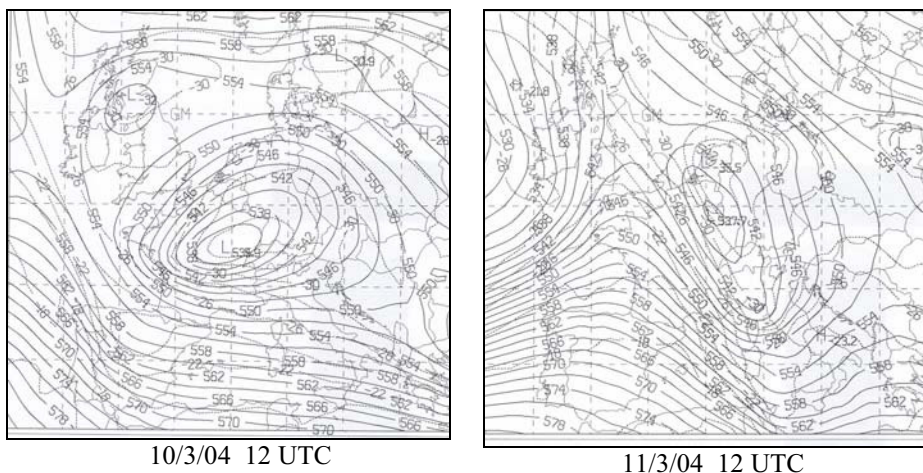


Figure 1. Geopotential and Temperature – 500 hPa (ECMWF)

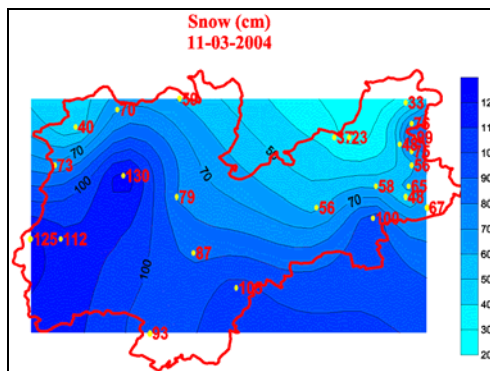


Figure 2. New snow observed on mountain sites (over 1000 m)

In figure 3 is possible to observe the behaviour of some meteorological parameters observed in the Trento Laste station (300 m): solar radiation, pressure, temperature, humidity and precipitation from 10th march 12 a.m. to 11th march 24 p.m.. The presence of solar radiation confirms that on 10th march there has been partly cloudy sky while pressure and temperature values began to decrease during the afternoon. After the maximum value of about 4°C observed at 10 a.m., temperature decreased until 2°C keeping stationary until 8 p.m.. Then temperature fallen to 0°C keeping between 0 and 1°C until 2 p.m. when began to increase again. After 9 p.m. a fall in pressure was observed until 4 a.m. of the day after. Pressure held stationary until 12 a.m. and then began to increase again. About at 8 p.m. the precipitation began to fall and from 1 a.m they became snowfall. The intensity increased until a maximum from 7 to 9 a.m.. Precipitation ended at 1 p.m. and then an improvement of the weaher condition was observed. In Trento and surrounding area in about 18 hours has been measured 61,8 mm of rain and 20 cm of new snow.

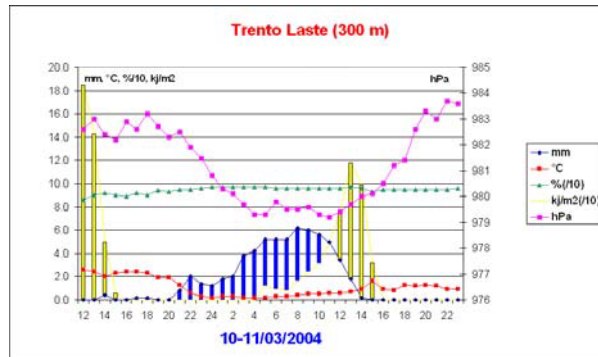


Figure 3. Meteorological parameters observed in Trento Laste station (300 m)

4. FORECASTED VALUES

The possibility of snowfall at the lower levels was forecasted two days before but the quantity of the precipitation was generally underestimated by the models. In figure 4 are reported two different forecasts for 12 UTC Thursday 11 March of the total precipitation cumulated on previous 12h and provided by BOLAM Model. This model was one of the best in predicting the event. On the left side is reported the forecast of two days before (run00–9/3/04 +60) while on the right side is reported the forecast of the previous day (run00–10/3/04 +36). In the D-2 forecast the total amount of precipitation doesn't exceed 10 mm/12h. The D-1 forecast increased the values and we could expect a changeable quantity from 10 to 30 mm/12h with the maximum values in the southwesterly areas.

As announced the event was predicted two days before but the quantity was underestimated.

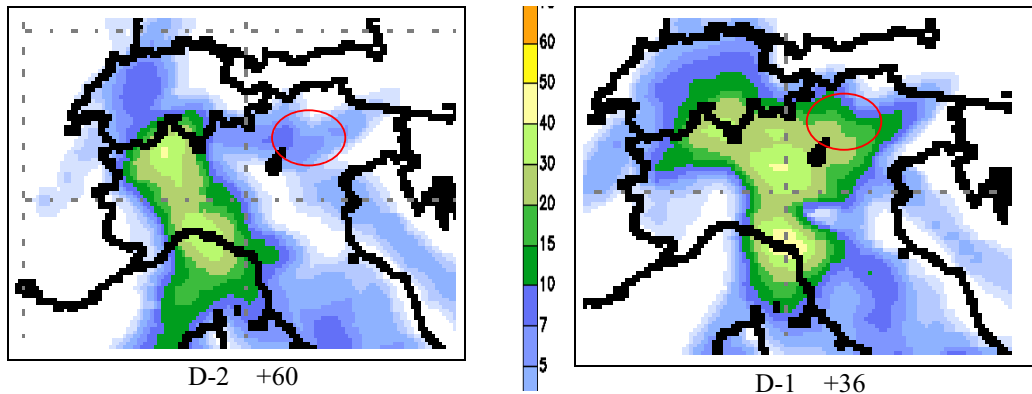


Figure 4. Precipitation forecasted on 11th March - 12 UTC two day (D-2) and one day (D-1) before the event by BOLAM Model

5. CONCLUSION

An extreme event of snowfall precipitation was described. The models generally underestimated the quantity of the precipitation but in any case they gave the opportunity to inform about possible problems due to snowfall at lower levels. Anyway the error in the estimation of the intensity didn't give the opportunity to the Civil Protection to prevent the problems in a proper way.

This event has revealed again the necessity to improve the meteorological information to supply the Civil Protection in case of extreme events.