Deutscher Wetterdienst (DWD) meteorological data set for the development of a flood forecasting system

Gdaly Rivin, Erdmann Heise

Deutscher Wetterdienst, Research and Development, 63067 Offenbach, Germany
http://www.dwd.de, Gdaly.Rivin@dwd.de, Erdmann.Heise@dwd.de

The development of a European flood forecasting system for early flood warning up to 10 days in advance [1,2] on the basis of the ensemble prediction system of the European Centre for Medium Range Weather Forecasts (ECMWF) is supported by examining historical flood periods. In co-operation with ECMWF and with the Danish Meteorological Institute, DWD prepared data sets which include all meteorological fields necessary as input fields to hydrological models. Four flood cases in different European river basins for different seasons (autumn, winter and summer) were investigated: a) Po – 1994, November, b) Rhine, Meuse – 1995, January, c) Odra – 1997, July, d) Elbe — 2002, August.

The fields are based on the analysis of observed precipitation and on model forecasts:

- 48 h forecasts by DWD's limited area model LM [3] (ca. 7 km resolution, model area is Central Europe, data provided at hourly intervals);
- 156 h forecasts by DWD's global model GME [4] (model resolution ca. 60 km, data provided at 6 hourly intervals on a $0.75^o \times 0.75^o$ grid with NW-corner at 75^o N, 35^o W and SE-corner at 30^o N, 45^o E);
- analyses of 24 h precipitation observations for the LM area in ca. 7 km resolution.

In Figure 1 results are shown for the region of the Alps and of Northern Italy. The analyses of the observed precipitation distribution for November 05, 1994, 06 UTC to November 06, 1994, 06 UTC are based on the routinely distributed measurements of Synoptic stations (631 observations in this case, Figure 1a), and on the same stations but additionally observations collected during the Mesoscale Alpine Programme (631 + 5173 observations, Figure 1b), respectively. For comparison, a 18 to 42 hours forecast by LM is given (Figure 1c), which started at November 04, 1994, 12 UTC. From this figure we can conclude that a) the use of high resolution precipitation data provides analyses significantly different from analyses based on Synoptic data only, b) LM gives a very good indication of tremendous rainfall in the eastern part of the Alpine arc, and c) LM overpredicts the amount of precipitation in this case.

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References

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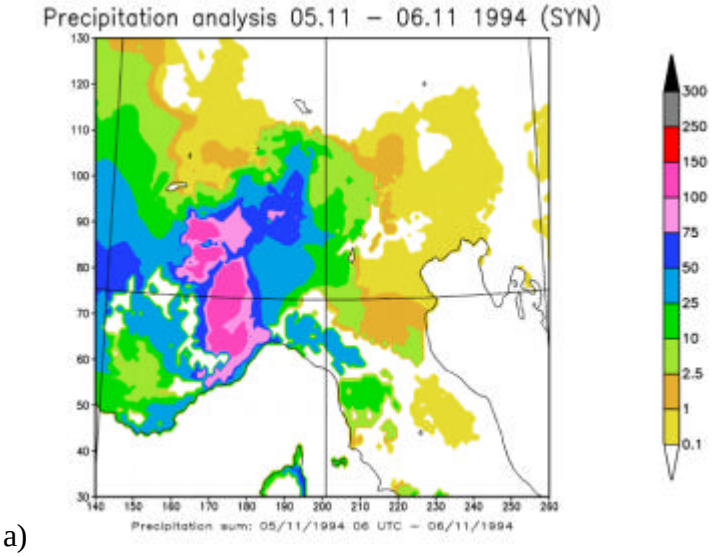
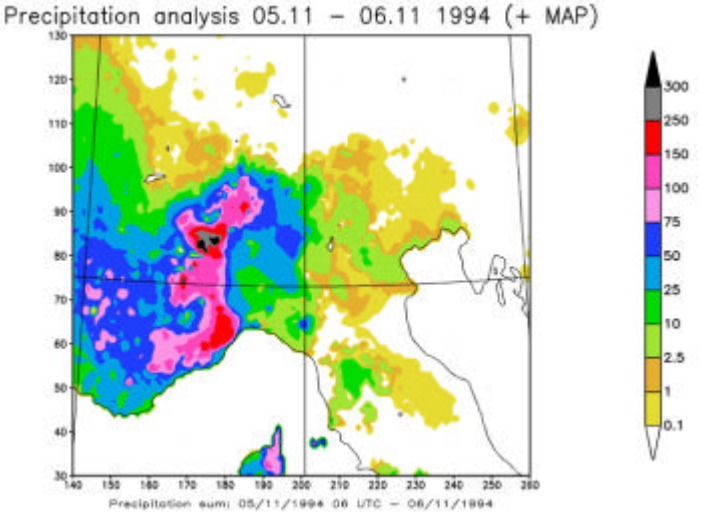


a)



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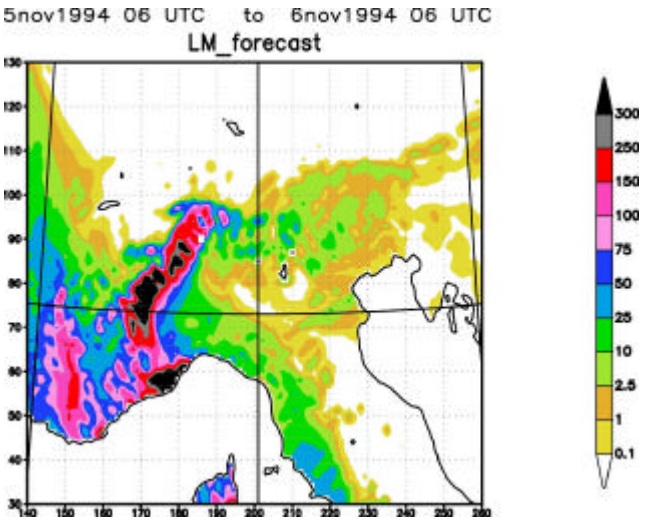

c)

Figure 1: Precipitation distribution (kg/m^2) for 05 Nov, 1994, 06 UTC to 06 Nov, 1994, 06 UTC. a) Analysis based on network of synoptic stations, b) analysis based on synoptic and MAP stations, c) model prediction. See text for details.