FLOOD AND THE ROLE OF LIMITED AREA MODELS
The 2002 Flood Disaster and "ALADIN AUSTRIA"

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Abstract: For meteorological forecasts in disaster control exact assignment to position, beginnig and end of precipitation is necessary. Limited area models (LAM) are therefore suitable. The LAM „ALADIN Austria", developed by ZAMG is depicted and the visualisation system ACuVis is shown.
For the flood period of August 2002 in Austria a verification of ALADIN Vienna (now: ALADIN Austria) precipitation forecasts is carried out. There has been good accordance with radar data and rain gauge measurements.

Keywords*: ICAM, MAP, Croatia*

1. INTRODUCTION

In the beginning of August 2002 a prominent upper low moved from France to Italy. Cold air advection intensified cycolgenesis over the North Mediterranean area. From the gulf of Genua the depression moved to the Northeast following a typical Vb- path. Heavy precipitation had been the consequence in Austria. On Sunday, 11.08.02 100 mm precipitation in 24 hours was exceeded. On Monday, 12.08.02 the cyclone reached Hungary. The northwesterly flow transferred the maximum of precipitation to the North of the Alps. Positive vorticity advection played a role in intensifying the rain fall. Severe floodings were registered.

2. ALADIN AUSTRIA AND ACUVis

ALADIN-AUSTRIA is a hydrostatic, spectral limited area model coupled to its global counterpart ARPEGE. It is adapted for Austrian purposes from the model-group of ZAMG. The model followed ALADIN-Vienna.

The new NWP-LAM system ALADIN-AUSTRIA has the following main characteristics:

- Vertical resolution is increased from 37 to 45 levels, where most additional levels are set in the lower troposphere.
- The model domain is almost the same as ALADIN-LACE
- The horizontal resolution is 9.6km, similar to ALADIN-VIENNA.
- Integration to 48 hours, twice a day at 00 and 12 UTC

ACuVis is a customized visualization tool specifically designed to view 5-dimensional gridded data produced by numerical weather prediction models. 2D and 3D fields can be viewed either in horizontal or vertical animated slices. Animated soundings can also be displayed at any point in the data set. Color scales are tailored to each variable individually. Some fields are computed on-the-fly to minimize file size and memory requirements. Time interpolation is used to provide smooth loops even at low frame speeds.Data from multiple files (different model runs) can be displayed at the same time in the plan-view, slice, temp and meteogram displays. The high resolution topography image can be combined with an image visualization of a field.

- Streamline visualization of wind fields
- Flow visualization of wind fields using particles
- More flexible scale control: adaptive scales, linear scales for precipitation

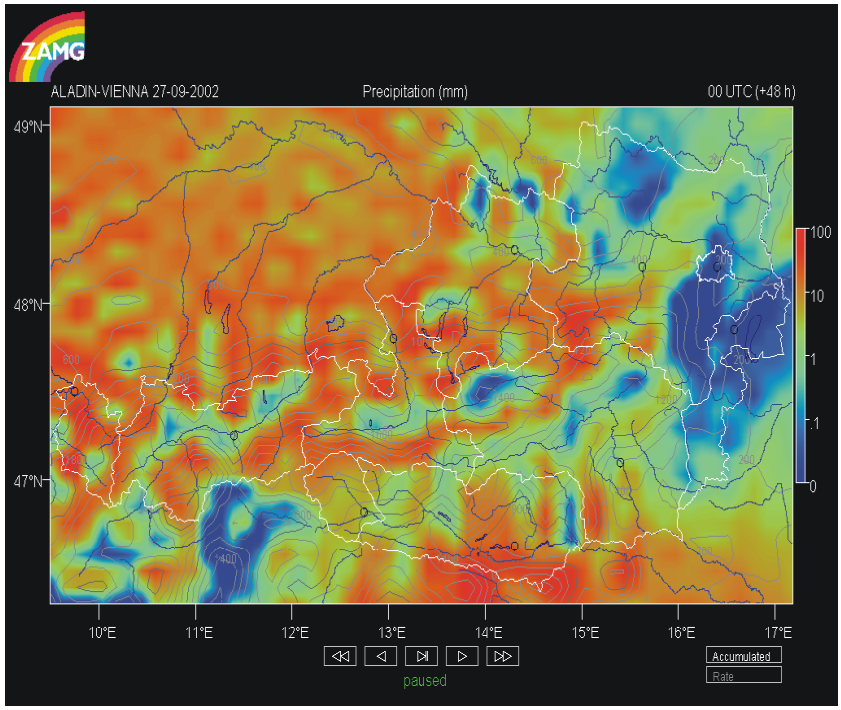

Figure 1. Example of an AcuVis forecast date: precipitation. An animation in hourly steps can be selected.

3. VERIFICATION OF THE MODEL ALADIN-AUSTRIA FOR THE CASE OF HIGH WATER SITUATION FROM 10 TO 13 AUGUST 2002

ALADIN-Austria is compared to the measured precipitation-amounts.

In figure 2 the precipitation forecast from Sunday to Monday 6 to 12 UTC can be seen. This picture shows in place of other model dates that the forecast of precipitation was very precise.

In comparison in figure 3 the corresponding radar image (Monday, 07:45 UTC).

The main area of precipitation (upper Austria, Salzburg, Enns valley) seems to be very good captured by the model.

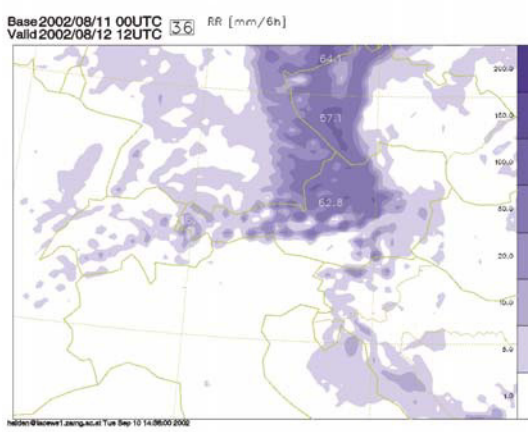

Figure 2. Precipitation forecast ALADIN Vienna

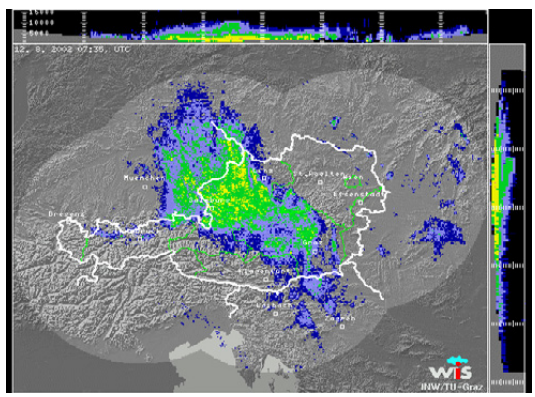

Figure 3. Radar image WIIS/ TU Graz

4. EVALUATION IN STYRIA

For this purpose two representative weather observing stations (Aigen / Ennstal for the upper part of Styria and Graz for the South of Styria) were chosen.

The evaluation of the precipitation values for Sunday and Monday takes place from 00 UTC to 00 UTC, corresponding to 24 hours.

The forecast amounts from Saturday were reached nearly in the southern parts, for Aigen/ E. however the values were overestimated. (Figure 4)

For Monday, the 12 August the forecast amounts matched also for the upper part of Styria exactly. (Figure 5)

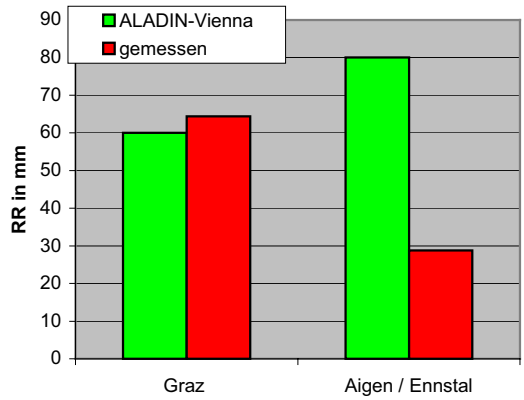

Figure 4. Precipitation forecast / observed Model run Saturday

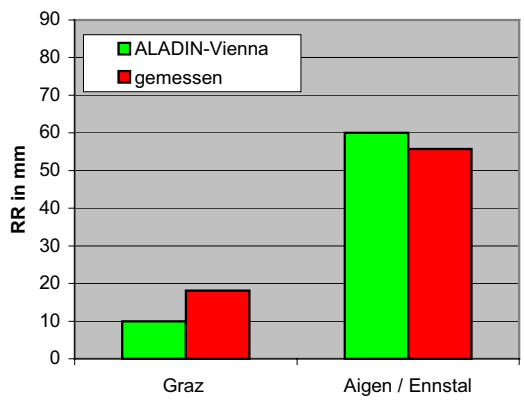

Figure 5. Precipitation forecast / observed Model run Sunday

5. CONCLUSIONS

In general we can say that ALADIN-Austria supplied good forecasts for Styria. Only for the North part of Styria the values were something overestimated. In the South the error rate lies only within a few percent.

By the way ALADIN-Austria produced also very ecact precipitation forecasts for the first high water case from the 06. to the 08. August in Kamptal and Waldviertel (concerning the extreme high area amounts of precipitation). It is a sign of quality of the model too that in the short range up to 48 hours precipitation was forecast which never in this intensity was registered in the considered area since the existence of the model (1998).

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