NowCastMIX – a Tool for AutoWARN on the Way to Centralisation of the Warning System at Deutscher Wetterdienst (DWD)

Introduction

Shortly after the political unification of the Federal Republic of Germany and the German Democratic Republic, and the subsequent unification of the two weather services, the German Weather Service (DWD) had a staff of over 3000 employees. Due to budget cuts and government orders, the number of staff has been reduced to about 2400 employees. This meant that also in the business area weather forecasting jobs had to be reduced, partly by giving up tasks such as forecasting for the media to private weather companies. Because weather warning and advisory for disaster management authorities is a core task of DWD, it was possible to keep the quality of service high with those employees that were left. But even in the coming years, as part of DWD’s strategy paper 2015+, it is intended to cut staff further. To keep the high standard of weather forecasting unchanged and still increase the quality of service, DWD is planning a significant centralization of the warning system, as well as maintaining the regional structure of its 6 offices. Therefore DWD is developing AutoWARN until 2015, a project which integrates meteorological products in an automated warning process with manual monitoring, warning proposals and decision capabilities by the forecaster. One component of the project is NowCastMIX which is currently in the operational test phase and delivering first results.

Reduction of Staff and increase of Efficiency with AutoWARN

The German Weather Service had a staff of over 3000 employees shortly after the political unification of the two states of Federal Republic of Germany and the German Democratic Republic and the subsequent unification of the two weather services. Due to budget cuts and government orders the staff has been reduced to about 2400 employees between 1991 and 2011 (Fig. 1) (Deutscher Wetterdienst, 2011).

Even in the following years, there will be further job cuts. The business area weather forecasting will be affected by this too. To maintain the quality of the warnings and service for the civil protection authorities and to further improve and increase efficiency, DWD plans to centralize forecasting and warning services, but will also maintain the regional structure of its 6 regional centres. It is planned to cut service times at the regional headquarters from 24/7 service hours to 05.30 - 22.00 hr (in the event of severe weather until 24.00 hr), by which staff numbers will be reduced. At the same time the forecast personnel will be downgraded from class I to class II meteorologists at regional offices to reduce salaries. This process has already taken place gradually since 2011/2012. In the final stage from the year 2015 on about 60 jobs will be saved in the regional centres (Fig. 2).
To keep the quality of the DWD warnings and weather services high and still further increase it, significant centralization of the warning system without closing the 6 regional offices is planned. Therefore DWD is developing AutoWARN until the year 2015. AutoWARN (Reichert, 2009) is a project which integrates meteorological products in an automated warning process with manual monitoring, warning proposals and decision capabilities by the forecaster. AutoWARN consists of several parts that run in partially automated manner, using as input all available observations, radar and lightning and numerical products (Fig. 3). Pre-results are monitored in AutoMON and if warning thresholds are exceeded they will be indicated to the forecaster on the screen. On the level of AutoWARN status generator (ASG) the forecaster will get warning proposals for the whole area of Germany. In the AutoWARN Status Editor (ASE), he has the opportunity to adopt these suggestions for warning manually or to amend it and pass it on to “External product generation, distribution” (PVW) for distribution to the customer. Since forecasters have the ability to edit the warnings and warning areas manually in the transition from the ASE to ASG, they will still be needed. This work will be centralized and be done only in the central forecasting office.

**NowCastMIX**

Currently AutoWARN is still in the development phase. First results show that the warning proposals fail, especially during convective situations in summer. They are too unstructured and too numerous. Therefore, the project NowCastMIX (James, 2012) has been developed to pre-process input which is dropped into the automated warning process (Fig. 4).

Under NowCastMIX all available nowcast-products, i.e. observations, statistical and numerical products, are passed through a fuzzy logic process (Fig. 5 & 6) and are then forwarded via AutoMON to ASG.

Initial results from the test phase of AutoWARN show that warning proposals of ASG are smoothed and are synoptically more logically structured after pre-filtering by NowCastMIX.

An example from July 2010 with a summer cold front with temperatures before the front of about 30°C and 10°C lower values following the front is shown in Fig. 7.
Without NowCastMix the proposed ASG club-shaped warning areas shows a useful indication of the stormy cold front, but however also wrong direction and speed indicators, especially behind the front (Fig. 8).

With NowCastMix and smoothing with a vectorial movement of storm cells Fig. 9 shows that the areas with warning proposals are improved considerably and are displayed to be synoptically more useful.

Figure 11 shows an example of warning areas, as they are proposed by ASG to the meteorologists for further manual processing. The areas are clearly structured and smoothed. The areas behind the cold front now also show the more likely movement of convective cells in contrast to the chaotic movements before using NowCastMix, as shown in figure 8.

**Summary**

The German Weather Service is still under pressure to reduce its staff in weather forecasting. Nevertheless, to maintain the quality of weather warnings and forecasts and to improve quality, many parts of this process will be centralized. To assist the forecasters in predicting larger warning watch areas the partly automated process of the AutoWARN project will be developed. In the current test phase early results demonstrate that warning proposals are, especially during convective weather situations in summer, partly unstructured and do not provide meaningful warning proposals. To manage this NowCastMix was developed. In NowCastMix all available nowcast-products are filtered through a fuzzy logic process and deliver better results, Forecasters get better and more meaningful proposed warning areas.

**References:**

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