TORNADOS IN GERMANY – ACTUAL DEVELOPMENTS AT DWD

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I. INTRODUCTION

The presentation will treat the topic Tornados from the point of view of DWD as the National Meteorological Service (NMS) of Germany. Some information will be given concerning the statistics of Tornados in Germany in the last years and the cooperation of DWD with ESSL and Skywarn Germany. It will be reflected the different activities at DWD in relation to Tornados, especially the efforts in implementing new methods such as integration of a Mesocyclone detection algorithm in NinJo (DWD Weather Presentation System). An overview of the actual warning management for this severe weather phenomenon and an outlook to future activities in this topic will be given.

II. PRESENTATION OF ACTUAL TORNADO-ACTIVITIES IN DWD

Since 2007 DWD has started his full membership in the ESSL organization. The presentation will give an overview of the participation of DWD in the field of ESWD. In the scope of this cooperation DWD has installed a special version of ESWD in DWD. Together with ESSL a new structure was developed to archive the ESWD data in DWD. The ASCII based data set was transformed in the DWD operational data base MIRAKEL. This offers the opportunity that ESWD information can be used in DWD with other operational data sources for further investigations. In the DWD Intranet a special user interface is available for including new reports to ESWD. There is built up a data exchange between the ESWD data server at the ESSL site and MIRAKEL data base at DWD. There are stored all severe weather reports for Germany.

One important area of activities is the topic of eyewitness reports. As well for the realistic climatology of Tornados as for a possibility of an effective warning management it is necessary to have enough and trustworthy eyewitness reports. Beside the cooperation with ESWD DWD has started in 2006 the project “Severe weather observation”. On the DWD internet warning site (www.wettergefahren.de) an online forum for the public is available. Every year several thousands of reports were received over this platform. But every of these reports has to be manually checked before it will be used e.g. for warning activities in DWD.

Especially for receiving time critical and plausible reports DWD has established a close and fruitful cooperation with Skywarn Germany. Up to the beginning of 2009 Skywarn has disseminated reports from Advanced Spotters with emails in form of voicemails in an mp3 data format. With this technique aroused some problems, like difficulties in understanding of recorded handy calls and in the time critical dissemination of the relevant emails. Since 2009 Skywarn has started a new digital reporting system, which is starting to use now in DWD. This digital information will be made available in future versions of the DWD meteorological workstation NinJo. The Skywarn Spotter reports could then be also used in future in a directly manner in the DWD warning system.

The operational DWD radar network consists of 16 Doppler radars. A Doppler radar is capable of discovering strong azimuthal shear regions typical for Mesocyclones. The velocities measured by a Doppler radar within such a vortex range from zero up to a maximum depending on the currently measured radial component of the vortex. In the last two years a Mesocyclone detection algorithm (MDA), formerly developed at the Storm Prediction Centre (SPC) in Oklahoma and also in use at the Meteorological Service of Canada (MSC), was transformed to the DWD radar network and evaluated with the different synoptic conditions in central Europe. The goal is to detect Mesocyclones by a pattern recognition algorithm. The MDA is searching for the typical signature, such vortices leave within a Doppler velocity field, the so-called RCV (Rankine Combined Vortex) velocity profiles.

The MDA is running within the meteorological software NinJo. It is completely embedded in the NinJo architecture and uses its features to process and visualize the data. After the processing is done, a warning status is generated and displayed. The status contains the severity index. It ranges from one to five (max. severity) and is based upon a set of parameters.

During the convective season 2009 the MDA and other related new tools are actually being evaluated in the Forecast and Advisory Center of DWD in Offenbach. First results of the preoperational usage of the new MDA tool will be presented. In Figure 1 an example of recognized Mesocyclones is shown, in combination with reflectivity and lightning data in the area of the Rhine valley near the town Baden-Baden. At the valid time of this picture a F2 Tornado was observed in the central town of Baden-Baden.

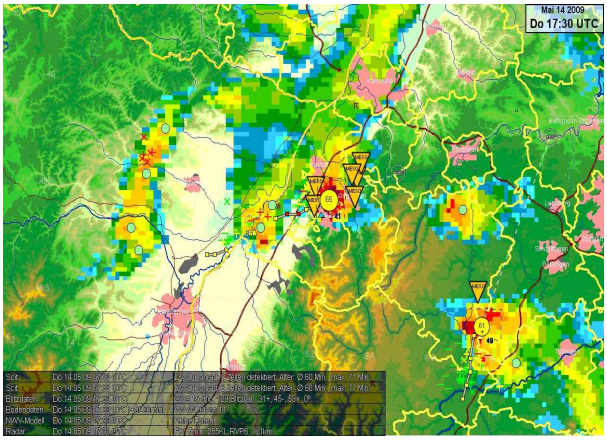

FIG. 1: Example of the Mesocyclone Detection Algorithm visualized with NinJo

III. RESULTS AND CONCLUSIONS

Tornados are also in Germany dangerous weather phenomena. Therefore DWD, as the NMS of Germany is engaged in this topic and active in the climatology and detection of Tornados. In this field DWD is involved in the ESWD, has become a full institutional member of ESSL and built up a close cooperation with Skywarn Germany. State of the art technologies are in use for the risk assessment and warning management of Tornados. Since 2006 Tornado warnings has become an official part of the DWD warning management. All these activities will lead to an optimization of the DWD warning strategy concerning severe thunderstorms and Tornados.

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V. REFERENCES

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