

Cooperation between National meteorological service and amateur meteorological associations in the Czech Republic

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ABSTRACT

National meteorological service cooperation with amateur meteorological associations is an important part of severe storm mapping. There are two major amateur societies in the Czech Republic: Amateur Meteorological Society (AMS) and Czech Thunderstorm Research Association (CTRA), which cooperate with Czech Hydrometeorological Institute (CHMI) on the basis of bilateral agreements. At the same time, these associations also cooperate with ESSL and deliver quality reports of the occurrence of dangerous phenomena to the European Severe Weather Database (ESWD). Currently CHMI is not capable to provide sufficient coverage of all occurrences of dangerous phenomena, particularly in the case of strong storms in the Czech Republic. The cooperation with amateur societies seems to be the most useful. Based on sample case studies that associations have dealt with, we point to the usefulness of their work and the scientific contribution to mapping impacts and damage in the field. AMS dealt with the situation of a very strong storm on August 11, 2017, which had a wider impact on several Central European countries, especially Poland, and in which 3 derechos were subsequently detected. CTRA dealt with the study of strong storms on the cold front from September 23, 2018, when two tornadoes were occurred most likely in the west of the Czech Republic. Both case studies show that even the amateur meteorologist sector can provide valuable and quality data that can be used as a basis for various scientific studies, but can also be a valid source of information for the wider public.

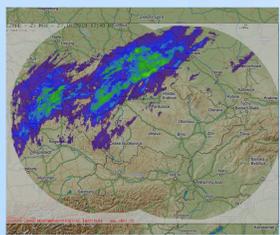
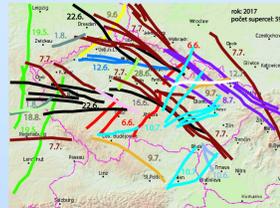
HISTORY

The first larger informal associations of amateur weather observers were established as early as 2000. They were often associated with the advent and expansion of the Internet and subsequently of social networks, as well as the massive expansion of digital photography. All these aspects have allowed for a much better exchange of information in the monitoring of severe storms, and have also improved the possibilities for monitoring. During this turbulent period, it turned out that it would be desirable for these organizations to operate within a defined legal framework. On the one hand, it would define the activities of these amateur organizations and, on the other hand, would facilitate communication or exchange of data with the National Meteorological Institute. It is based on the fact that the activities of amateur organizations remain non-commercial and focus primarily on research into severe storms. Based on these principles, the Czech Hydrometeorological Institute has concluded cooperation agreements with amateur organizations in the past, in particular the exchange of data (radar, satellite, lightning data), which should not be used for commercial but exclusively for research purposes. At the same time, the two largest Czech amateur meteorological organizations contribute significantly to the filling of the ESWD database with dangerous phenomena. CHMI does not have sufficient capacities for detailed mapping of all dangerous phenomena occurring in the territory it administers. The role of amateur societies in this case is irreplaceable, as it complements a number of white spots that the national service would not be able to cover in sufficient breadth and quality.

Amateur Meteorological Society (AMS)

It was officially founded in 2012, since 2015 cooperates with ESSL. The objectives of AMS are:

- documentation, research and experimental predictions of dangerous meteorological phenomena and their presentation on the website (www.bourky.cz)
 - website management www.bourky.cz (.com), www.skywarn.cz, www.tornado-cz.cz, www.amaterskameteorologie.cz
 - educational and preventive impact on the public, dissemination of information on these phenomena and the dangers associated with them, as well as popularization of meteorology in the Czech Republic
 - cooperation with the CHMI and official meteor. institutions within the EU
 - cooperation with foreign organizations of similar focus, especially with other sections of SKYWARN within the European Union.
- Cooperation between AMS and CHMI brought together a common website that maps current and historical cases of tornadoes in the Czech Republic. (<https://www.tornado-cz.cz/>)
- In cooperation with the Czech Hydrometeorological Institute and other entities, they have prepared web products for the public as well as iOS and Android applications (i.e. Supercell historical database in the Czechia, elaborate radar imagery, mobile apps iRadar CZ, Meteor, ...)



Czech Thunderstorm Research Association (CTRA)

The history of the organization goes back to 2012, when it was created as a group of enthusiasts interested in storms or documenting them. Many of them dealt with this topic several years before. The members are mainly hunters and storm observers but also amateur meteorologists. In 2013 they became an officially established non-profit organization. In the same year they signed a cooperation agreement with ESSL in the project of the European Database of Dangerous Meteorological Phenomena (ESWD), where they have the possibility to manage and verify reports at QC1 level. Within this framework, they also established cooperation with some IRS units with which they exchange information. CTRA is also involved in several research projects on supercells and severe storms.

Association CTRA has a contract with the Czech Hydrometeorological Institute, which brings new horizons in their observation to meteorological enthusiasts and storm hunters. Using data, it enables better orientation in field and static observations as well as conclusions of amateur sky surveys. In a situation where storm development is rapid, these data are essential. The same applies to the evaluation of the situation. From their point of view, the cooperation of observers with meteorologists is essential for further progress in the research of dangerous meteorological phenomena.

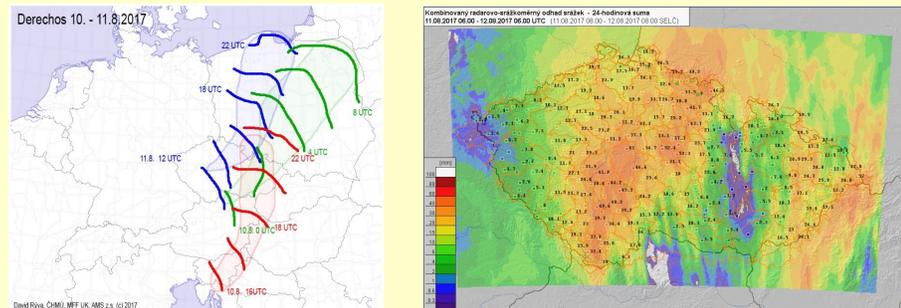


Example from The trinity derecho case study on 10th and 11th August 2017

Description of meteorological situation - R. Tomšů (CHMI)

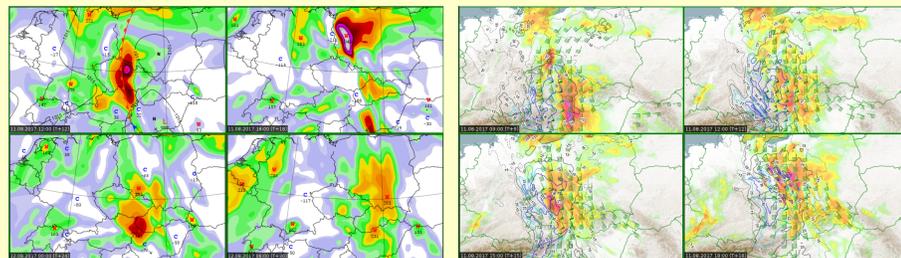
Above Central Europe, a very distinct frontal boundary was maintained, separating the very warm air in eastern Europe and relatively cold in the west. During the day, the boundary proceeded very slowly across our territory to the east and northeast. Area of lower air pressure, resp. its center (1013 hPa) associated with the frontal boundary was initially located in the territory of German Saxony, near the Czech border. During August 11th this center moved very slowly north to the Baltic Sea and deepened slightly further (1007 hPa). The situation was accompanied by a very strong wind shear in the convergence area, especially on the border of East Bohemia and Moravia, which continued further north towards Poland. In this area, a series of strong storms were created, which caused extensive damage, especially in East Bohemia and further in Poland.

The situation described above eventually led to the occurrence of 3 derechos in less than 48 hours, the first hit Moravia and Silesia on August 10th at night, the second passed again before Moravia and Silesia from 10 to 11 August and the last affected Northeast Bohemia on August 11th afternoon and evening.



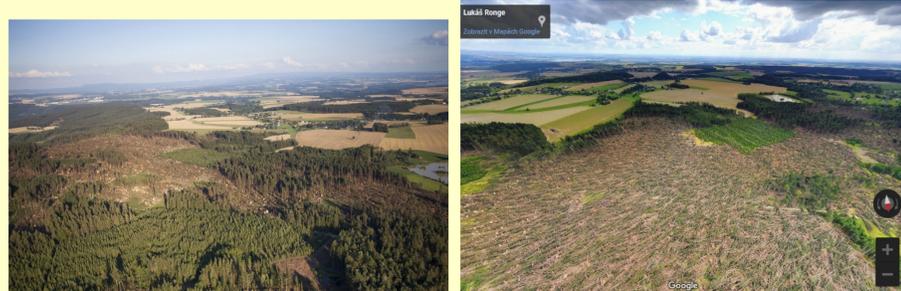
1. Derechoes trajectory

2. 24-hours precipitation amounts



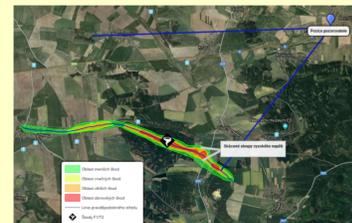
3. Helicity forecast

4. Windshear forecast



Example from from A tornado storm situation case study on September 23, 2018

On September 23, 2018, the "Fabienne" pressure lowered over Central Europe. It was bound by the frontal system, which in the afternoon began to influence the weather over our territory. First, a warm front passed through, bringing warmer sunny weather to Bohemia for a while. However, this was soon completed by the transition of the cold front. Forecasting models promised good dynamic parameters in addition to increased instability. The first tornado damage from the Czech Republic was reported from Horšov in the Pilsen region, where colleagues from CHMI and AMS z.s. showed a tornado of F1 strength, at a similar time the wind phenomenon caused even more damage in the Rakovník area, where we were already on the border between the intensity of F1 and F2. The greatest damage to property first came from the village of Chrástany, where several dozen buildings were damaged and more trees fell. The next day there was a report about the fall of high voltage poles near the village of Lišany (wrongly reported in the media village Krušovice). According to photos of media and local people, we have suspected some characteristic damage, corresponding to the occurrence of tornadoes ...



Damage Examination Protocol

Location: Kněžves, Chrástany, Lišany, Olešná

Date and time of the event: 23.9.2018, approx. 19:15-25 CEST (17:15-25 UTC)

Initiative: Numerous damage to the roofing and trees in the village of Chrástany, a break in the forest towards the village of Lišany, dropped very high voltage poles southwest of the village of Lišany

Description of the synoptic situation: The transition of the cold front, which was part of the frontal system bound to the low pressure "Fabienne", at the front of the cold front was a line storm system, accompanied by storm and torrential collisions, signs of derecho.

Date of the survey: 26.9.2018 7:30 - 12:00 CEST - field survey,

28.9.2018 10:30 - 12:00 CEST - aerial survey (drone)

Event description: Squall line arrived at about 19:25-19:30, with an area of light rainfall in front of it, witnesses describe crashes and the sudden arrival of a whirlwind with a sound reminiscent of a jet engine. The presence of groats excluded.

Damage analysis:

The damage arrangement is in the main belt, about 7.5 km long, stretching from Kněžves to the beginning of the forest behind the Lišany and secondary damages caused by a linear flat wind (hůlava / derecho) and do not deviate in any way from the surrounding damages. The damage is most pronounced in the eastern part of the forest, where many trees are broken. Branches and sheets were hurled up to several hundred meters.

Tornado characters:

The damage is arranged in a distinctive belt

The arrangement of fallen trees corresponds to the effect of rotation, chipped tips of trees, stripped branches

Intensity fluctuations with gradual gain

Conclusion: Tornado F1 / T3 with local characters F2



CONCLUSION

All sides are very pleased that can participate in such cooperation, because it is very useful for further developments in meteorology and in the field of severe storms. Cooperation is also very beneficial in case studies which, for example, map high-quality dangerous events that pose a risk to the population. Also in the field of meteorological applications for the web or mobile phones, amateur meteorologists have helped popularize meteorology, especially radar images. Their popularity in the Czech Republic is relatively high due to the quality work of enthusiastic amateurs who have devoted their time to developing very useful applications for the wider professional as well as the general public. As another example of successful cooperation we can mention quality processing of sounding measurements and above all the historical database of tornadoes in the Czech Republic, which is a joint work of all participants. Amateur meteorologists are also involved in a number of research projects and some of them have become professional meteorologists. Cooperation with amateur societies has proved to be extremely beneficial and has contributed to positive developments in the field of meteorological knowledge.

Web: AMS: www.asmos.cz (case study: <http://www.bourky.com/porozovani/trojice-derech-10-a-11-8-2017/>) CTRA: lovcibourek.cz (case study: <https://lovcibourek.cz/tornado-lisany/>) CHMI: portal.chmi.cz

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