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Road Weather Data Presentation in BUFR Format

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ABSTRACT

Well arranged presentation of road weather data and information is a basic tool for composing specialized road weather forecasts as well as its verification. The forecasters on central and regional forecasting centres are utilizing resources processed by sophisticated presentation system Visual Weather. The system works on the basis of unique database and is capable of decoding various data formats. For the purpose of road meteorology the „Unified road weather data format" - BUFR is used. As a superstructure over this system the System for forecast of the road surface on the territory of the Czech Republic which is currently under development is planned.

Keywords: .BUFR, Visual Weather, Unified Road Weather Data Format.

1 INTRODUCTION

The presentation of road weather data improved significantly after the Visual Weather (VW) system was installed on the forecasting centres of CHMI. The application of BUFR (Binary Universal Form for Representation of meteorological data) proved to be the best solution due to universal concept of decoding separate data of various formats in the VW system. This conception was applied also in Germany where advanced operational presentation of road weather data in this code is a routine task.
Furthermore the international exchange of road weather data was enhanced due to these steps. The idea of mutual road weather information and road weather stations data exchange was brought up on the conference in Sapporo, where the international Czech-German project Šumava [1], based on the cooperation of road experts and meteorologists, was presented.

2 UNIFIED ROAD WEATHER DATA FORMAT

One of the basic attributes was definition of unified road weather data format and establishment of mutual warning system on severe road weather conditions.
Below is a part of the bulletin in previous unified data format

SHCZ70 OKSC 280644
SWIS 2806441
S019 111 10044 20008 32000 52404 7000/
222 10041 67//0=

2.1 SH70 code

This code reminds the classic meteorological report SYNOP created by groups of 5 digits in each sections routinely produced in the weather stations.
The basic structure of the advanced unified road weather data format was derived from the SH70 code (based on the older SH10 code applied in Germany in the past).

2.2 BUFR code

As the WMO migrated to BUFR code [2], the specialists from CHMI and DWD developed a new BUFR template which replaced traditional alphanumeric codes by the table driven code. For detailed description of the BUFR template for example see [3].

The advantage of the new road weather code is indisputable. The code is capable to transfer not only data, but also other useful information about the individual road weather station (position of road sensor, type of road, type of construction etc). The process of standardisation of the road weather stations (placing the temperature/ humidity sensors 2 m above the surface, measuring the wind speed and direction 10 m above the terrain etc) enables to apply the acquired data into BUFR as valid information source. The utilisation of data in RWIS is sometimes difficult in case the measuring standards vary from regulation.

The BUFR is flexible and open for further development, for example addition of chemical aspects (freezing temperature, salt concentration, etc).

3 ROAD WEATHER DATA PRESENTATION

The system based on BUFR code can be used to create variable outputs based on the unique database. Big advantage is parallel utilization of more products from the main menu of Visual Weather in fact it is possible any product can be viewed in classical windows presentation. There is no need to reduce the presentation only to the road weather data but utilize all possibilities of Visual Weather without any restrictions.

3.1 Data synthesis

Basically Visual Weather enables unique data synthesis. There are about 416 road weather stations on the territory of the Czech Republic. The outputs of these stations can be supplemented by data from professional weather stations of the national weather service and other sources which can be decoded by the product.

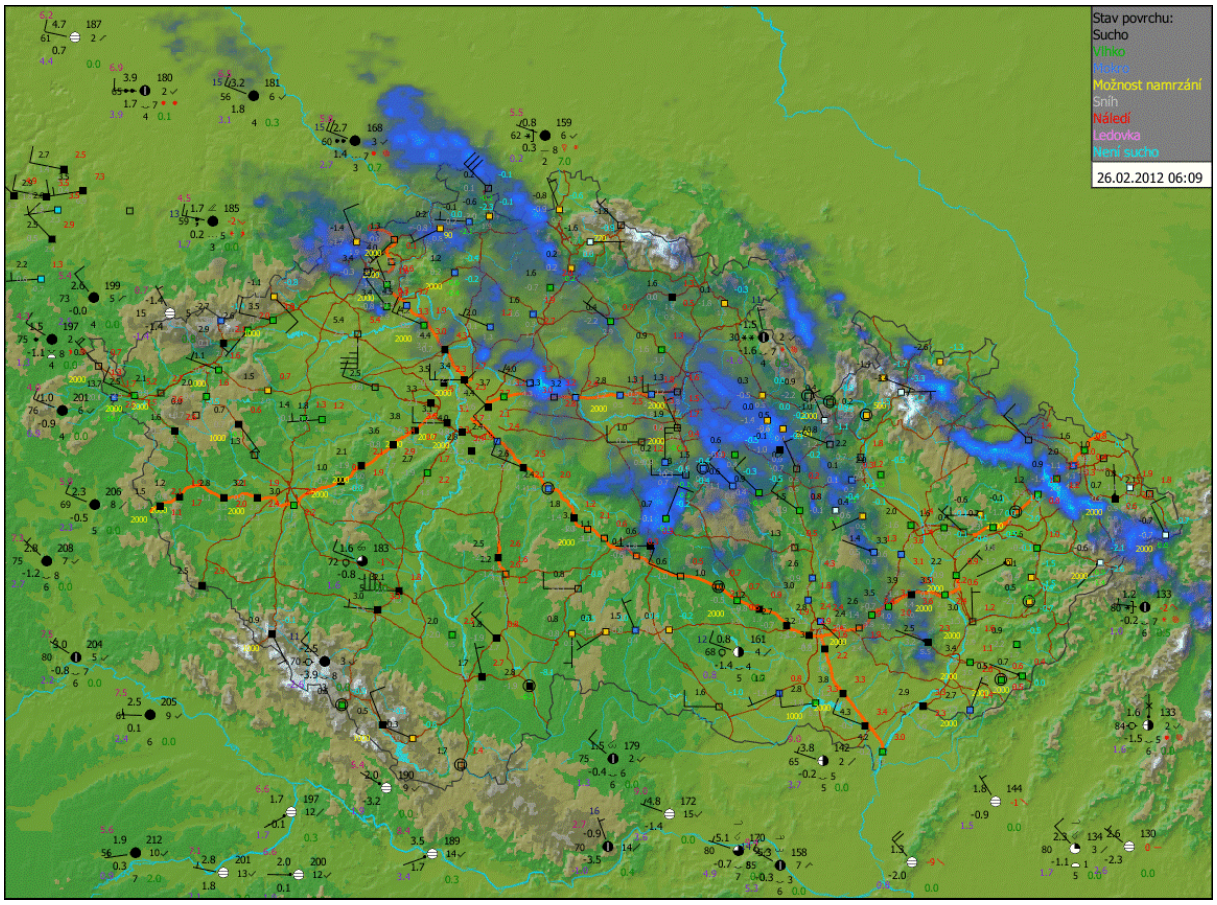

Figure 1. Road and professional weather stations.

3.2 Presentation

The data are interpreted on the map of the Czech Republic. The road weather stations are presented by classical meteorological symbols, convenient for the forecasters. The road weather stations use a square in contrary to classical weather stations presented by a circle.

The filling of the square indicates the surface status on the site of the road weather station

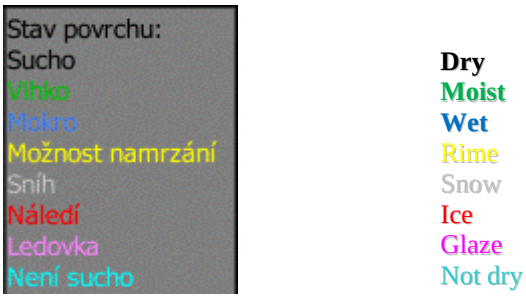

Figure 2. Surface status

Positioning of the mouse on individual station is possible display tooltip

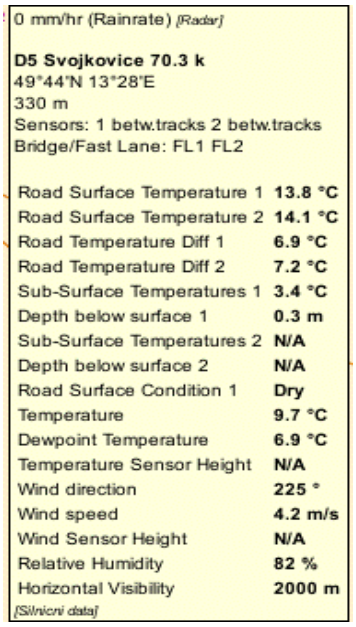

Figure 3. Station tooltip

Other information

The measured values are presented in a similar way around the station square. The data visualisation can be switched on or off on demand of the forecaster.

3.3 International Exchange

The international exchange of the road weather data takes place as a part of the project „Šumava“ among the Czech Republic and Germany [4], at this moment the exchange uses the SH70 format, which is to be replaced by BUFR within the year 2012. The Visual Weather will be able to interpret data from the border regions of both countries. Besides the data outputs can be implemented into international traffic telematics systems.

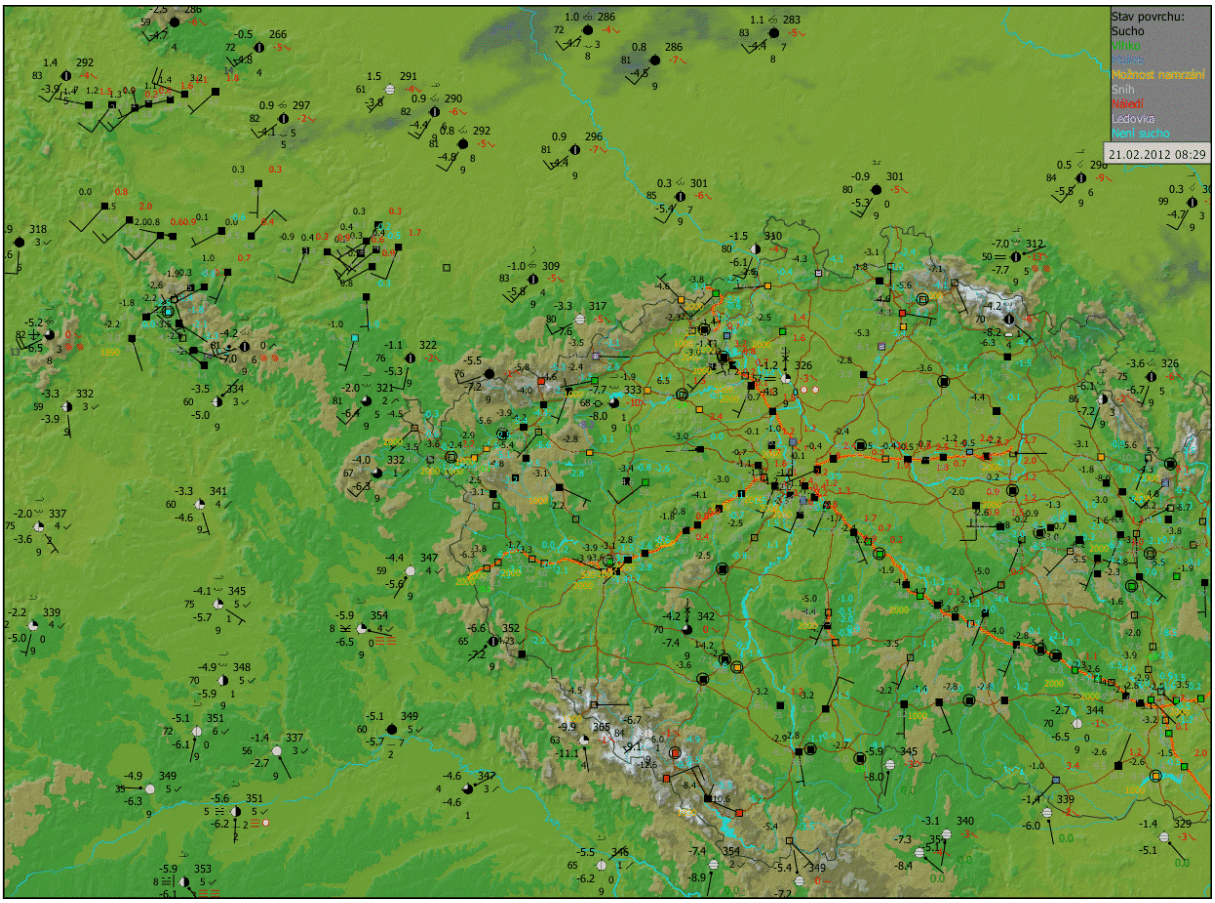

Figure 4. Result of the international data exchange.

3.4 Other features

The system is able to interpret also calculated values, for instance difference of Ts-Td. The values are marked in corresponding colours presenting the danger of rime and are located below the station circle. Another feature is the possibility of application of various overlays on the map as orography, radar (see Figure 1.) and satellite images etc.

4. CONCLUSIONS

The above mentioned presentation of road weather data in BUFR format by the sophisticated interpretation system Visual Weather is currently in regular use on the forecasting centres of the Czech Hydrometeorological Institute. It is one of the basic tools of the software support for the forecasters, who provide specialized forecasts. The next step is implementation of own model for the road surface status forecast.

5 REFERENCES

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