

OPERATIONAL EXPERIENCE WITH ICEWARN MODEL (METRO-CZ) IN COMPARISON WITH OTHER TOOLS

Jan Sulan¹, Martin Tomáš²

¹*Regional Forecasting Office, Czech Hydrometeorological Institute, Mozartova 41,
323 00 Plzeň, Czech Republic*

²*Central Forecasting Office, Czech Hydrometeorological Institute, Na Šabatce 17,
143 06 Praha 4 – Komořany, Czech Republic
sulan@chmi.cz*

Successful forecast of road surface temperature (RST) and conditions is crucial for winter maintenance decision support as well as for warning system of national meteorological services. Czech Hydrometeorological Institute (CHMI) has been using outputs from the **VAISALA FORECASTER** for almost 20 years (22 sites mostly around the highways, 24 hours lead time) calculated four times per day. Since the 2013/2014 winter season we have had access to the Support System for Winter Maintenance (**SSWM**) operated by CROSS Zlín and KLIMATOR company – developer of RST model (1,2). The outputs are in form of thermal maps and graphs calculated every hour with lead time 12 hours presented in the official Road Weather Information System (RWIS). The third source of RST forecasts is the **ICEWARN** system based on the METRo algorithm. METRo-CZ version was developed by Institute of Atmospheric Physics AS CR (3,4) and has been operated regularly by CHMI since winter 2014/2015 for internal use and further development with outputs adapted to the Visual Weather meteorological workstation software produced by IBL Software Engineering. Since February 2018 the graphs from METRo-CZ have become regular alternative source of RST forecasts for RWIS and serve for the purpose of nowcasting and warning in some local systems as the ICEWARN. RST is calculated for most road weather stations every hour with lead time 18 hours. All the above-mentioned RST models are supported by weather forecast from the numerical weather prediction (NWP) model ALADIN operating with horizontal resolution 4,7 km in four runs per day.

The first findings from case-studies in winter 2014/2015 revealed tendency of all RST models to be a little pessimistic with negative bias 1-2 °C for the first 6 hours and 2-4 °C for 6-12 hours lead time during nights. Maybe VAISALA FORECASTER was more successful in some cases. Models failed especially during nights with: a/ unexpected low cloudiness, b/ during warm advection c/ non-falling air temperature.

In the next seasons we focused on cases with cold advection and risk of black ice behind the cold front and warming after cold spell with potential of freezing precipitations. We found 5-6 suitable situations for each category. If the forecast of cloudiness behind cold front had been correct the models were almost perfect, if there had been more cloudiness than expected the negative bias was about 1 °C. For cases with warm advection the negative bias was usually up to 1 °C for ICEWARN and SSWM and 1-3 °C for VAISALA FORECASTER.

Conclusion from these case-studies can be that both SSWM and ICEWARN undertook positive development whereas VAISALA FORECASTER without update of the software remains behind these two RST models. During 2018 CHMI will start to operate new version of local NWP model with horizontal resolution 2,2 km which could be promise of further improvement in RST forecasting.

References:

1. Gustavsson T. et al., **2008**. Decision Support System (DSS) for road weather conditions – trial in the Czech Republic. *Proceedings of SIRWEC 14th International Road Weather Conference, Prague, Czech Republic*. <http://www.sirwec.org/Papers/prague/36.pdf>
2. Konečný D., **2014**. Advances in winter maintenance decision support in the Czech Republic. *Proceedings of SIRWEC 17th International Road Weather Conference, La Massana, Andorra*. <http://www.sirwec.org/Papers/andorra/40.pdf>
3. Sokol Z. et al., **2014**. First experience with the application of the model METRo in the Czech Republic. *Proceedings of SIRWEC 17th International Road Weather Conference, La Massana, Andorra*. <http://www.sirwec.org/Papers/andorra/13.pdf>
4. Sokol Z. et al., **2016**. Ensemble of road surface temperature by the METRo-CZ model. *Proceedings of SIRWEC 18th International Road Weather Conference, Ft. Collins, Colorado, USA*. <http://www.sirwec.org/Papers/2016-ftcollins/005.pdf>