Performance of the models during inversion situation considering the demands of energy supply

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At HMS, besides the media and transportation, the most important clients are the energy supply, which are interested in the predicted daily mean temperature especially during winter. Natural gas has an extremely high portion (40 %) in the Hungarian energy balance. The change of natural gas consumption strongly depends on air temperature, therefore the reliably predicted temperatures play an important role. As all forecasters know, the weak point of the models is inversion situation during winter. In these cases the accumulated cold air mass in low level is blown away only by a cold front or by strong wind. According to our regular verification, in inversion situations the models very often are not able to capture the lower cloudiness and fog leading to an overprediction of diurnal temperature.

The different types of inversion situation can be classified taking into account the predictability of the situation. In persistent inversion situations, (for example December 2004, and 2006) the forecasters are able to improve on the model results significantly, because it is easy to know the behaviour of the models day by day. In the ECMWF analysis inversion layer could be found, but it starts much closer to the surface than in the reality. The most complicated situations connected with inversion are those when the inversion develops unexpectedly from one day to the other and it is uncertain, whether the solar radiation or the fresh wind are able to break up the relatively thin inversion or not. According to our investigation, it seems that even if the models are able to capture lower cloudiness or fog, the breaking of the inversion is too early in the model comparing to the reality.

Summing up it can be said that in certain inversion situations, the models are not able to capture the inversions and therefore in these cases, the model results need to be modified by the forecasters.