Model Predictions Using More Precise Meteorological Data, Basic Comparison for Available Data Formats in ČR

[1]Zemánková Kateřina , [2]Pecha Petr

In order to test an atmospheric dispersion model based on a more sophisticated computational algorithm, the HYSPLIT modeling system [1] has been adapted and applied in a case study of radioactive plume release from the Temelin nuclear power plant.

The HYSPLIT model uses a lagrangian approach where a pollutant dispersion is described within the moving coordinate system and is simulated by tracking the movement of puffs or a large number of particles representing quantity of the air pollutant. Using three dimensional gridded meteorological data together with terrain description inside desired domain, the HYSPLIT model is capable of calculating pollutant deposition and dispersion even in a complex terrain. The model displays a trajectory of the plume center as well as a concetration field in user defined vertical levels.

Meteorological data fields for the model simulations were obtained from the MM5 model (The PSU/ NCAR Mesoscale Model v.5) being operated by UI AV ČR. According to the weather data we selected three time periods for the HYSPLIT model calculations representing three different meteorological conditions - calm situation with low wind speeds, situation with normal stability conditions and unstable situation during storm.

The wind speed and direction data from MM5 model for these cases in the first hour of release were compared with meteorological data from another prognostic model - Aladin (Czech Hydrometeorological Institute) and with measurements. Unfortunately considerable differences between these data sources were observed, especially under light wind conditions. The inconsistence of the input meteorological data sugests that the data assimilation in the first hours of the release will be necessary for proper prediction of the pollutant dispersion.

References

[1] Draxler, R. R., and G. D. Hess. Description of the HYSPLIT 4 modeling system. NOAA Tech. Memo., ERL ARL-224, Natl. Oceanic and Atmos. Admin., Washington D.C., 1997.

[1]Institute of Information Theory and Automation, AV ČR, Prague; Faculty of Mathematics and Physics, Charles University in Prague, *katerina.zemankova@centrum.cz*

[2]Institute of Information Theory and Automation, AV ČR, Prague, *pecha@utia.cas.cz*