



Some aspects of the numerical weather prediction at Lake Balaton: application of a simple numerical wave parametrization scheme and experiments with the lake parametrization in WRF

Attila Nagy, Akos Horvath

Hungarian Meteorological Service Storm Warning Observatory

Lake Balaton, as the largest lake in Hungary (and in Central Europe) is one of the most frequented region in the country, this is the place where the weather prediction directly serves life protection. In the nowcasting system of the Hungarian Meteorological Service (HMS) has the NWP segment a key role, attended to the linear part (extrapolations in time and space) the system is designed to provide warnings especially for convective objects. However, at the lake also weaker meteorological conditions can occur dangerous situations, primarily due to increased wind speed and wave heights, so the applied numerical model (WRF) has to be able to forecast these fields with more accuracy.

Over lakes the numerical results at high resolution (~1-2 km) seem to be very sensible to certain model variables and parameters, for example the wind speed is related to the diurnal change of the skin temperature. WRF contains a lake parametrization possibility, which helps the model to calculate better water temperature and skin temperature. In this talk some sensibility experiences will be presented.

In order to predicate wave height, a simple parametrization method has been applied on a 200 m resolution grid. The formulation involves at every gridpoint the wind speed, the lake depth and the distance between the actual point and the land in the line of the wind direction. The results basically depend on static input data, thus first of all we have had to create a high-resolution dataset for the waterdepth of Balaton. The wind fields can be interpolated from a nested WRF run, which has the resolution of 900 m. This application requires correct downscaling and high-resolution background data. It has been also applied a verification method to the calculated wave data based on manual measurements of wave height. The comparison between the calculations and observations facilitated the modification of the principal parameters of the parametrization formula. Using the new values better wave forecasting can be produced especially for Balaton, because the original form was based on empirical considerations firstly tested at the Great Lakes.

The high resolution model run as well as the wave prediction are applied operationally in the nowcasting system of the HMS, and also play a role in the storm warning activity as well as in meteorological insurance of many events organized at the lake, especially in summer."