METEOROLOGICAL CONDITIONS OF EXTREME FLOODS IN THE TISZA BASIN – OPTIONS TO INCREASE LEAD TIME OF FORECAST

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Under the particular geographic conditions of Hungary, important and steadily growing interests have been attached to flood control for centuries. The fundamental cause of the grave flood hazard is that the overwhelmingly plain country is situated in the deepest part of the Carpathian Basin. The system of 4000-km long 3-8 m high flood protection embankments and floodwalls has been created starting the mid-19th century and nowadays 97 % of the flood plain is protected. Rainfall, snowmelt induced and mixed floods all are frequent. Catastrophic floods appeared on River Tisza in 1888, 1932, 1940-41, 1970, 1985, 1998, 1999 and 2000. Conditions of floods passing during the last three years have been analysed on a detailed way. The autumn flood of 1998 had extremely wet antecedent conditions. Continuing cyclone activity generated a significant rainfall induced flood, which appeared on the last days of October. The flood wave triggered by the heavy rains on November 4 and 5 has overtook the first one still in the riverbed of the Upstream Tisza and superimposed thereon has caused the second, the main flood wave. In early March 1999 - hardly four months later - and extraordinary flood wave developed and travelled down the Bodrog and the middle reaches of the Tisza. Rising temperatures and intensive radiation induced rapid snowmelt in the entire catchment. The snowmelt induced flood and several rainfall originating waves caused that the flood crest surpassed the peak recorded 111 years ago in 1888. This record-breaking stage was not a long-standing one, in the spring of 2000 the coincidence of a number of flood waves resulted new historical records. Downstream from the town of Tokaj on the middle current of Tisza flood crests have surpassed the highest thus far on record at every gauging station for an unprecedented period of time. These events cannot be assign to single meteorological cause but the cumulative impact of several precipitation and/or snowmelt, rain-on-snow and rainstorm events. Experience forecasting and following simulation of these phenomena indicated high sensitivity of the complicated river network. Slightly different distribution of precipitation could cause quite different resulting flood. More extensive use of quantitative precipitation forecast and coupling of mesoscale meteorological models with the hydrological forecasting scheme could be the solution in the way to improve existing forecasting tools.