

For Extending Forecast Lead Time in Flood Forecast --- Probabilistic Flood Forecast using Ensemble Forecast

KAWASAKI Masaki, Head
INOMATA Hironori, Researcher
Water Cycle Division, River Department

Key words: Ensemble forecast precipitation, long-time flood forecast

1. Introduction

As part of the measures against flood disaster, which is considered to become larger than ever before, development of the time line (disaster prevention action plan) to prepare for a large-scale flood disaster is progressing. In the time line type disaster prevention behavior, in view of the time required for responsive actions such as mass evacuation in wide area, it is necessary to decide whether to implement responsive actions in full advance to occurrence of damage (e.g. about 48 hours before). However, in the present specifications of flood forecast, which serves as a ground for determining implementation, forecast lead time is at most about several hours and there is no information about reliability of the forecast. Therefore, there is an issue that it is difficult to decide the implementation of responsive action based on the forecast conducted. Here, we introduce long-time flood forecast with reliability information for contributing to the time line type disaster prevention.

2. Long-time flood forecast based on ensemble forecast precipitation.

As a tool for conducting long-time flood forecast with reliability information, ensemble forecast precipitation is used. Ensemble forecast is based on the recognition that deterministic forecast with one initial value is difficult, and evaluates the width of forecast obtained by conducting forecast calculation for multiple initial values. Figure 1 represents the water levels for 84 hours of forecast lead time, obtained by computing ensemble forecast precipitation for the 2013 Typhoon No. 18 and inputting the calculation result into runoff calculation. The Figure shows simultaneous conduct, as ensemble forecast, of water level forecast based on multiple forecast precipitations as well as one forecast precipitation. Figure 2 indicates the results of Figure 1 with the probability (= number of ensemble members that exceed the normal water level / total number of ensemble members) of exceeding the normal water level, such as overflow danger level, according to forecast lead time. The flood indicated by the Figure considerably exceeded the overflow danger level, and according to Figure 2, the water level forecast based on ensemble forecast precipitation shows "Exceed the overflow danger level within 54 hours with the probability of not less than

60%." Such information is expected to encourage implementation of more active responsive behavior as compared with the information obtained from the present flood forecast.

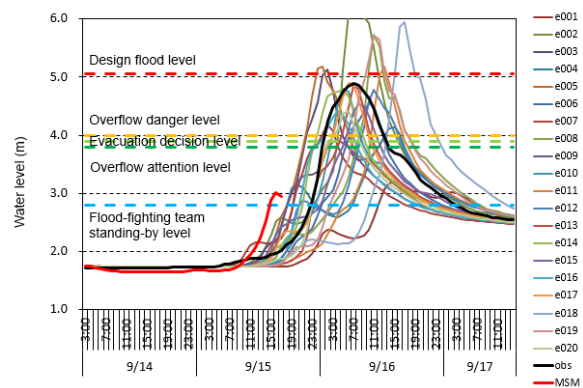


Figure 1. Flood Forecast Calculation Using Ensemble Forecast Precipitation

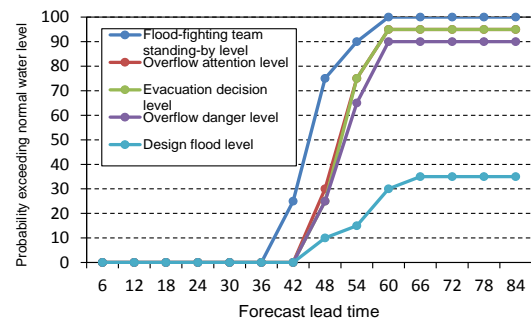


Figure 2. Probability of Exceeding Normal Water Level according to Forecast Lead Time

3. Conclusion

The long-time flood forecast with reliability information introduced herein is expected not only to contribute to the time line type disaster prevention behavior but also work effectively in all aspects of flood control measures including evacuation of elderly people and avoidance of night-time evacuation. What needs to be discussed for this study is organization of the issues related to real time operation, including addition of the number of examples and calculation time required.