

### The Weighted Mean for the water level forecasts in the MME system

Taking advantage of the near real-time observations, the root mean square error (RMSE) of the individual forecast can be evaluated. The forecasts, which are more precise than others, should have more importance in the MME system. Hence, instead of the simple mean, a weighting method based on the RMSE is applied for calculating the MME mean.

For a set of the current ensemble forecasts  $\{x_1, x_2, \dots, x_n\}$ , the weighted mean ( $\bar{x}$ ) is calculated as follows:

$$\bar{x} = \frac{\sum_{i=1}^n \omega_i x_i}{\sum_{i=1}^n \omega_i}$$

where the weighting factor for each forecast ( $\omega_i$ ) is given by the inverse square of the RMSE ( $\sigma_i$ ):

$$\omega_i = \frac{1}{\sigma_i^2}$$

The RMSE for each forecast ( $\sigma_i$ ) is derived using the first 24 hours of the unbiased forecasts of the last 2 days previous to the current forecast (marked as colored lines on the grey background in the figures) and the corresponding available observations. The biases of each forecast are removed over the whole validation period and calculated as follows: The averaged difference between the forecast and the observations are derived using the first 24 hours of the last 2 days previous to the current forecasts.

Note that if the  $\sigma_i$  is missing, due to the lack of the observations, a simple equally weighted mean is calculated for the MME mean.