



# EVALUATION OF THE MEDIUM-RANGE EUROPEAN FLOOD FORECASTS FOR THE MARCH-APRIL 2006 FLOOD IN THE MORAVA RIVER

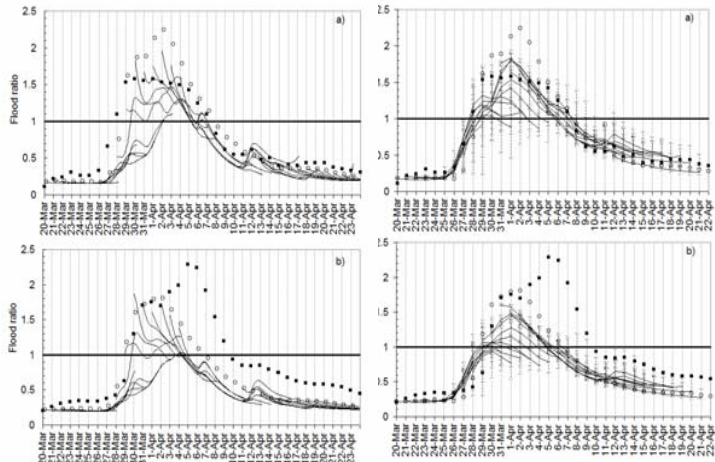
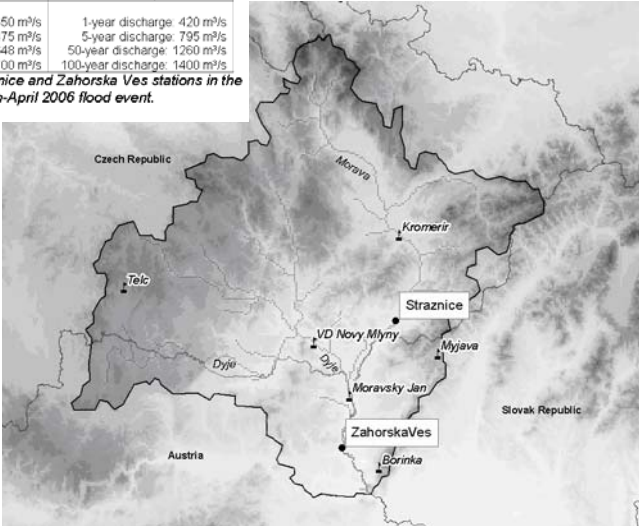
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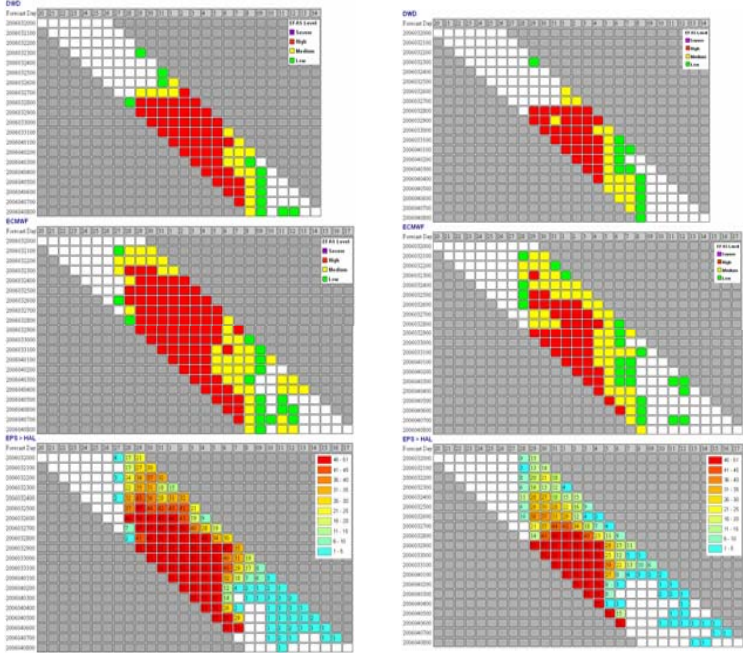
In this study results from the first prototype of the European Flood Alert System (EFAS) are presented for the March-April 2006 flood event in the Morava River. The analysis shows that EFAS forecasts based on probabilistic weather ensembles were able to detect an earlier and persistent signal of probability of flooding: 12-20 simulations out of 51 indicated a probability of flood (discharges above EFAS high flood threshold) with 8-10 days in advance in downstream Morava (Slovakia/Austria border). With such a lead time, deterministic-based forecasts were at most indicating an increase in river discharges (discharges above EFAS medium or low thresholds) and exceedances of high thresholds were only forecasted at the most upstream parts of the catchment: simulations based on deterministic weather forecasts showed a persistent signal for 29th-30th March only from the forecast starting on 25th March onwards (i.e., 4-5 days in advance) for ECMWF-based forecasts and from the forecast starting on 28th March onwards (i.e., 1-2 days in advance) for DWD-based forecasts. EFAS results on the exceedances of high flood thresholds well forecasted the core period of the flood event (29th March-6th April).

|   | Straznice   | Zahorska Ves  |
|---|---|---|
| Peak discharge and date of peak                                   | 733 m³/s on 29 March 2006 – 20:00-24:00   | 1,402 m³/s on 4th April 2006 – 19:00-00:30  |
| Estimated return period of peak discharge                         | >100 years  | 100 years   |
| 1 <sup>st</sup> local warning stage and time period under warning | 218 m³/s<br>26th March to 14th April  | 341 m³/s<br>23rd March to 21st April  |
| 2 <sup>nd</sup> local warning stage and time period under warning | 313 m³/s<br>27th March to 8th April   | 444 m³/s<br>30th March to 15th April  |
| 3 <sup>rd</sup> local warning stage and time period under warning | 456 m³/s<br>28th March to 6th April   | 608 m³/s<br>30th March to 9th April   |
| Characteristic quantiles  | 1-year discharge: 350 m³/s<br>5-year discharge: 475 m³/s<br>50-year discharge: 648 m³/s<br>100-year discharge: 700 m³/s | 1-year discharge: 420 m³/s<br>5-year discharge: 795 m³/s<br>50-year discharge: 1260 m³/s<br>100-year discharge: 1400 m³/s |

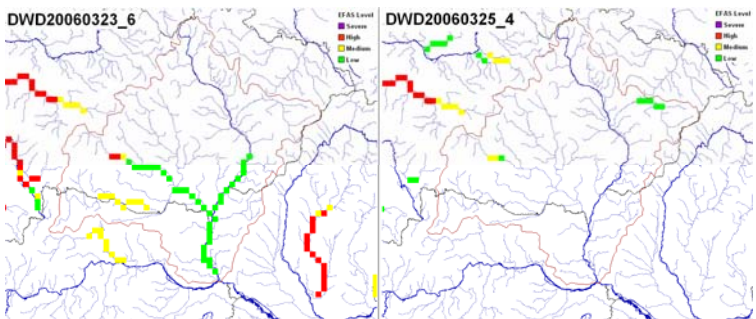
Characteristics of the observed flood at Straznice and Zahorska Ves stations in the Morava river/Danube catchment for the March-April 2006 flood event.



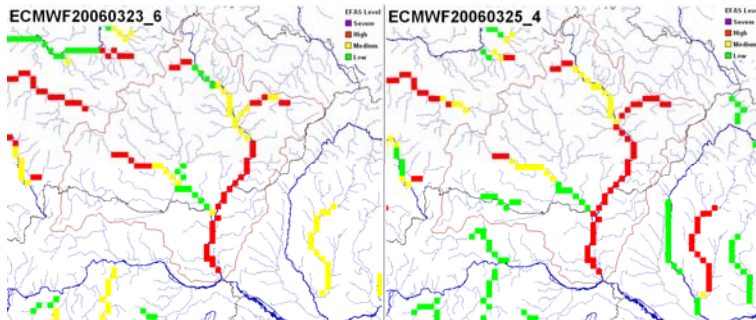
Flood ratios for the March-April 2006 flood event in the Morava River at a) Straznice station and b) Zahorska Ves station: ratio between EFAS forecasted discharges based on DWD midnight 7-day weather (left) and on ECMWF-EPS midnight 10-day weather forecasts (right) and EFAS high threshold (thin lines), ratio between EFAS simulated discharges with observed meteorological data and EFAS high threshold (circles), ratio between observed discharges and local warning stage (squares).



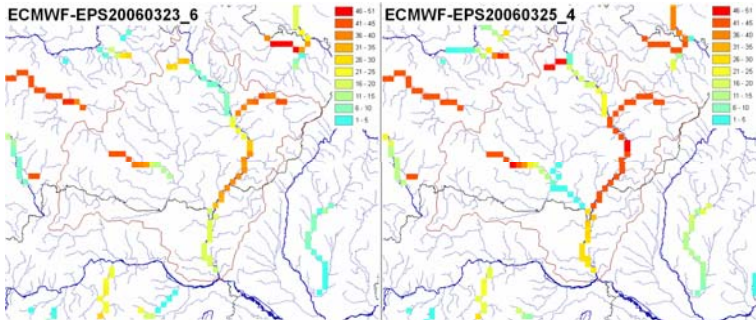
History of EFAS forecasted levels at the Straznice (left) and Zahorska Ves (right) station for forecast dates from 20th March 00:00 to 08th April 00:00 (rows). EFAS forecasts are based on DWD deterministic weather forecasts (top), ECMWF deterministic weather forecasts (middle) and ECMWF-EPS probabilistic weather forecasts (bottom). The dates for which the forecasts apply are shown in the top of each diagram (columns); each box corresponds to a 24-hour lead time. For DWD and ECMWF, the boxes show the EFAS level reached by forecasted discharges. For EPS-based forecasts, the number of EPS above EFAS High Flood Threshold (EPS>HAL) is shown.



EFAS Flood Threshold Exceedance Maps for 29th March 00:00 to 30th March 00:00 based on DWD deterministic weather forecasts for the Morava catchment. Left: forecast starting on 23rd March at 00:00 (i.e., 6-7 days in advance). Right: forecast starting on 25th March at 00:00 (i.e., 4-5 days in advance).



EFAS Flood Threshold Exceedance Maps for 29th March 00:00 to 30th March 00:00 based on ECMWF deterministic weather forecasts for the Morava catchment. Left: forecast starting on 23rd March at 00:00 (i.e., 6-7 days in advance). Right: forecast starting on 25th March at 00:00 (i.e., 4-5 days in advance).



EFAS High Threshold Exceedance Maps for 29th March 00:00 to 30th March 00:00 based on ECMWF-EPS probabilistic weather forecasts for the Morava catchment: number of EFAS simulations (out of 51) forecasting discharges above EFAS High Flood Threshold. Left: forecast starting on 23rd March at 00:00 (i.e., 6-7 days in advance). Right: forecast starting on 25th March at 00:00 (i.e., 4-5 days in advance).