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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Two-stage Variational Mode Decomposition and Support Vector Regression for Streamflow Forecasting" *by* Ganggang Zuo et al.

Anonymous Referee #2

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General comments: Streamflow forecasting is important for water management and optimal allocation of water resources. This study aimed to improve the model performance of decomposition based forecasting methods. A two stage decomposition predication framework (TSDP) was proposed by the authors based on VMD and SVR, to avoid the influences of validation information on training. The effectiveness, efficiency and reliability of the TSDP framework and its VMD-SVR realization in terms of the boundary effect reduction, decomposition performance, prediction outcomes, time consumption, overfitting, and forecasting capability for long leading times were investigated. The final results on monthly runoff from three stations at the Wei River showed the superiority of the TSDP framework compared to benchmark models. It is found that

the results are interesting for guiding proper use of decomposition-based forecasting methods in streamflow forecasting practice.

Specific comments: 1) This study only focused on decomposition-based methods and aimed to solve one disadvantage existing in applying decomposition methods. Although this might be interesting for readers who use decomposition based methods, a wider scope including more streamflow forecasting techniques like ARIMA, BP, LSTM etc. can be more interesting. Even if a new technique is proposed (not the case in this manuscript), a companion with different types of techniques is often needed to support the application of the proposed technique. 2) Five experiments were designed for the assessment of different performance aspects including the reduction of the boundary effects, decomposition performance, predictability, time consumption, overfitting, and forecasting capabilities for long leading times. This might be interesting for readers. However, it is difficult to understand these experiments, since the complicated five-experiment design and presentation styles stopped the successful understanding and digestion of the results. I suggest the authors rewrite this part and add tables (for a comparison of five experiments) to help readers better understand the six different experiments and their differences. 3) Lines 66-67: when you mentioned the boundary effect for the first time in the manuscript, I expect an explanation of the 'boundary effect'. 4) VMD and SVR are well-known techniques. The authors can shorten the descriptions of these two techniques and focus on the new things the authors proposed. 5) Line 81: change 'usage' to 'use' 6) Line 259ïijŽ what is BOGP? Do you mean 'Bayesian optimization based on Gaussian processes'? How is BOGP used to optimize EEMD, SSA, DWT and SVR? Add some details. 7) Add a table for a clear comparison of five experiments 8) 4 'Experimental Results and Analysis' should be 'Experimental results' 9) Line 354: Why 3,5,7,9? 10) Line 356: What does that mean by 'the 20-month lag'? Does that make sense for monthly forecast? 11) Figure 2: if possible, put a map of China 12) I didn't really get how 'the mixing and shuffling step' works. If possible, please clarify.

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