

Response to anonymous Reviewer #1

Reply explanation: The reviewers' comments are shown in black, while the author's replies and revises are shown in blue.

Comments: The authors present a reasonable supplement to the conductivity two-component hydrograph separation method.

Reply: We appreciate the positive comment for this study.

Comments: I have found only one smaller calculation error. Page 3, equation 14, and page 8, equations A8 and C1: In the second term in the numerator of the partial derivative dBFI/dyk a factor n is missing. It comes from the partial derivative of the sum of y_k with respect to y_k : $(\sum y_k)' = d(\sum y_k)/\text{dyk} = \sum \text{dyk}/\text{dyk} = n \text{ times } 1 = n$.

Reply and Revise: Well taken, thank you very much for finding out our errors. We have rechecked all the equations in the manuscript and revised the errors (Page 4, equations 12, 14 and 16; Page 9, equations A8; Page 10 equation C1, and line 10).

Comments: Some formulations are linguistically or technically incorrect. Please consider the following suggestions: page 2, lines 10 - 11: Parameter sensitivity, as I understand this term, is the sensitivity of model output to the varying values of model input and not "the sensitivity of the parameters". Also, better than "fluctuation parameters" would perhaps be "varying parameter values". Replace "Eckhradt" by "Eckhardt".

Reply and Revise: Well taken, we also understand that parameter sensitivity is the sensitivity of model output to the varying values of model input. There may be some errors in the expression of the manuscript, and we have revised it (Page 2, lines 24--25). And we have replaced "fluctuation parameters" by "varying parameter values" (Page 2, lines 24--25), also "Eckhradt" by "Eckhardt" (Page 2, line 26).

Comments: page 2, line 12: Replace "An empirical sensitivity analysis is only an analytical calculation of the error propagation through the model, is not feasible." by "An empirical sensitivity analysis is only a makeshift if an analytical sensitivity analysis, that is an analytical calculation of the error propagation through the model, is not feasible".

Reply and Revise: Well taken, we have replaced the sentence as suggested (Page 2, lines 26--28).

Comments: page 2, line 14: Replace "However, the" by "Until now, the".

Reply and Revise: Well taken, we have replaced the words as suggested (Page 2, line 30).

Comments: page 3, lines 5-6: Replace "the BFI' errors caused by tiny errors of BF_C and RO_C can be expressed as" by "the errors of BFI caused by small errors of BF_C and RO_C can be approximated by".

Reply and Revise: Well taken, we have replaced the sentence as suggested (Page 3, lines 24--25).

Comments: Throughout the paper, the sensitivity indices should be noted with vertical bars, and not with slashes (e. g. $S(BFI|BF_C)$ instead of $S(BFI/BF_C)$)

Reply and Revise: Well taken, we have revised the sensitivity indices throughout the paper as suggested.

Comments: page 3, lines 16 - 17: Replace "e.g. $S(BFI/BF_C) = 1.5$, the relative error of BF_C is 5%, then the relative error of BFI should be 1.5 times 5% (7.5%)" by "e.g. if $S(BFI|BF_C) = 1.5$, and the relative error of BF_C is 5%, then the relative error of BFI is 1.5 times 5% = 7.5% "

Reply and Revise: Well taken, we have replaced the sentence as suggested (Page 4, lines 4--5).

Comments: page 3, line 26: If the unit of Q_{ck} is $\mu\text{s}/\text{cm}$, then the unit of the partial derivative of BFI with respect to Q_{ck} is $\text{cm}/\mu\text{s}$.

Reply and Revise: Well taken, we have added the unit of the partial derivative of BFI with respect to Q_{ck} (Page 4, line 17).

Comments: page 3, line 27, page 8, lines 16 and 22: If the unit of y_k is m^3/d , then the unit of the partial derivative of BFI with respect to y_k is d/m^3 .

Reply and Revise: Well taken, we have added the unit of the partial derivative of BFI with respect to y_k (Page 4, line 17; Page 10, lines 8 and 14).

Comments: page 4, line 3: Omit "usually".

Reply and Revise: Well taken, we have deleted the "usually".

Comments: page 4, lines 2-5, and lines 6-10: These two paragraphs express one and the same ("the error of BFI caused by the errors of Q_{ck} and y_k can be neglected"). Then, this is empirically shown again in rest of this section, including figures 1 and 2. Is this necessary? If the sum of delta Q_{ck} and the sum of delta y_k were not zero for n to infinity, then delta Q_{ck} and delta y_k did not stand for random errors, but for systematic errors.

Reply and Revise: Well taken, we have reduced the description of this section and have added Fig. 1 and Fig. 2 and related descriptions to the Supplement S1 (Page 5, lines 3--31).

Comments: page 5, line 3: Replace "a parameter g is calculated" by "a variable g is calculated".

Reply and Revise: Well taken, we have replaced the words as suggested (Page 5, line 34).

Comments: page 5, line 5: Equation 17 is the Gaussian error propagation. The citation "(Taylor, 1982; Kline, 5 1985; Genereux, 1998)" is not appropriate in this context.

Reply and Revise: Well taken, we have adjusted the description and citation of equation 17 (Page 5, lines 34--37).

Comments: page 6, line 24: Replace "The sensitivity index" by "The absolute value of the sensitivity index".

Reply and Revise: Well taken, we have replaced the words as suggested (Page 7, line 31).

Comments: page 6, line 25: Replace "-1.39 times of uncertainty in BFI (-6.95%), while RO_C leads to -0.98 times (4.9%)" by "-1.39 times 5 % of uncertainty in BFI (-6.95%), while RO_C leads to -0.98 times 5 % (4.9%)".

Reply and Revise: Well taken, we have replaced the sentence as suggested (Page 7, lines 33--34).

Comments: Fig. 3: Replace "normal axes" by "linear axes".

Reply and Revise: Well taken, we have replaced the words as suggested (Fig. 1)

Language Improve: We have asked an English native language agency to check and correct the grammar and structure of the manuscript.