



EGUsphere, referee comment RC1
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Comment on egusphere-2022-955

Anonymous Referee #1

Referee comment on "A signal-processing-based interpretation of the Nash–Sutcliffe efficiency" by Le Duc and Yohei Sawada, EGU Sphere,
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The paper deals with a novel interpretation of the NSE score measure starting from the observation that it is mostly used in hydrology and poorly exploited in other sciences.

This interpretation is based on a signal processing viewpoint.

While the paper is interesting and useful the following concerns are at the hand.

The NSE interpretation provided is based on a model error for forecast which is given in eq 5 and is basically driven by a Gaussian random error being it equal to noise in the signal processing viewpoint. This basic foundation provides by itself a lack of generality with respect to application of NSE to other sciences included hydrology. In hydrology the NSE is intended as a model performance

metric where the difference between model and observation is not limited to noise. Differences between model and observation but also differences between observation and reality and also differences between different models can be analyzed by means of NSE or KGE whose meaning is quite clear and leaves no doubts in my personal opinion.

In a hydrologic model, but also in other earth sciences, different models may arise because different processes are modelled in a stochastic or deterministic way and/or because some processes are described or neglected following the fact that they can be more or less important according to the time-space scale of application and modeling purpose. Hence the difference between model output and observations may be very different from what given in eq 5, It can be deterministic or stochastic, and affected by deterministic or stochastic (or both) variability.

As a consequence it seems that the the proposed analysis, while interesting and well founded in the context of the signal processing field (or any other fields where only noise provides difference between model output and observation). In the same light one may not accept the "general case" version of NSE which is obtained by considering the multiplicative error, beside the additive error, defined in eqs (32). Even in this case the "general case" should be addressed as relative to which field of application, besides the field of signal processes or affine methods.

I believe the authors should strongly address this issue in a revised version of the manuscript.

On any other respect the paper is technically and scientifically well sounded, nevertheless I have to say I couldn't thoroughly check notation and mathematics.