

Itemized Response to Anonymous Referee #2

This is the response to the comments by Anonymous Referee #2 (Nonlin. Processes Geophys.

5 Discuss., 2, C542–C544, 2015) on our manuscript NPGD, 2, 1-22, 2015, entitled “Toward a practical approach for ergodicity analysis”. We would like to thank the Reviewer for reviewing our manuscript in detail as well as for the constructive comments which enable us to greatly improve the quality of our manuscript. In the following, we present a detailed point-to-point response to each of the comments. We hope that the revisions in the manuscript and this response will be sufficient to address the reviewer’s

10 concerns.

General comments:

Environmental change has brought great challenges to the hydrological consistency, whether time-series still can be regarded as stationary stochastic process? Is the historical monitoring data 15 consistent with the current monitoring data? Those questions need be studied and answered by the hydrological workers.

20 *At present, the non-consistency analysis has become the key and difficult issues in hydrology, but people ignore a very important premise, hydrological sequence has really changed? Is it stochastic changes or certainty change? In this paper, ergodicity analysis is an effective method to answer this question. Therefore, this paper has important theoretical significance and important realistic demand. However, in order to get a general method on this problem, there are three parts need be revised.*

Response: Thanks for the general comments. We appreciate the reviewer’s opinion on the importance of exploring ergodicity analysis.

25 **Specific comments:**

1. *L107-111, P6:In the time series analysis, the sample size is large enough to be the most basic requirement. When the sample size is insufficient, it is not appropriate to identify the law by delaying time series length. See postils 1. The shorter time series, Chinese example, need be removed. American example should be retained and add more American station date as an example.*

30 **Response:** Thanks for the suggestion. The case studies of two Chinese precipitation data series have been removed from the manuscript and only the case study for Newberry of USA remains.

2. *L182-183,P10 and the table 2, the monthly data series of Ankang station are clustered into four classes based on the climatic characteristics. In my opinion, it is in order to increase the number of sample. But in time length of month (30 days) to analyze the precipitation characteristics, there are 35 great differences in the meteorological formation background of each month. In China, for example, the rain is formed in front when monsoon move from south to north .However, the front is different on the formation process and position in each month. Similarly, for a fixed hydrological station, its meteorological background is not the same. Thus, it is recommended to ergodicity analyzed separately for each month (Jan, Feb, Mar Dec). Meanwhile, if the author accepts the above 40 comments, then this item will naturally be modified. See postils 2.*

Response: Thanks for the correction. Following the reviewer’s first comment, we have removed the case studies of two Chinese precipitation data series from the manuscript; therefore, this is

not an issue any more.

3.L191-195, P11: According to the data in terms of mathematics, there is ergodicity when MT and D (MT) converge to 0. This is a very demanding test conditions, the actual engineering problems is not suitable for using this method to test the cumulative value change after 30 years. In this paper, we 5 only see whether the trend of MT and D (MT) is change in the graph. The trend analysis method is suggested to use to analysis the trend of cumulative value, such as Mann-Kendall test. See postils 3.

Response: Thanks for the suggestion. The Mann-Kendall trend test has been implemented as one of three proposed approaches for ergodicity analysis and the details are presented in the revised manuscript.

10 **Technical corrections:**

1. *Table 2 appears twice in this paper, maybe is a mistake in writing.*

Response: Thanks for the correction. We messed up Figures 2 and 3 in the proofreading. This mistake has been corrected.

2. *In this time, a few of attention was paid to some technical details, such as variables, formulas, and 15 language, etc. and these will be checked carefully in revision manuscript.*

Response: Thanks for point out this issue. The manuscript has been carefully reviewed and the addressed concerns including the consistence of variables, equations, and English grammars have been closely checked and corrected.