Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05893, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05893
EGU General Assembly 2008

The effect of parameter estimation bias on the effectiveness of prewhitening in trend analysis of hydrologic and climatic data

K. H. Hamed

Sultan Qaboos University, Muscat, Oman & Cairo University, Egypt.

Prewhitening of hydrologic as well as climatic and other types of time series has been suggested in the literature to eliminate the adverse effect of autocorrelation on the results of trend tests. Numerous studies have been dedicated to the investigation of the effectiveness of prewhitening when a trend does exist in the data. Recently, there has been a debate on two major issues: whether or not to remove an apparent trend before estimating the prewhitening parameter; and whether prewhitening should be performed at all for a given combination of series length and trend slope. Unfortunately, most of the arguments made in relation to those two issues, especially the latter, involve subjective judgment about the magnitude of a trend prior to formally testing for its significance. The aim of this study is to investigate the bias in parameter estimates and to derive bias correction formulas for some simple cases. The results show that parameter bias correction can greatly improve the effectiveness of prewhitening. However, a major challenge is that the magnitude of bias depends on the actual correlation model, skewness of the data, and the type of trend. This emphasizes that careful inference about the correlation model as well as the type of trend are critical for effective prewhitening. A comparison between the results obtained with and without bias correction is presented for a case study of trends in river flow time series from different parts of the world.