Detecting inhomogeneities in pan evaporation time series

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There is increasingly growing demand for evaporation data for studies of surface water and energy fluxes, especially for studies which address the impacts of global warming. To serve this purpose, a homogeneous evaporation data are necessary. This paper describes the use of two tests for detecting and adjusting discontinuities in Class A pan evaporation time series for 28 stations across Australia, and illustrates the benefit of using corrected records in climate studies. The two tests being the bivariate test of Maronna and Yohai (1978), also known as the Potter method (WMO 2003), and the RHTest of Wang and Feng (2004).

Overall, 58 per cent of the inhomogeneities detected by the bivariate test were also identified by the RHTest. The fact that the other 42 per cent of inhomogeneities were not consistently detected is due to different sensitivities of the two methods. Ninety-two per cent of the inhomogeneities detected by the bivariate test are consistent with documented changes that can be strongly associated with the discontinuity. Having identified inhomogeneities, the adjusments were only applied to records which contained inhomogeneities that could be verified as having a non-climatic origin. The benefit of using the original and adjusted pan evaporation records in a climate study were then investigated from two points of view: correlation analyses and trend analysis. As an illustration, the results show that the trend (1970-2004) in the all-stations average was -2.8 ± 1.7 for the original data but only -0.7 ± 1.6 mm/year/year for the adjusted data, demonstrating the importance of screening the data before their use in climate studies.

References

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