HydroTest: orthogonal metrics applied to 20 hydrological stations in South America

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HydroTest is an open access web resource that has been available to scientists and practitioners since 2006. It offers a wide range of statistical metrics for the testing and evaluation of hydrological model outputs. The most recent upgrades have attempted to address the need for an orthogonal set of metrics to assess different aspects of each model's performance. This paper presents a case study of 20 hydrological stations in Columbia, north-western South America. It is used to emphasise the need for a set of performance measures that will evaluate different aspects of a model. The reported investigation involves models of daily, weekly and decadal water levels. Particular emphasis is placed on one performance metric that was introduced to the site in 2008: a measure of model skill that was developed in the Russian Hydrometeorological Centre (Inertia Root Mean Squared Error - IRMSE). The reported behaviour of this latest metric is observed to depend on the memory of the hydrological process i.e. short- or long-term memory processes. Thus, as such, it provides a type of assessment that none of the earlier metrics can support and, in so doing, forms a starting point for an orthogonal set of performance measures. Through continuing development of this open access resource the authors are attempting to share and promote: the latest analytical procedures; discussions on current thinking; and a dynamic hydrological modelling tool that is evolving in parallel with its associated application domain.