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Analysis of micrometeorological data using a two sample variance

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In ecosystem research infrared gas analyzers are increasingly used to measure fluxes of carbon dioxide, water vapour, methane, nitrous oxide and even stable carbon isotopes. As these complex measurement devices under field conditions cannot be considered as absolutely stable, drift characterisation is an issue to distinguish between atmospheric data and sensor drift. In this paper the concept of the two sample variance is utilized in analogy to previous stability investigations to characterize the stationarity of both, spectroscopic measurements of concentration time series and micrometeorological data in the time domain, which is a prerequisite for covariance calculations. As an example, the method is applied to assess the time constant for detrending of time series data and the optimum trace gas flux integration time. The method described here provides information similar to existing characterizations as the ogive analysis, the normalized error variance of the second order moment and the spectral characteristics of turbulence in the inertial subrange. The method is easy to implement and, therefore, well suited to assist as a useful tool for a routine data quality check for both, new practitioners and experts in the field.

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