



On the use of the post-closure methods uncertainty band to evaluate the performance of land surface models against eddy covariance flux data

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The energy balance of eddy covariance (EC) flux data is normally not closed. Therefore, at least if used for modeling, EC flux data are usually post-closed, i.e. the measured turbulent fluxes are adjusted so as to close the energy balance. At the current state of knowledge, however, it is not clear how to partition the missing energy in the right way. Eddy flux data therefore contain some uncertainty due to the unknown nature of the energy balance gap, which should be considered in model evaluation and the interpretation of simulation results. We propose to construct the post-closure method uncertainty band (PUB), which essentially designates the differences between non-adjusted flux data and flux data adjusted with the three post-closure methods (Bowen ratio, latent heat flux (LE) and sensible heat flux (H) method). To demonstrate this approach, simulations with the NOAH-MP land surface model were evaluated based on EC measurements conducted at a winter wheat stand in Southwest Germany in 2011, and the performance of the Jarvis and Ball-Berry stomatal resistance scheme was compared. The width of the PUB of the LE was up to 110 W/m² (21% of net radiation). Our study shows that it is crucial to account for the uncertainty of EC flux data originating from lacking energy balance closure. Working with only a single post-closing method might result in severe misinterpretations in model-data comparisons.