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Data availability and model identification in the case of sediment and phosphorus transfer at the plot scale

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Environmental modelling is restricted by practical limitations on the amount and scope of data that can be collected in the field to parameterise and drive model assumptions. Therefore, the scale of application and the availability of field observations should direct model development for a given study. We will address this issue with respect to sediment and phosphorus transfer from intensively managed grasslands. Discharge, suspended and volatile solids, total phosphorus, total dissolved ($<$0.45 μm) phosphorus, and dissolved ($<$0.45 μm) reactive phosphorus were measured for two drained and two un-drained, hydrologically isolated, 1 ha plots (Rowden, SW England) over the 2005-2006 hydrological season. We will adopt a parametrically efficient, yet physically realistic modelling approach. Hydrology, sediment and phosphorus dynamics will be represented sequentially in a top-down fashion, and will be assessed independently within a model learning framework (i.e. with the aim of rejecting specific models where possible). This framework incorporates uncertainties in model structure, parameters and observed data. We will discuss the limits of inferring processes robustly from the available data, with comments on the implications for data collection and model development when we scale up from this small spatial scale and dense temporal sampling scheme.