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A Bayesian data assimilation approach to estimating land-use change

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The aim of this work was to make improved estimates of land-use change in the UK, using multiple sources of data. We applied a method for estimating land-use change using a Bayesian data assimilation approach. This allows us to constrain estimates of gross land-use change with national-scale census data, whilst retaining the detailed information available from several other sources. We produced a time series of maps describing our best estimate of land-use change given the available data, as well as the full posterior distribution of this space-time data cube. This quantifies the joint probability distribution of the parameters, and properly propagates the uncertainty from input data to final output. The output data has been summarised in the form of land-use vectors. The results show that we can provide improved estimates of past land-use change using this method. The main advantage of the approach is that it provides a coherent, generalised framework for combining multiple disparate sources of data, and adding further sources of data in future is straightforward.