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Abstract: Process-based models have been used to simulate 3-dimensional complexities of forest ecosystems and their temporal changes, but their extensive data requirement and complex parameterisation have often limited their use for practical management applications. Increasingly, information retrieved using remote sensing techniques can help in model parameterisation and data collection by providing spatially and temporally resolved forest information. In this paper, we illustrate the potential of Bayesian calibration for integrating such data sources to simulate forest production. As an example, we use the 3-PG model combined with hyperspectral, LiDAR, SAR and field-based data to simulate the growth of UK Corsican pine stands. Hyperspectral, LiDAR and SAR data are used to estimate LAI dynamics, tree height and above ground biomass, respectively, while the Bayesian calibration provides estimates of uncertainties to model parameters and outputs. The Bayesian calibration contrasts with goodness-of-fit approaches, which do not provide uncertainties to parameters and model outputs. Parameters and the data used in the calibration process are presented in the form of probability distributions, reflecting our degree of certainty about them. After the calibration, the distributions are updated. To approximate posterior distributions (of outputs and parameters), a Markov Chain Monte Carlo sampling approach is used (25 000 steps). A sensitivity analysis is also conducted between parameters and outputs. Overall, the results illustrate the potential of a Bayesian framework for truly integrative work, both in the consideration of field-based and remotely sensed datasets available and in estimating parameter and model output uncertainties.