Comparing the input, output, and validation maps for several models of land change

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Abstract This paper applies methods of multiple resolution map comparison to quantify characteristics for 13 applications of 9 different popular peer-reviewed land change models. Each modeling application simulates change of land categories in raster maps from an initial time to a subsequent time. For each modeling application, the statistical methods compare: (1) a reference map of the initial time, (2) a refer-ence map of the subsequent time, and (3) a prediction map of the subsequent time. The three possible two-map comparisons for each application characterize: (1) the dynamics of the landscape, (2) the behavior of the model, and (3) the accuracy of the prediction. The three-map comparison for each application specifies the amount of the prediction's accuracy that is attributable to land persistence versus land change. Results show that the amount of error is larger than the amount of correctly predicted change for 12 of the 13 applications at the resolution of the raw data. The applications are summarized and compared using two statistics: the null resolution and the figure ofmerit. According to the figure ofmerit, themore accurate applications are the ones where the amount of observed net change in the reference maps is larger. This paper facilitates communication among land change modelers, because it illustrates the range of results for a variety of models using scientifically rigorous, generally applicable, and intellectually accessible statistical techniques.

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