

Improving long-term forecasts of ecosystem-climate dynamics through community-based model-data fusion

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The co-evolution of rapidly growing and more automated ecological data collection along with advances in ecological data assimilation has created excellent opportunity for increased interactions between data and models. In this big-data framework, models are particularly useful as scaffolds for analyzing connections between ecological and climate processes occurring at multiple scales through time and space. While model accessibility and data informatics can be obstacles to successful model-data fusion for large-scale terrestrial biosphere models, we argue that these challenges are surmountable through collaborative community efforts. We present two case studies of on-going model-data fusion projects to highlight how barriers of accessibility and data informatics can be overcome: 1) the Predictive Ecosystem Analyzer (PEcAn) project lowers accessibility barriers by providing a generalized web-based framework for rigorous model-data fusion, and 2) the PaleoEcological Observatory Network (PaleON), unites paleoecologists, statisticians, and modelers to improve long-term forecasting of ecological dynamics by synthesizing diverse paleoecological data and ecosystem models with data informatics.