Using Equation Discovery to Revise an Earth Ecosystem Model of the Carbon Net Production

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Equation discovery approaches to automated modeling from observed data usually derive equation based models from scratch rather than from an initial model already established in the domain of use. In this paper, we present an approach that uses new or recent observational data to improve an existing equation based model. The approach is used to improve the accuracy of the Earth ecosystem model of the net production of carbon in the atmosphere. We revise the initial ecosystem model in two directions. First, we calibrate the values of the constant parameters in the model on new observational data. Second, we allow the use of alternative equation structures for some of the sub-models of the initial model and use our approach to choose among them. Experiments show that both revision of values of the constant parameters and revision of the structures of sub-models can considerably improve the accuracy of the initial model.