

PREFACE

The first name for this model was "MCHammer," and I even drew a square peg being hammered into a round hole on the first MC1 poster that I presented at a national meeting in the mid-1990s. The model was conceived and the code written by a small team. We worked well together and had complementary skill sets: Lenihan for the biogeography (and later the fire model), Bachelet for the carbon cycle, Daly for the climate impacts; we were in the trenches. Neilson supervised the project by bringing the 10,000-foot overview and commentaries about what made sense and what did not, sending us back to the drawing board from time to time. Parton was the CENTURY model guru to whom I could always ask questions related to the biogeochemistry part of the model. The USDA Forest Service funded most of the early enterprise. The Joint Fire Science Program funded the fire model development and fire suppression work.

The first results of the model surprised us by their "accuracy," and our confidence in the tool that we had built increased, despite Neilson's constant reminder that a better tool (BIOMAP) would soon be built by other team members. A variety of events marked the model's evolution. Daly moved on to fame and fortune by further developing his PRISM model, the only source of historical climate data for MC1 to this day. The day Lenihan's fire model showed a large fire in Yellowstone without any particular calibration was a happy day for the team that was using the first dynamic global vegetation model (DGVM) in the world to include dynamic fire (instead of prescribed fire events or carbon removals). We readily shared our approach with the LPJ (Lund-Potsdam-Jena) team that quickly thereafter wrote its twin called SPITFIRE. The sad day was when our model disagreed with other DGVMs, MC1 was simulating a decline in global carbon capture by the end of the 21st century. Unlike in other DGVMs, the CO₂ fertilization effect was deemphasized (following Parton's lead with CENTURY). It cost us a place in a much-cited group publication, but

our model was still young and only summarily tested, and it did not agree with better-published models. A missed opportunity. Since then, field experiments (free-air CO₂ experiments) have shown that the CO₂ fertilization effect boosting production had been in fact overestimated.

We were a small team with much to do: find and fix model bugs, revise and improve the code, run the model for a variety of domains and scales, deliver the results, and write reports and papers. Formatting and QA/QC of the input climate data became the major responsibility of a new team member, Drapek, who also mapped model results using GIS. If that was not enough, training new users (students) soon became part and parcel of running the model. Much later, when Neilson and Lenihan both retired and funding to further develop the model became nonexistent, it was touch and go for MC1. But Conklin and I kept it going, and the USGS soon provided funding to develop a newer version with land use, MC2, which we are continuing to refine. Even Neilson's replacement, who was supposed to complete BIOMAP to supersede MC1, now also uses MC1 or rather its successor MC2 in his research projects. The model definitely has been a workhorse, and despite the many bugs that were (and may still be) discovered during its long career, it has served us all well.

The purpose of this book *MC1 Dynamic Global Vegetation Model: Concepts and Applications*, is to document the MC1 DGVM and provide peer-reviewed documentation that can be cited in future journal publications. Hopefully this will help satisfy unconvinced reviewers of manuscripts reporting MC1 results, making the model a better-known entity. Since 2000, the model has been used in various research projects nationally and internationally and was featured in a number of publications and reports (88 as of April 2015), many of them written by our small research team. Hopefully, this book will entice others to further develop the model and explore our changing future by facilitating the training of new users.

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