BOOK REVIEW

Nicolas Remy, Alexandre Boucher and Jianbing Wu: 
Applied Geostatistics with SGeMS: A User’s Guide 
Cambridge University Press, 2009, 288 p., $99 (U.S.), hardback, 
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In the tradition of GSLIB, a new generation of Stanford graduate students has developed a software package that makes available to the public the most recent geostatistical tools developed by the Stanford Center for Reservoir Forecasting. This book serves as the user’s guide for a software package that the authors have named SGeMS (Stanford Geostatistical Modeling Software). With such books, a review runs the risk of becoming a review of the software package, and not of the book itself. Some commentary on the software is necessary, since software is the focus of the book; but it is possible to access and use the software without buying the book and so this review will try to maintain a focus on the book itself. 

This SGeMS book is not only a software user’s manual; it also provides quick explanations of the theory behind the many geostatistical procedures implemented in the package, shows many case study examples and includes a software disk with data sets and examples. The book’s explanations and examples focus on the application and practice of geostatistics, and not on theory, so the book can also serve as a practical reference book and tutorial manual. For those who do not feel a need for the explanations and tutorial examples, and wish only to use the software, an earlier version of a shorter software manual is available directly at http://sgems.sourceforge.net, along with the source code. 

The disk distributed with the book contains the SGeMS executables (an improvement from GSLIB, which provided only source code), the C++ source code, and all of the ancillary files needed for the book’s many tutorial examples: the data sets, the parameter files and the Python scripts. An aspect of SGeMS that distinguishes it from much of the other geostatistical software, both commercial and public domain, 

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is that its developers have created a toolkit that cooperates with the Python scripting language. With the ability to operate in a scripting framework, the software can function more like an integrated toolkit and less like a collection of stand-alone routines. The scripting language also makes it easy to run repetitive tasks (like multiple realizations of a simulation), to automatically post-process output and to maintain a library of ready made recipes for complex tasks that involve several different algorithms. The book does not aim to provide a complete introduction to the Python scripting language and simply directs readers to other books and references on this subject. With the relative simplicity of the Python scripting language, however, the availability of example Python scripts on the book’s disk will enable many readers to understand as much as they need to know about Python.

Following a Foreword by Albert Tarantola and a brief introductory chapter, the book includes chapters on: (2) General Overview; (3) Geostatistics: A Recall of Concepts; (4) Data Sets and SGeMS EDA Tools; (5) Variogram computation and modeling; (6) Common Parameter Input Interfaces; (7) Estimation Algorithms; (8) Stochastic Simulation Algorithms; (9) Utilities; (10) Scripting, Commands and Plug-Ins. The longest of these, and the natural focus of the book, is the chapter on stochastic simulation algorithms. This is, more than anything else, a book that presents the recent developments in stochastic simulation from the research program at Stanford University.

There have been great advances in stochastic simulation since the GSLIB book of the 1990s; at Stanford University, much of the research in the past decade has focused on procedures for honoring multiple-point statistics. Though the traditional cornerstone of geostatistics, the variogram, provides a useful summary of spatial continuity, it is only a two-point statistic (it considers pairs of locations, and not triples, quadruples, etc.). As such, the variogram often does not contain enough information about the spatial character of the phenomenon being studied and simulations that honor the variogram often end up being visually disappointing: channels that fork, splay and rejoin are hard to simulate with variogram-based procedures, as are complex cross-cutting features. The multiple-point simulation algorithms are therefore a significant new development in geostatistics. The main strength of this book is that it provides the reader with a good introduction to the theory of multiple-point geostatistics, and supplements this with many tutorial examples that clarify the appropriate use these new tools.

With more than a decade’s worth of additional material to cover since the GSLIB book was written, the authors of the SGeMS book faced a difficult decision: should this new book try to cover everything (again), or should it focus instead on the new advances? They have tried to do both and this ends up being the book’s main strength and also its main weakness. For some, the Recall of Concepts chapter (second longest in the book) will seem like too light a skim over the surface of many topics that have considerable depth. For others, having access to the two-hour bus tour version of geostatistics will give them all they need to know. It is unlikely that anyone will be able to self-teach themselves geostatistics from this book but that was surely never the authors’ goal. I expect that anyone seriously interested in this book will already have other geostatistical reference books and technical articles to which they can refer when they need to refresh their memory on specific details.