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Book Review

The Seismic Analysis Code: A Primer and User's Guide by George Helffrich, James Wookey, and Ian Bastow, Cambridge University Press, 2013; ISBN: 978-1-107-04545-3 (hardback), ISBN: 978-1-107-61319-5 (paperback)

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Seismic analysis code, best known by the acronym SAC, is among the most popular and widely used software in seismology. It was developed in the 1980s, mostly for nuclear test monitoring purposes. However, the code was freely available, and was later embraced by academia and became a standard in seismology and geophysics. This book fills a gap in the literature by providing a novice level introduction to the SAC, to accompany the detailed command descriptions in the form of reference manual that is available online from IRIS Consortium.

The authors start by introducing new users to the philosophy of the SAC processing environment, describing the typical analysis task phases of large seismic datasets. The book then presents fundamental commands for performing such routine tasks as reading, writing, and basic plotting of the data, header manipulation, resampling, de-glitching, rotation, frequency domain operations, and filtering. It includes one chapter explaining, with examples, the powerful facility of SAC which enables encapsulation of routine sequences of commands into user-defined "macro" procedures that can be called to repeat the analysis on different datasets. The authors also present, in brief, automation of SAC execution by use of shell-scripts, and the ability to access SAC functionality from external programs, written in a variety of programming languages, by use of shared libraries.

More advanced topics are then presented. Array data processing and common tasks associated with this, for example trace stacking, array maps, beamforming, and travel-time analysis are discussed, with examples, in a separate chapter. The spectral estimation procedure in SAC is also presented as a separate brief chapter.

The authors include a chapter that explains the facilities of SAC for handling three-dimensional data, and the different visualization techniques, including spectrograms and contour plots. The book concludes with implementation in SAC for two very common tasks, shear-wave splitting analysis and receiver function calculation.

Overall, this book is easy to follow and pleasant to read, containing many high-quality, explanatory figures, some in color. It is not intended to be a complete reference, but to lead the first time SAC user from the very basic level to more advance topics quickly yet methodically. It can serve as a textbook for students in seismology and geophysics, but is also useful reading for more experienced practitioners of the software, because it also presents some less-known features, and additions to newer versions of the software. The book is accompanied by online material that includes the command examples presented in the book, the source code, and macros for basic routines for analysis of teleseismic data.

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