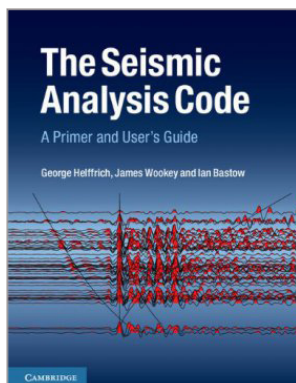


# The Seismic Analysis Code: A Primer and User's Guide

## A book review



By George Helffrich, James Wookey and Ian Bastow

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Seismological data are one of the most prominent data-resources in many fields of geophysics. Various codes and libraries are available for seismic data analysis in order to extract information for different applications. The Seismic Analysis Code (SAC), originally developed in the 1980s, is one such code. It is a general purpose programme for basic operations on time series data and, due to its ease of use and suitability for data analysis, it is one of the most widely used analysis packages for regional and teleseismic data.

[The Seismic Analysis Code: A Primer and User's Guide](#), by George Helffrich, James Wookey and Ian Bastow, is the first book that provides users with a complete guide to SAC. Its main target audiences are researchers and graduate students in seismology and geophysics. The book has a practical approach to a wide range of topics: from the essence of SAC processing, basic commands and macro language, to many advanced features, such as its file structure, integration of external processing steps into production-type data analysis schemes and advanced graphical aspects.

This book is based on the authors' decades of experience, both as core contributors to its development and as advanced users. The text is well-written with high-quality illustrations and example outputs of the SAC programme that support the concepts presented in the book. The chapters are short and thoughtfully divided into sub-sections which provide a categorised access to the content. Each section starts with a clear introduction to the key concepts followed by practical examples that represent the main functionalities of SAC.

The Seismic Analysis Code: A Primer and User's Guide is divided into eleven chapters. Chapters 1–3 provide an introduction to history of SAC development, different versions of this code, data formats and SAC processing philosophy. This helps readers familiarise themselves with SAC and the main concepts behind the data format, processing scheme and SAC commands. Chapter 4 introduces the

basic commands. It explains the fundamental features of this code such as reading and writing data, plotting and cutting, picking, file header, trace preparation and resampling, rotation and frequency-domain operations and filtering, all of which are essential in routine processing of seismological data. While using the programme in interactive mode can be very helpful for many applications, SAC's powerful macro capabilities can capture repeated or commonly used commands and execute them with minimal user interaction. This plays an important role in today's seismic data processing and is explained in Chapter 5, which introduces the required elements for writing macros. The book goes one step further in Chapter 6 by describing how to access SAC data and its functionalities from external programs. Chapters 7–10 address more advanced examples of plotting and data processing (array data handling and spectral estimation), as well as three-dimensional data in SAC. Finally, in Chapter 11, SAC implementations for two standard applications, shear wave splitting and receiver function analysis are presented. Additionally, the authors provide a list of SAC commands in alphabetical order as well as SAC command descriptions sorted by a selected set of keywords at the rear of the book.

Perhaps the most impressive aspect of this book is its ability to guide new users through the steps of learning SAC basics in detail, by providing extensive example inputs and outputs, as well as catering for experienced users, by describing hidden features in SAC. However, due to the focus on practical usage of the code and the shortness of the text in introducing the theoretical concepts, it is more a tutorial guide for methods available in SAC rather than a reference book for theoretical aspects of data processing. This is indeed not a disadvantage since the aim of the book, as the book's title suggests, is to be a primer and user's guide for SAC.

All in all, the book is an excellent and complete guide to SAC for users with different levels of expertise. It covers diverse aspects of the Seismic Analysis Code in a concise and clear way and provides a practical description for both fundamental and more advanced features of SAC.

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### More information

All the examples can be downloaded from the publisher's website:

[www.cambridge.org/helffrich](http://www.cambridge.org/helffrich)