FIRST STEPS IN
Seismic Interpretation

by Donald A. Herron
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About the Author

Don Herron received a bachelor of science degree (with honors) in geological sciences from Brown University in 1971 and a master of science degree in geological sciences from the California Institute of Technology in 1973. He enjoyed a career as a seismic interpreter at Texaco (1973–1977), Gulf (1977–1984), and most recently Sohio/BP (1984–2008). Since retirement in 2008, he has worked as an independent geophysical consultant for Petroleum Geo-Services (PGS) as a geosciences advisor, and with several oil companies as a seismic interpretation instructor. At Gulf and Sohio/BP he taught in-house courses in seismic interpretation and was co-instructor for the SEG Continuing Education course “Seismic Interpretation in the Exploration Domain” (1995–2007). He was a member of the Editorial Board of The Leading Edge (2002–2007, chairman in 2006–2007) and is author of the bi-monthly “Interpreter Sam” column in The Leading Edge. He is an active member of SEG, AAPG, and Sigma Xi.
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Preface

This book begins with an introduction that is more philosophical than technical, followed by five chapters on fundamentals of reflection seismic (titled Seismic Response, Seismic Attributes, Velocity, Migration, and Resolution). The gist of what I really have to say about the correlation of seismic records is in Chapters 7 (Correlation Concepts) and 8 (Correlation Procedures). Chapter 9 (Data Quality and Management) certainly should not be glossed over, and Chapter 10 (Other Considerations) contains my thoughts on several worthy topics that do not fit neatly into any of the preceding chapters.

In large part, this book is a compilation of notes from seismic interpretation courses that I’ve had the good fortune to teach over the past three decades. Because I’ve assumed that readers are familiar with basic concepts and principles of geology and reflection seismology, the book is best viewed as a synthesis rather than a fundamental treatment of those concepts and principles. When I use the expression “geologically reasonable” to qualify interpretation results, which I do throughout the book, I mean “reasonable” in the sense of “analogous to known geology” or “consistent with known geology or sound geologic models” or “within the context of expectation or realization of some geologic concept or model.”

I certainly don’t intend this book to be the definitive primer on interpreting reflection seismic data or a comprehensive treatise on the latest in correlation tools and techniques; rather, I’m seeking to give voice to a concern about “this particular art” that I’ve had ever since my first foray into interpretation in the early 1970s. My concern is founded on a statement by a man from whom I had the privilege to learn about exploration geophysics in the classroom and in the field. In his own book he wrote that “the correlation procedure itself is of such a nature that it can hardly be adequately described in a book.”

Well, with the utmost respect for that man, here goes.
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Acknowledgments

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Interpretation is telling the geologic story contained in seismic data. It is correlating the features we see in seismic data with elements of geology as we know them. The story is read from a book having many chapters, some of which are either illegible or unintelligible, and others are lost or yet to be written. And although the story doesn't always have a happy ending, only in its telling do we expand our knowledge.

—Interpreter Sam