

LITERATURE REVIEWS

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MORE THAN A REVISION

PRINCIPLES OF ISOTOPE GEOLOGY. 1986. 2nd ed. Gunter Faure. NY: John Wiley and Sons. 589 p.

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The first edition (1977) of this book was reviewed in *Origins* 6(1):47-48. When the second edition appeared I did not anticipate that a follow-up review would be a significant contribution. As I consulted the second edition I began to realize that it merited an independent review.

The second edition contains nine more chapters (for a total of 28) and 125 more pages than the first edition. Many of the carry-over chapters are substantial revisions. The recently developed samarium-neodymium and lutecium-hafnium dating techniques are fully treated in the second edition. Unsurpassed convenience of access to the technical literature is provided by the fully updated references throughout. There is an average of 2.9 pages of literature references per chapter.

The book is exceptionally well written, with a clear, fascinating style. The reader is "led by the hand", step by step, in the mathematical development of formulae for interpreting radioisotope data. Quantitative illustrative examples are explained carefully. In addition to the technical treatment there is historical background information that adds to the enjoyment of reading and to the ease of comprehension. In each category there is a thorough discussion of the various assumptions that must be made to interpret a radioisotope "age" in terms of real time. Throughout the book there are examples of success and of failure in the effort to obtain a valid chronological conclusion from radioisotope data. Most of these examples represent success, but sufficient failures are presented to give the discerning reader a sound perspective.

In his discussion of rubidium-strontium dating Professor Faure says:

Unquestionably, 'discordance' of mineral dates is more common than 'concordance'. ... the mineral dates

generally are not reliable indicators of the age of the rock
(p 120-121).

In his summary of Chapter 8 he says that a rubidium-strontium date for sedimentary rocks “may refer to the age of the source rocks, or to the age of diagenesis or metamorphism” (p 136), rather than to the time of deposit.

Individuals who have not recognized the difficulty of determining whether a plot of the ratio of two sequentially related isotopes in a suite of samples is an isochron or a mixing line will find Chapter 9 and also pages 327-331 of Chapter 19 enlightening.

The treatment in Chapter 14 makes it evident that samarium-neodymium ages for “fine grained detrital sedimentary rocks are similar to those for the igneous and metamorphic rocks from which they were derived” (p 246), and do not relate to the time when these sediments were initially formed.

For individuals who have taken a simplistic view of uranium-lead and thorium-lead radioisotope age determinations, Professor Faure’s statement on page 291 is significant:

Although examples of nearly concordant U, Th-Pb dates can be found in the literature ... in most cases U- and Th-bearing minerals yield discordant dates whose geological significance is questionable.

Chapter 18 gives an extended discussion of highly significant improvements in the techniques for zircon dating and in the interpretation of zircon uranium-lead ages that have been made since the first edition was written. In Chapter 19 the author points out that in general “the dates calculated from the single stage model [for radiogenic lead accumulation] do not agree well with the geologic ages of the associated rocks” (p 334).

Chapters 24-28 treat the information that may be provided by variations in the ratios of the stable isotopes of hydrogen, oxygen, carbon, nitrogen and sulphur. For example, the $^{13}\text{C}/^{12}\text{C}$ ratio “of the carbon in coal is similar to that in modern land plants and apparently does not vary significantly with increasing rank of the coal or its geologic age” (p 493). Biblical creationists have a challenge to develop a sound alternative explanation for the sulphur isotope patterns in sediments, coal, and petroleum that are discussed in Chapter 28.

In the estimation of this reviewer, the second edition of Faure’s classic text is the prime reference for anyone concerned with isotope interpre-

tation on a chronologic basis, and it must be read, *and understood*, by anyone who attempts an interpretation of radiometric age data from a biblical perspective.