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Isotopes in Palaeoenvironmental Research, edited by Melanie J. Leng, 2006. Developments in Palaeoenvironmental Research 10. Springer, P.O. Box 17, 3300 AA Dordrecht, The Netherlands. Hardcover, xviii + 307 pages. Price USD 129.00; EUR 99.00. ISBN 1-4020-2503-3.



This 10th volume in Springer's series 'Developments in Palaeoenvironmental Research' is intended to show how stable isotopes can be applied to increase the understanding of palaeoenvironments. The volume includes six chapters on the interpretation of isotopes in water, in tree rings, bones and teeth, lake sediments, speleothems and marine sediments, respectively. Through knowledge of isotope systematics, calibration exercises and undertaking a multi-proxy approach, isotope techniques have become invaluable to understanding environmental changes. All chapters emphasize justifiably the need to calibrate isotope records from hosts using studies of the isotope systematics of the modern environment. A robust calibration should be based on evidence from a multi-proxy approach using isotope signals from different materials, or combined with other palaeoenvironmental techniques.

The book has an advanced level, but aims at both students and scientists who are interested in stable isotopes and environmental changes. The readers will find new methodologies and advances regarding isotope analysis for palaeoenvironmental research, and learn the basics on isotope fractionation and transport. Chapter 1 describes O, H and C stable isotope compositions in present-day water and aqueous carbon cycles to provide a framework for the interpretation of these isotopes, which is worked out for lacustrine sediments in Chapter 4.

The development of on-line techniques are introduced in Chapter 2. It mentions why new techniques allow to analyse small samples, so that it is possible, for instance, to analyse each individual ring from one single tree; it is thus possible to quantify the variability of the values and to provide fairly exact confidence intervals for quantitative palaeoclimate estimates.

Chapter 3 gives a background for understanding how isotope changes in bone (and teeth) are caused, and shows how these changes may be understood, though not always, in terms of environmental effects. Chapter 5 deals with recent methodological developments for the extraction of reliable stable-isotope signals from speleothem fluid inclusions, and provides a rationale for their interpretation. It describes the use of stable (O, H, C) isotopes, with emphasis on understanding the isotope systematics in the context of karst systems, and on the processes by which isotope signals are transferred from the atmosphere and near-surface environment through the karst system to the speleothem calcite.

Chapter 6 describes the current state of palaeoceanographic and paleoclimatic uses of both O and C isotopes, alongside less frequently applied stable isotopes such as N, Si and Bo. The future development and use of O and Si alongside C and N of intrinsic organic matter within marine recorders will be of great help for the preparation of even more detailed isotope-based palaeoceanographic reconstructions.

It is unfortunate that the book has not been prepared with the care that one would expect from a book on such a subject. For instance, there are more than 30 typographical errors in page 234 and 235 alone.

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