



Journal of Sedimentary Research

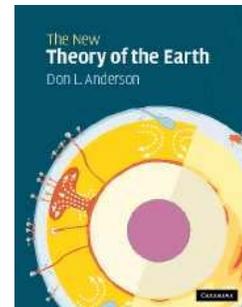
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The New Theory of the Earth, by Don L. Anderson, 2007. Cambridge University Press. Hardbound, 384 pages. Price GBP 35.00; USD 70.00. ISBN 9780521849594.



Understanding Earth's origin and tracing its temporal evolutionary history requires significant input from other branches of science. Earth science is therefore a purely multidisciplinary science in every sense. The maturing of earth sciences has, however, led to its "fragmentation" into various subdisciplines like mineralogy, petrology, geochemistry, seismology that, in turn, have their own still finer subdivisions. Developments and discoveries in one subdiscipline diffuse slowly into others and this creates confusions, paradoxes and enigmas among students, researchers and practitioners. Some of these paradoxes and enigmas remain unsolved and do persist in scientific literature for a prolonged time.

Highlighting such enigmas and paradoxes through questioning and criticism is an inescapable task of a geoscientist. Don Anderson is among one of those rare geoscientists who have wisdom and capability of in-depth criticism, as is evident from this book, which is basically a complete update of his book "Theory of the Earth" (1989).

The contents of the book are presented in twenty-seven chapters, grouped into seven parts. Earth, being a member of the solar system, cannot be completely understood in isolation, and hence a planetary perspective is necessary. The first three chapters (Part I, Chapters 1-3) deal with the origin and early history of the earth, comparative planetology, and building blocks of the planets. Part II is on the dynamic aspects of Earth. Topics covered in this part are: outer shells of the Earth (Chapter 4; critical overview of fundamentals of the plate-tectonics theory, hotspots and, of course, a very interesting discussion on plume versus anti-plume tectonics), the eclogite engine (Chapter 5), the shape of the Earth (Chapter 6) and mantle convection and its complexity (Chapter 7). Part III (Chapters 8-11) is devoted to the internal structure of the Earth from a geophysical (seismological) perspective. The fourth part (IV) of the book is on sampling the Earth. As rightly pointed out by Anderson, a large part of petrology, geochemistry and geophysics is about sampling the Earth, and there are ample situations where statistical methods are useful (Chapter 12). The composition of the Earth's mantle and petrogenetic aspects of various igneous rocks including noble-gas isotopes are critically addressed in the next five chapters (Chapters 13-17). The seismic properties of minerals depend on composition, crystal structure, temperature, pressure, and, in some cases, on defects and impurity concentrations. The fifth part (Part V) is devoted to mineral physics. Various aspects of elasticity and solid-state geophysics, mantle anisotropy, non-elastic and transport properties of rocks, phase changes and mantle mineralogy are addressed in five chapters (Chapters 18-22). Key issues like the nature and composition of the upper mantle, early chemical stratification of the mantle, magma sources, melt generation, the nature and cause of mantle heterogeneity, terrestrial heat flow and the thermal history of the Earth are critically addressed in the last few chapters (Parts VI and VII; Chapters 23-27).

The New Theory of the Earth is a comprehensive and in-depth account on the Earth's interior, and it encompasses all major findings, developments and discoveries in various subdisciplines of the earth sciences during the last few decades. To me, it is an unconventional book, which is essential not only for understanding the mysteries of Earth's interior but also to learn how to question conventional ideas, hypotheses and beliefs, and how to find the paradoxes, enigmas and inconsistencies in scientific literature: a basic prerequisite for the advancement in science! In addition to conventional (highly relevant and up-to-date) references, the added "googlets" will be of immense help for students and researchers to find many relevant but otherwise inaccessible web documents. The mode of presentation is enjoyable and the illustrations are reader-friendly. This book will definitely motivate new research and I strongly recommend this book for libraries of universities and institutes. Last but not the least, I must congratulate Cambridge University press for publishing such a good book.

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