

Book Review of

James Maxlow

On the Origin of Continents and Oceans: A Paradigm Shift in Understanding

by Stephen Hurrell

The science of geology has always dealt with big ideas. When James Hutton became interested in geology in the eighteenth century many people believed the world was only about 6,000 years old, yet the science of geology told Hutton that the Earth was “immensely old”. Virtually no one seemed to believe him when he first read a paper presenting his reasoning to the Royal Society of Edinburgh in 1785. His new idea seemed to mainly result in “intemperate responses” (as Hutton described them). Even his friend John Playfair admitted that his own mind “seemed to grow giddy by looking so far into the abyss of time.” The age of the Earth was a big idea that rumbled on throughout the nineteenth and early twentieth centuries engaging well-known scientists like Playfair, Lyle, Darwin, Kelvin and Holmes in the debate. Finally, the science of radiometric dating indicated that the Earth was “immensely old” at over 4.5 billion years – a truly staggering age that could indeed make the mind go giddy. Today Hutton is known as the Father of Modern Geology for his insights and just how startling his ideas were at the time can be easily forgotten.

Other big geological controversies like Ice Ages and Mass Extinctions spring to mind as well but one of the biggest ideas must be Continental Drift, or Plate Tectonics, as it has been rebranded today. The concept of Continental Drift first came to Alfred Wegener in 1910, while he considered a map of the world. By the 1920s his book about Continental Drift had started a debate that lasted for most of the first half of the twentieth century, until finally it was acknowledged that all the evidence did indicate that continents had moved and it became established geological science.

But even as this new science became part of the school timetable some prominent geologists were pointing out that the revolution was far from over. The first part of the evidence had been accepted but there was another piece of the puzzle. Leading geologists described how geological evidence indicated the Earth was expanding in size. This debate continued to rage on even in well-known science journals like *Nature* and *New Scientist* with articles like Dr Hugh Owen's *The Earth is expanding and we don't know why*, published in 1984. Today there are hundreds of scientific articles debating the concept of expansion spread across an array of scientific journals.

The most prominent geologist researching the concept of expansion was the Tasmanian Professor of Geology S. Warren Carey. He wrote three books and many scientific papers on the subject and organised conferences attracting geologists from all over the world. In his last book, published in 1996 with an updated second edition in 2000, he “handed over the baton” to younger geologists. Dr James Maxlow, an Australian geologist, is widely regarded by his geological peers as a key inheritor of Carey's baton. At a week-long Earth expansion conference held in 2011 at Erice, Sicily, Maxlow was invited to attend as lead speaker. His credentials can't be in any doubt. He has worked as a professional geologist in the mining industry for many years, pinpointing where to mine for gold, and has studied the geological evidence for expansion in impressive detail.

Anyone researching into Earth expansion will find it a difficult task. There are hundreds of detailed scientific papers to read with some of them extending to over 50 pages. Scientific conferences devoted to the subject also tend to examine the subject with a high level of technical detail. Maxlow's new book consolidates the work of the many scientists who have explored the expansion concept into a readily readable form whilst still presenting the information in depth. It gives us all the latest research into expansion and brings the evidence up to date.

Maxlow's new book is an inspiring work covering nearly 500 pages, including many diagrams and Earth models in full colour. The colour is particularly important for the impressive reconstructions of the Earth as it expands over hundreds of millions of years. All the continental plates can be reconstructed onto a globe that gets progressively smaller into the geological past. Spread over millions of years, these reconstructions use the latest data available for the geological age of the ocean floor. Early reconstructions of a few decades ago indicated expansion but Maxlow shows how the latest ocean floor data supports the theory to an even greater degree than previously achieved. He also extends the geological period covered into deep time to reconstruct the Earth during these early periods of geology.

Maxlow gives a brief description of conventional Plate Tectonic theory which he then uses to illustrate how expansion provides a better solution to the many geological problems the Earth presents. The conventional wisdom is that the Earth has been the same unchanging diameter for at least the last 4,000 million years and we are often told that we must accept this almost as an act of faith. Maxlow upsets this conventional view by examining the physical evidence to reveal that there is geological confirmation that our planet has slowly evolved over this immense period of time from a smaller planet to its present size.

It habitually seems that some people can't relate to new theories without responding in an "intemperate manner" - it was just the same in Hutton's and Wegener's time. It is a pleasure to observe that Maxlow has ignored any "intemperate" responses about the expansion theory and clearly focused his book on decades of methodical research about expansion. The book presents the factual evidence as he understands it and he is able to show how the new data available "is not consistent with conventional tectonic theory and therefore requires rethinking, reinterpreting, or redirecting."

Maxlow notes that although the concept of expansion has been debated for many years, the rejection of the idea is based on arguments from the 1950s to 1970s, well before the modern data Maxlow has used. Maxlow argues that the theory of expansion was rejected using data that is now many decades old so it now needs to be re-examined using modern global information. He has taken this bold step "to see if the modern global data fits better on an Earth whose radius is changing through time." The answer he sees is that the evidence does support the concept of expansion and he goes on to demonstrate how expansion explains the geological observations with numerous examples. Maxlow explains how the Earth's past history, "shows a very simple, predictable, and easily understood process involving a progressively changing Earth surface area and curvature through time." He uses the modern physical evidence "to recreate and discuss the entire 4,000 million years of Earth's recorded geological history."

Maxlow uses the new term Expansion Tectonics to embrace all the older terms for describing expansion. He notes that conventional theory insists that "continental and seafloor crustal development is a random, non-predictive, and somewhat catastrophic process." In complete contrast to this Maxlow's reconstructions show a process that is progressive, predictive and

evolutionary. Magnetic North and South Poles are precisely located and the established poles and equator coincide fully with observed climate, plant and animal evidence. All these various strands of evidence interconnect. They show that Expansion Tectonics represents a paradigm shift in our understanding of the Earth.

Maxlow explains that with the Plate Tectonics theory the “theoretical Tethys, Iapetus and Panthalassa Oceans are required to maintain a constant radius Earth premise.” These needed to be of a similar size to the present oceans to allow the continents to be reunited. However, on a smaller diameter Earth these large oceans are not required. There is still evidence that some form of ancient seaway existed so Maxlow uses the original names but calls them seas instead of oceans to illustrate the difference. They were small inland seaways and Maxlow once again uses his ancient globe reconstructions to show these ancient seas in position.

The discussion on palaeomagnetic results is enlightening. Palaeomagnetism caused much discussion about the possibility of expansion particularly during the 1960s and 1970s and the debate was published in *Nature* and other scientific journals. Some scientists argued that it proved the Earth hadn't changed diameter, some argued that it proved it had changed diameter and some argued that it wasn't accurate enough to prove either. Many of the arguments became more convoluted as time went on with the “minimum scatter method” and “statistical analysis” being used to prove that the Earth hadn't expanded. These arguments from the 1970s are still often repeated today. Maxlow cuts straight through this “minimum scatter” and “statistical analysis” argument and plots the magnetic poles straight onto an expanding Earth to test the evidence. Having done this he finds that he can “physically locate the ancient magnetic poles and corresponding equators on each small Earth model”. The palaeomagnetic evidence supports expansion of the Earth. Expansion means that the location of each ancient magnetic pole remains, “diametrically opposed throughout this time, as it is today” and he precisely positions the poles on his reconstructions of the ancient Earth. In later chapters Maxlow compares these magnetic poles with climatic zones and plant and animal distribution to find that they all match.

One very useful addition for anyone who wants to explore palaeomagnetism in greater detail is the appendix of palaeomagnetic formulas. Having noted that conventional formulas are “based on the fundamental assumption that the Earth's radius is constant” Maxlow derives the formulas necessary for an expanding Earth and presents them over several pages.

Having established the change in the Earth's radius through time Maxlow further investigates the change in other parameters like Earth mass, density and surface gravity. He takes us through the problems of a constant mass expanding Earth and explains how this results in an unacceptably high density and surface gravity. Having discussed the various difficulties in detail Maxlow explains that this is the reason “an increase in Earth mass appears to be the most acceptable scenario by most researchers”. He notes that Carey had “concluded from his own research that, because of the limitations shown from estimates of our ancient surface gravity, there may be no alternative but to consider an exponential increase in Earth mass with time”. Maxlow calculates that this increasing mass expansion would cause the Earth's surface gravity to increase exponentially so it “increases from approximately one third of the present value during the Archaean and mid-Proterozoic time” up to the present.

Maxlow returns to the concept of a changing surface gravity caused by increasing mass later in his book. In one later section he discusses how life has been affected by the change in Earth's diameter and mass throughout geological time. Maxlow mentions my own work and explains that “Hurrell ... provided independent evidence for a reduced gravity during these times after analysing the

mechanical aspects of dinosaur bones [and] independently calculated a surface gravity during the Permian of 50 percent of the present surface gravity.” This value of surface gravity is of course the same conclusion Maxlow had presented in the first part of the book based on geological evidence and he offers the evidence for reduced gravity as confirmation of the latest thinking about mass increase.

Several different mechanisms for mass increase have been proposed by different scientists over the decades. Maxlow presents the solar wind as an example of a “proposed causal mechanism for an increase in Earth mass ... in order to stimulate further discussion and research”. The solar wind is “a rarefied flow of hot plasma emitted by the Sun ... with a density of around 5 ions per cubic centimetre.” During magnetic storms it can become much denser and this solar wind has been shown to be trapped by the Earth. Maxlow is able to describe new research that suggests this process allows the solar wind to reach the Earth’s surface. This concept is being researched by the American John Eichler who is quoted as explaining how there “is no lack of component particles to create new matter deep within the body of the Earth. [It] is plausible and warrants further serious scientific investigation.”

This book review was based on Maxlow’s hardback book which is somewhat expensive even for a text book. As a cheaper alternative, Maxlow has also provided another version in the new kindle ebook format. The kindle ebook version is presented as two separate ebooks, part one and part two.

It is clear that Professor Carey made a perceptive choice in selecting Dr Maxlow to receive his expansion baton. Maxlow has provided an excellent resource that adds to the decades of work of many scientists by providing us with a comprehensive text book. It will enable geological students to easily review the latest evidence indicating the Earth has expanded over geological time. Maxlow’s full colour reconstructions of the expanding globe are particularly useful in this respect. The globes clearly illustrate the highly predictive nature of expansion and allow us all to see how expansion agrees with the palaeomagnetic, climate, plant and animal evidence. As the leading rival theory to Plate Tectonics this book clearly has a place in every university library. The evidence presented in the book allows us all to contemplate: Is expansion the next big idea that will revolutionise our view of the Earth?