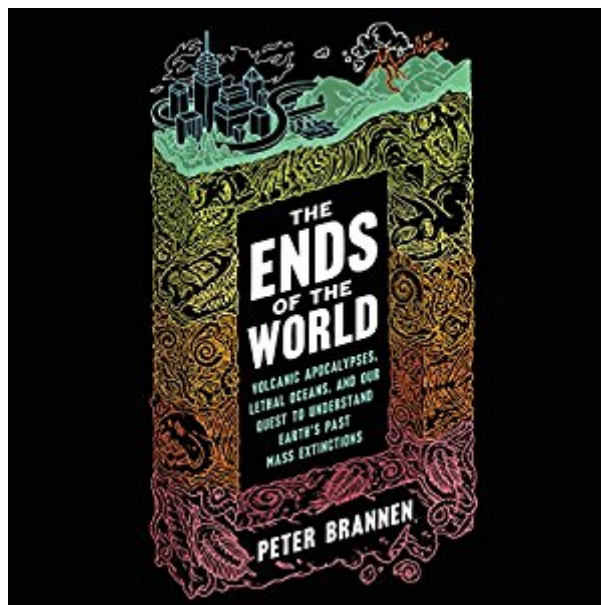


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# The Ends Of The World: Volcanic Apocalypses, Lethal Oceans, And Our Quest To Understand Earth's Past Mass Extinctions





## Synopsis

As new groundbreaking research suggests that climate change played a major role in the most extreme catastrophes in the planet's history, award-winning science journalist Peter Brannen takes us on a wild ride through the planet's five mass extinctions and, in the process, offers us a glimpse of our increasingly dangerous future. Our world has ended five times: It has been broiled, frozen, poison gassed, smothered, and pelted by asteroids. In *The Ends of the World*, Peter Brannen dives into deep time, exploring Earth's past dead ends, and in the process offers us a glimpse of our possible future. Many scientists now believe that the climate shifts of the 21st century have analogs in these five extinctions. Using the visible clues these devastations have left behind in the fossil record, *The Ends of the World* takes us inside "scenes of the crime", from South Africa to the New York Palisades, to tell the story of each extinction. Brannen examines the fossil record - which is rife with creatures like dragonflies the size of sea gulls and guillotine-mouthed fish - and introduces us to the researchers on the front lines who, using the forensic tools of modern science, are piecing together what really happened at the crime scenes of the Earth's biggest whodunits. Part road trip, part history, and part cautionary tale, *The Ends of the World* takes us on a tour of the ways that our planet has clawed itself back from the grave and casts our future in a completely new light.

## Book Information

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## Customer Reviews

The five mass extinctions are a cliché. We actually have no understanding of what really happened. Peter Brannen has written a remarkable and extremely readable book (his first) to fill in the voids. The result is thought-provoking, gripping, and more than a little worrisome. It might be



clear insight, but it makes you squirm. There were three main reasons for the extinctions. We all know about the asteroid hit, because it was only proven in the 1980s. But volcanic eruptions like the likes of which we have fortunately never seen like were the cause of another. As well, the planet keeps tipping in and out of ice ages as it wobbles its way along. When mass extinctions occur, they tend to be really fast like same day in the case of the asteroid hit, very few years in other cases. It's not a gradual decline; it's a stunning vanishing. Few species make it to the next era; we start over every time. The mechanics are remarkably similar. The level of carbon dioxide soars, crippling the oceans from doing their job, and they return the favor to the air, crippling everything else. The weather turns unimaginably violent. Everything gets wiped out. Land surfaces get scoured. It takes the oceans a good hundred thousand years to regain balance, and then a hundred million years for a new world of plants and animals to evolve and populate the barren Earth. In the interim, Earth is Hell. Brannen assembles the wisdom of renowned paleontologists to put the scenes together. There isn't much disagreement on the mechanics or the major events. As CO<sub>2</sub> rises, so do temperatures, and very few beings are capable of functioning in higher temperature bands. They falter and die. For survivors, there would be nothing to live on. Today we are in remarkably pleasant pause between ice ages, in which the continents have very fortuitously aligned north-south. That allows for migration and survival as different climates take hold. It also keeps the oceans pumping. There is a nice, benign balance to the weather, and the horrific volcanic flows that can deposit literally miles thick lava over entire countries, have ceased. Unfortunately, one species has seen fit to take command, and it is working to throw the balance the Earth has achieved into another era of chaos. We are imposing change at a rate "ten times faster" than the worst events in Earth's history, say the paleontologists. When temperatures rise just one degree, the balance is upset. We are (laughably) attempting to hold it at another two. That will not support life as we know it. "The entire global economy depends on how quickly we can get carbon out of the ground and into the atmosphere," says one. And we're doing it bigger and better even than our volcanoes. As for rising oceans, paleontologists snicker at estimates of .5 to 2m. Every time this happened before, it was more like 15-20m for this kind of temperature rise. Considering all the factors that make a mass extinction, "We are the perfect storm." One key takeaway is that we cannot learn from the events of the past. Every mass extinction was different. There are so many variables, life forms, different configurations of land and sea, there is no way of predicting numeric outcomes with certainty. Past performance does not guarantee future results. But the overall picture is grim



and coming up fast, and Brannen found no paleontologists who say different. The Ends of the World fills in huge gaps, put things in perspective and (cough) clears the air about how the Earth works. It is an extraordinary, valuable insight, colorfully written and also horribly frightening. Maybe nothing is forever, but we're not helping. David Wineberg

This is an amazing book. The information about the extinction events certainly gives one cause to stop and consider. The author has a clear bias, but that is probably to be expected, and it was not too distracting. The last hour or so was not about the historical record but more of a what we should be doing. That is fine, but not what I needed to hear. The reader did a great job.

A delightful, if somewhat scary, read. Has a reasonable depth for a mildly informed reader while delving into several related phenomena. In addition to providing a knowledgeable discussion of the paleogeology of extinction theories, the author provides some neat perspectives on evolution and species differentiation, provides a fun description of prehistoric megafauna and some accessible discussions of deep time and climactic evolution. Frequent excursions into recent climate change debates are a little heavy-handed but certainly are appropriate to the subject. Overall, a pleasant, engaging read.

This book is not for everyone. The earth has seen several mass extinctions. Sooner or later another extinction is on the way. Reading about the ends of the world is interesting to me. Those persons who refuse to learn from history are doomed to repeat it.

Peter Brannen is an extremely gifted science writer in the tradition of the venerable Richard Dawkins and much wittier than Stephen J. Gould. He provides here an excellent overview of our current thinking on prehistoric mass extinction events. The basic concepts (such as the carbon cycle) are well explained, down to the appropriate level of detail: there really is no need to descend into astrophysical details and try to explain why the early Sun was faint, and the many scientific uncertainties and counterexamples are highlighted. More importantly the author presents all this with a 'helicopter view', never losing sight of the whole, something professional scientists (like myself) struggle with mightily when communicating their findings. He also includes lots of funny anecdotes, making this just a terrific page-turner. The whole story reads like a thriller where few of the protagonists die peacefully of old age and evidence against the suspects and what weapons they used is well explained, and which all ends well with us triumphant humans appearing in the final



chapter to enjoy the show. If you think that great writers only write novels, do read this book instead. It is quite US-centered, with Americans even appropriating the cause for the first extinction with the rise of the Appalachians, but it all fits the intrigue. What I came away with is that only the earliest mass extinction- the one that ended the Devonian- is believed to have occurred directly by climate change (cooling). Life has since evolved to become much more robust, occupying a bewildering variety of niches and able to weather a wide range of climates- merely laughing at the 'recent' Ice Ages. Subsequent extinctions after that Devonian event required more sudden perturbations, like volcanoes and meteorites, and the wild CO<sub>2</sub> swings that accompanied these just made things worse. I especially like the view that a large meteorite initiated the extinction of almost all dinosaurs (read the book if you still believe that all dinosaurs went away), but that this also caused Earth's magma to slosh around, helping a hotspot to pierce through India, which was just moving over it. Now where things get tricky is that this book is written in an era of heated debate over anthropogenic CO<sub>2</sub>, but that is not what the book is primarily about. What few fail to appreciate is that today's greenhouse gases are likely to greatly affect human civilization, but much less so all other life forms. So saying that the Paris agreement attempts to 'save the Planet' is therefore somewhat misleading. Coastal areas will disappear, but places like Canada and Siberia will much better support agriculture to feed us (which the FAO says should increase productivity threefold this century). Yet of course there is the ominous risk of hitting 'tipping points', so count me in as a climate worrier. Still, I would be much more concerned about an immediate return to the next Ice Age (again, this possibility is well discussed in the book). Also, we won't be pushing CO<sub>2</sub> levels to the 30,000 ppm or so seen in the past (today's counter just passed 400). A massive extinction event is in fact ongoing (though not as bad as previous ones), but we are causing that by habitat destruction (appropriating Earth's surface for agriculture and building cities)- changing our climate has not much to do with it. I suspect Mother Nature is just waiting for us humans to go away to resume business as usual- from Her perspective, humanity's demise (through global warming or otherwise) is actually a boon for The Planet. Like I said, all this is a subtle discussion, and this book provides an excellent, well informed and well explained background to this. What is somewhat surprising is that human overpopulation, the elephant in the room, is not discussed. There is just no way Planet Earth can both maintain its biodiversity and 10 billion people, and this is a delicate discussion omitted from this book.

Explores the theories of the cause of the past mass extinctions, and which species survived and which didn't and possible explanations as to why. Compares our current rise of CO<sub>2</sub> to past events.



This book is broad and lightly touches on various topics. It's an easy and enjoyable read! I didn't think the book was political but explored some of the consequences to the present Earth and its inhabitants if CO2 continues to rise.

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