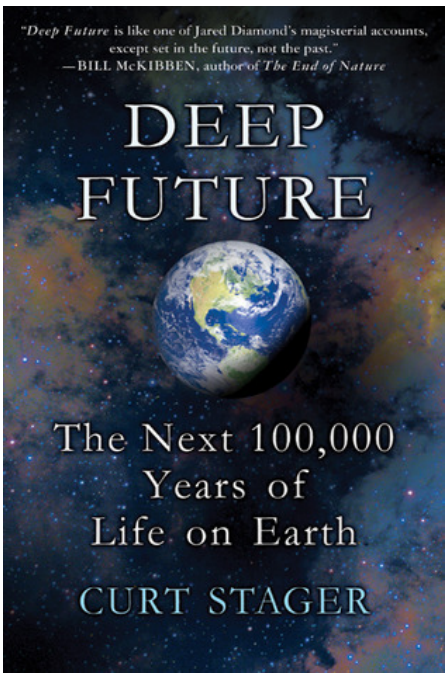

Deep Future: The Next 100,000 Years of Life on Earth

Curt Stager

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In this major new book, paleoclimatologist Curt Stager vividly shows how what we do to the environment in the 21st century will affect the next 100,000 years of life on this planet Most of us have accepted that our planet is warming and that we've played the key role in causing climate change. Yet few of us realize the magnitude of what's happened. The course we take will affect our civilization and the planet for millennia. What will that world look like? Curt Stager draws on the planet's geological history to provide a view of where we may be headed. That future is far different from anything anyone has ever seen before. In the long run, the greatest threat to humans will not be global warming, but global cooling. Just when that "climate whiplash" happens is entirely up to us. We have already put off the next Ice Age, but whether our descendents will see an ice-free Arctic, miles of submerged coasts, or an acidified ocean still remains to be decided. Stager shows how vastly different the world will be if we continue to pollute or if we rein ourselves in for the sake of future generations. Like the bestsellers The World Without Us and The Next 100 Years, this book offers a new perspective that will change the way climate skeptics, activists, and everyone in between thinks about what we're doing to our planet.

Deep Future: The Next 100,000 Years of Life on Earth Details

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From Reader Review Deep Future: The Next 100,000 Years of Life on Earth for online ebook

Leo Knight says

Paleoclimatologist Curt Stager offers a view of past climate change, and projects current trends into the future. He accepts climate change caused by man as a given, even using the term Anthropocene, or epoch of man, for our current geologic period.

My grasp of past climate changes had been hazy. Stager gives a good deal of information. However, I had a lot of difficulty with his tone and organization. He jumps around in time from the end of the last ice age, further back to the beginning of that ice age, even further back, then forward to speculate on the future, all in a few pages. I would have preferred a linear timeline. He also adopts a flippant tone, trying to split the difference between climate winners and losers. Polar bears may go extinct, but brown bears will thrive. Tropical reefs may vanish, but new reefs may form further north. The past had great die offs, too, so our time isn't so special. Cold comfort if you happen to land on the losing side.

He did shed light on a little publicized consequence of carbon dioxide buildup in the atmosphere, namely ocean acidification, and its impact on sea life. He also highlighted how long carbon will remain in our atmosphere, causing effects for millennia.

He has a lot of interesting information, but ultimately I couldn't get past his style. The book did spur me to find out more. For those interested, I found my copy at, of all places, Dollar Tree, for, you guessed it a dollar. Worth every penny!

Gilda Felt says

Though the information was thorough, I thought it was unnecessarily flippant. In an area where drought has already taken hold, the author cheerily announces that the area's people's descendants will have plenty of water—hundreds of years in the future. What the people are supposed to drink in the meanwhile, isn't addressed. In several places the same issue is "resolved" in the same manner. One need only wait a few centuries or millennium and things will be just fine. Taking that approach, why bother with anything, since the sun will eventually die and engulf the earth in its death throes?

I was looking for possible answers, or at least ideas, in combatting climate change; all I got was an author trying to be clever.

Alan says

Curt Stager, a paleoecologist, has assembled a book well worth reading if you are interested in or concerned about global climate change. Probably the most imporant thing this book adds to the body of scientific literature that addresses issues of climate change is that of "deep time". "Deep time" refers to expansive

lengths of time needed to envision both earth's history and its future. These are time frames most people do not deal with or consider on a regular basis, and so have a difficult time comprehending, but with which geologists like Stager use all the time.

This book provided me with a truly new perspective that I never considered before: a climate future that may be predictable (albeit in broad strokes) for the next 100,000 years or so. Most climate predication models extend only through about 2100, not 102,100! Stager uses known, predictable varibles such as the Milankovitch cycles together with known greenhouse-earth episodes in earth's history to predict what might happen to the planet if we experience a moderate episode of carbon-loading in the atmosphere of 1000 giga-tons or so versus an extreme episode of loading of 5000 giga-tons of carbon. Both scenarios are possibilities.

Stager predicts that we have already emitted enough additional carbon into the atmosphere to forestall eareth's next major glaciation period. He also predicts that though we will certainly see sea levels rise, an ice-free Arctic, shifts in growing regions and precipitation patterns, these things will not be the end of mankind. These things will happen gradually, with time enough for humans and other species (except perhaps for tundra or polar species) to adapt.

Stager interestingly mentioned that many climatologists believe that he is not alarmist enough, while many climate change naysayers say he is too alarmist. This, Stager says, is an indicator that he is probably somewhere near the truth.

One of the most important messages he shares has to do with the degree of confidence we can have in scientific work and conclusions. In the Epilogue Stager states that, "In a media-saturated world where public opinions are easily swayed by team loyalty, marketing strategies, and short-term self-interest, science stands apart as a rare source of relatively impartial, self-correcting information. The strict rules of scientific investigation favor well-supported ideas over weak ones, and the international peer-review system is a firewall of checks and balances that provides an additional line of defense against sloppy of slanted thinking."

So why don't I give this book 5 stars? For one thing, I think Stager's comments on carbon-14 dating need to be better clarified. For another thing, his view of what it means to be a native versus an introduced species is too heavily influenced by his deep-time persepctive and lacks a shorter-term perspective needed to describe ongoing competition, displacement, etc. He also seemed to generalize too much about what may happen in the temperate regions of the planet by focusing on what he thinks is or is not happening in the Adirondack Mountains.

Stager nevertheless provides a level-headed view of our possible possible future that is well worth a look.

Jeff Crunk says

How should we respond to our carbon crisis? Stripped down to its essence, Carl Stager's answer is a simple “don't panic.” Deep Future is an optimistic read on climate. Civilization will adapt to a future world of our inadvertent remaking. It's a thesis that puts Stager in opposition to the renowned climate activist Bill McKibben, whose career has been founded on the environmental declension narrative. Unlike McKibben, who insists the wolf of climate instability is beyond the door and in the living room, Stager draws upon his reading of paleoclimatolgoy to tell an entirely less alarmist story. We can take comfort in the certainty that Earth's climate has seen this movie plenty of times before.

That said, what's genuinely novel about a warming world this time around, says Stager, is that a single species, that would be us, is self-aware about what it's doing. Not yet two centuries into a process of grossly overloading the planet's carbon cycle, Stager shows us an Earth that has already begun to manifest physical changes that will, according to the laws of physics, inexorably play out for many millenniums to come.(1) He takes measure of that future in successive chapters on the rainforest, the temperate latitudes, the coasts, the poles, always with an eye to balance the good perturbations with the bad. In doing so he models outcomes based on a moderate carbon emissions scenario of 1000 gigatons and an extreme scenario of 5000 gigatons. To me this is where Stager shines. Earth is incredibly plastic in the author's prose, which mirrors the plasticity of rock, ice, and life over deep time as a point of natural fact. A future Earth will be utterly transformed by today's anthropogenic warming. It will be almost or entirely devoid of ice, with coastlines vastly altered by rising seas, oceans acidified, and profound changes to contemporary biota, much of which either will be extinct or will be well on the way. But Earth has seen this kind of warming before with all that it implies, including an epic warming event 800 million years ago when the north pole was a balmy shallow ocean ringed by conifer forests teaming with life. If we burn all our oil and coal in the coming centuries the planet might well return to that climate state.

Stager assess his own canvassing of these transformations cautiously. For future human communities and natural communities there will be winners and losers, but who are we to judge in advance what that will look like? As Stager puts it, “How can we tell which changes are truly 'bad' for all or most of the parties involved, and which ones might simply come to seem normal or even desirable later on?”
Framed over at least 800 million years, huge swings in climate regimes are the norm. Ice ebbs and flows, seas rise and fall, life adapts. If we keep our heads, which means for Stager, heeding the wisdom of impartial scientists for policy proscription, people are likely to do just fine. The closing chapter really makes the case for an emotionally temporized approach to climate change. In the long run it will all work out.

The problem for me, I guess, is that “just fine” is somebody's else new climate normal. It's not my Earth, or my Neolithic ancestor's for that matter. And while a person 10,000 years in the future is entitled to their own opinion, I'm wondering at the end of the book why Stager's preference for natural variability is any more valid than my preference for natural stasis, for polar bears, for Nemo and his mates, and for everyone living in Bangladesh. By my measure the big fat comet of carbon (Stager's favorite metaphor) that we're thrusting into the planet's carbon cycle is going to wreak havoc with the planet that I know and love over the coming centuries. It deserves to be called a carbon crisis. Stager counters that most of these dramatic changes are gradual on the human scale. For example, where I see flooding of a lot of coastal real estate and the resulting dislocation of a quarter of humanity Stager sees “zones of anticipation” where people adapt in intelligent, perhaps even beneficial ways to gradually rising seas. As they have done many times in climates past, animals and plants will also attempt to relocate but will find themselves hemmed in by man's presence and agenda. In this profound way climate change of the Anthropocene is truly novel. Eventually, many tens of thousands of years hence, the fossil-sequestered carbon that we are prodigiously liberating today will be cycled out of the atmosphere. Humanity then will be riding down the tail of the carbon comet. The earth will gradually cool and dramatic changes to geology and ecology will proceed apace. Stager imagines future human communities, thriving in a much warmer climate regime in Greenland and the Arctic Circle, fretting over their own crisis of diminishing carbon that threatens to return biting cold to an ice-free planet.

The upshot of all this? Humans will survive. The Earth will endure. The next scheduled ice age will not occur, perhaps not the one after that. We have bequeathed to our progeny in Greenland an interior, highly productive deglaciated ocean and bountiful mineral wealth. Should you want to dispense real estate advice in your will that would be it. What happened to the 7-9 billion people in the 21st century and their companion lifeforms along the way? Deep Future doesn't say much about that because in the sweep of eons the big picture of process is the protagonist. One is tempted to call this callous but then that's not adhering to the

rules of perspective. So I'll say that Stager's book is informative, entertaining, and provocative. Provocative books are worth reading and natural perturbations are in the eye of the beholder.

(1) This assumes no geoengineered, artificial draw-down of atmospheric carbon; Stager doesn't speculate on geoengineering, Kurzweil's singularity, or collapse scenarios stemming from peak resource or biosphere overshoot, even though these wildly varying environmental history potentialities would have enormous repercussions for which emissions scenario civilization will end up with. Stager's models make culture static and largely reactive to nature.

Ben Babcock says

I've always held that the Sun is out to get us. Oh, sure, it plays the role of life-giver, showering the Earth in energy and heat necessary for life. Yet too much time in the Sun leaves us open to cancer. And in a little under five billion years, the Sun, in its senescence, will expand to engulf our planet. Before that happens, however, its expansion will have already scorched the surface and rendered the Earth uninhabitable. So pack your bags now, people. We might have as little as a billion years left!

If that sounds crazy, well, fine. But I really enjoy science fiction that considers the concept of human survival into the far-far-future. For one thing, it's optimistic, because it assumes that we survive this tumultuous age. And then it asks: what happens to humanity when the Earth can no longer support life? What happens to humanity when the Andromeda and Milky Way galaxies collide? What happens to humanity when the very universe itself ends? These events are almost impossible to fathom from our limited, terrestrial perspective. They have no bearing on our present-day lives. Yet they are fascinating to consider.

Curt Stager doesn't look quite so far ahead in *Deep Future: The Next 100,000 Years of Life on Earth*. However, the sentiment is similar. He discusses global warming and greenhouse gases from a longer-term perspective than the topics usually receive in most media. Stager isn't interested in how warming trends will affect the Earth into the next century or even the next millennium; instead he goes several orders of magnitude beyond. Central to this discussion is his argument that we, this generation, this century, have the opportunity to influence the next 100,000 years, depending on how much of our fossil fuels we leave in reserve and how much we manage to curb our carbon emissions.

The Earth is warming. The scientific consensus is in. This consensus includes a determination that humans are the primary culprits of this warming, thanks to our newfound skills at digging up dead plant life and burning it in offering to the gods of power and propulsion. For the first time in the history of the Earth, a species has managed to alter the biosphere of our planet through deliberate action. That's rather staggering. (Stager introduced me to the term Anthropocene, a proposed new geological era corresponding to humans affecting the environment on a global scale.)

Denial of global warming is, thankfully, shrinking—but there are still plenty who, while acknowledging the fact, practise cognitive dissonance in claiming that global warming is either (a) not that much of an issue or (b) not this generation's problem. Those with economic interests in maintaining our dependence on oil, coal, and natural gas claim that switching to alternative fuels is impractical or even impossible. Those who favour such a switch claim we're selling our descendants of the next century up the river.

Stager points out that few people on either side of this debate consider what will happen to humanity and Earth beyond a century or two hence. And he has a point. The carbon cycle is such that our carbon emissions don't affect the warming and cooling trends for the planet just into the next century or two; these emissions will affect warming and cooling for the next hundred millennia. So it behoves us to consider our actions on such a timescale, as incomprehensible as that might seem at first. So with *Deep Future* Stager aims to present some of the possible consequences if we either tamp down our emissions to a "moderate" level or continue to burn through our reserves as aggressively as possible.

The book treats us to visions of the past and the future, as Stager examines evidence of the former's warming and cooling trends to help prognosticate possibilities for the latter. Past temperatures are available to us through ice core and sediment core samples, while future temperatures are the realm of advanced computer models. Stager is careful to attach a caveat when discussing the results of models: climate modelling, though distinct from weather modelling, remains quite difficult to get right. In some cases the timing might be off even when we are confident of the actual consequences.

Perhaps one of the most interesting contentions of the book is that our descendants might intentionally burn any remaining fossil fuels to ward off the next ice age. For this reason, Stager argues, we might want to consider leaving some around. I find this idea fascinating because it perfectly describes the Anthropocene; as time goes on, we are increasingly going to need to make more conscious decisions about how to alter our biosphere. It also demonstrates another idea that recurs throughout the text: "warming" doesn't necessarily equal "bad".

To be sure, the current warming is having and will continue to have adverse effects on society, industry, and infrastructure. Yet change is inevitable. Only a billion years ago, the idea that there would ever be this much oxygen in the atmosphere would have seemed absurd to any life on Earth capable of such considerations. But thanks to some enterprising early bacteria mastering the art of photosynthesis, we're now a planet dominated by oxygen-breathers, with our anaerobic distant cousins squatting in oxygen-deprived hovels deep in the ocean, shaking their metaphorical fists at us. Thus, there is precedent for life on Earth altering the atmospheric makeup and very environment of the planet. And life will adapt, as it always does, and flourish—with or without humans present.

This is Stager's assertion. Other reviews call *Deep Future* an optimistic book, and indeed, Stager seems pretty sanguine about humanity's chances of survival millennia from now. He's careful to qualify that as the survival of the species, and that's an important distinction. It's very easy to discuss how global warming will be socially disruptive in the next century or so. Naturally, it's harder to predict how society will change in response to continued warming over the next millennium. But aside from a few catastrophic scenarios, Stager opines, it will be very difficult for *all* of humanity to go extinct, even if civilization as we know it collapses again.

In this respect I think Stager is being too quick to dismiss those possible catastrophes. True, he's engaging in speculative science rather than speculative fiction. I'm not expecting him to consider grey goo or a Singularity as possible apocalyptic events. Yet our continued tinkering with genetics, the ease with which we spread disease, etc., presents a host of opportunities for us to hasten our extinction.

On balance, though, Stager's probably right. Civilization might end, but humans will endure. So *Deep Future* is an attempt to provide a glimpse at what the Earth might be like for these survivors. Using the latest techniques in climate modelling, Stager attempts to demonstrate how two different scenarios for human-caused warming will change the face of the planet. It's an impressive education in how we affect our environment and an important reminder of how much every aspect of life on Earth is inextricably bound

together. From the carbon cycle to the water cycle, all these processes conspire—sometimes over geological time-scales—to produce the most amazing changes. When Stager talks about how the weight of the ice on Greenland will actually create new, massive fjords as the glaciers melt … that's just a "whoa" moment. Geology is cool.

Stager's dedication to being even-handed, neither alarmist nor reactionary, in his presentation will doubtlessly frustrate or even infuriate readers on either side of the issue. Those who accept the scientific consensus that human-caused warming is a pressing issue, myself included, might wish that Stager were not so sunny in his outlook. But that's missing the point. There is plenty of literature talking about the present crisis we face, and it's an important subject. But it's not the only way to view the issue of global warming, and with *Deep Future*, Stager reminds us of that. It's important that we don't forget that warming itself is not the bad thing, carbon dioxide itself is not the bad thing; rather, it's the intensive, runaway warming that we've caused that is the problem.

We've passed the point where we can just throw up our hands and claim that we don't have an impact on the environment. There is no going back. The only thing to do now is to accept our stewardship of the planet Earth and try to determine how best we can influence the next 100,000 years, for our own species and all the others here on planet Earth.

Lisa Eskra says

I wasn't quite sure what to expect from a book that purports to predict the next 100,000 years of climate change on Earth. I thought it would be an alarmist view -- a wake-up call per-say -- but I found Stager's position balanced and reasonable. He backs up his theories with hard data and studies, resulting in a well-argued and believable portrayal of the future. I enjoyed the book and will definitely use it as a reference.

Some have complained that the book reads too much like a textbook, and for the average person I'd probably agree. But I didn't have a problem with it. Stager did a good job of explaining the material without patronizing the reader. It wasn't dry either, and flowed well from one chapter to the next. If you have any interest in humanity's lasting effect on the climate, don't miss this book.

Edward H. Busse, III says

I wasn't really sure what to expect from this book - I desperately hoped that it wasn't going to "preach" to me about global warming, greenhouse gases, polar ice caps melting, etc. I was pleasantly surprised. The author - Dr. Curt Stager - did a very, very nice job of laying out the scientific foundations for our current climatic conditions and, using historical reference points across a broad spectrum of 'ologys (Geology, Paleoanthropology, Marine Biology, etc), gives us an excellent and detailed overview of Earth's climatic history going back millions of years. In turn, by using that information as a guide, merely a guide, he lays out what we can most logically and scientifically expect over the next tens of thousands of years based on several levels of atmospheric carbon emissions. Dr. Stager not only gives us the what if's for the climate but also the impact(s) on vegetation, land based animals, ocean based animals and us homo sapiens. At no time does Dr. Stager point the dirty end of the stick at you or me - he lays out the facts and in the end, gives us

some options for how, as a global society, we deal with what is indisputably the warming of our atmosphere. At no time did I feel preached to or scolded…which was important to me. I've got a lot of takeaways from Deep Future and I learned a tremendous amount about climatic change - this was also important to me and worth the time spent reading Deep Future. BOTTOM LINE: this was a very well written book about an issue, that, without question, effects every living thing on the planet…literally. It's well worth the read…thanks for writing it Dr. Stager.

Rhys says

Deep Future was interesting when the author stuck to his expertise. Avoiding the next one or two ice ages was fascinating, as was the description of the science backing our knowledge of the deep past.

When the author, however, tried to talk about the present, he seemed confused. Clearly he wanted to present himself as the objective scientist walking the Golden Mean, and clearly he did not want to be considered an 'activist, alarmist and ecofreak' nor a 'skeptic, denier, or naysayer'. Fair enough, but raising science to pure objectivity and ignoring the scientists' apparent subjectivity presents a false ideal - we do, in fact, live in a real world with real people who care about their children and grandchildren. Dis-ing James Hansen as having emotions unbecoming of a real scientist smacked of unmerited conceit.

Also, given that 'caution in the face of uncertainty to be the hallmark of good science' and that science should be based on facts, he makes an untenable assertion that humanity will (obviously) be around for the next 100,000 years. It seems to assume that global warming is the only problem facing civilization (though he almost admits that a full world is a little precarious). I don’t think anyone doesn’t think that the earth will keep on keeping on, the question is if homo sapiens will be around to observe it, and if there are things we can do now to increase that probability. That is why I like the authors/scientists (like James Hansen, Minoru Kyo, Bill McKibben) that are raising some alarms – it gets attention. Going the way of stoic scientific indifference offers nothing.

In summary, good book on the deep future, well written, a little too detached from the real world of today.

Andrea McDowell says

Well. Where do I begin.

On the plus side, Stager is obviously enormously qualified to discuss his own field of expertise, climates and ecosystems in the very distant past. These discussions were informative and fascinating and if he occassionally delved a bit too deeply into the minutia he can be forgiven for it.

However. "Too optimistic" does not really begin to describe the book's major failings, which is his utter failure to treat any global warming subject that didn't fit neatly into his "it's a big problem for sure but nothing to panic over" thesis. So, he's got two climate change scenarios: one where we see a further 2-3C warming, and one where we see another 5C or so. The first he calls "moderate," based on what will happen if we stop burning fossil fuels in the next few decades; the second he calls "extreme," based on what happens if we burn everything left in the ground. Except for one potential little problem, which is that every climate

model I've seen recently concludes that we'll be lucky to only get another 2-3C of warming if we stop burning all fossil fuels TOMORROW, and if we continue on a business-as-usual path and burn everything left in the ground, we could see 8-10C.

So if you're going to read this, do keep in mind that the 5C path he describes is far the more likely one, and in itself will take a fair bit of work on the part of the human species in short order.

As well: Where are the Canfield Oceans? Where is desertification? Where are the agricultural problems brought on by declining aquifers, disappearing glaciers, changing growing seasons, issues with seed germination (already an issue in some countries, as seeds really only germinate in narrow temperature bands), etc.? Where in hell are the four previous mass extinction events caused by rapidly climbing carbon levels and the associated ocean acidification and global warming? Shouldn't a paleoecologist at least mention them in a book about long-term climate change, even if only to describe why he dismisses it as an option? Where is any even brief discussion of the positive feedback loops already being triggered, decades ahead of schedule at relatively low levels of atmospheric carbon? Where is any even brief discussion of how the rate of increase in carbon levels is unprecidented, so no one really knows how ecosystems will react? It doesn't even come up.

So: go ahead and read it, but don't think of it as a reliable guide to what we are actually facing. Having read the whole thing, my overall impression is that he went through his substantial data-sets and picked whatever scenarios and issues that best supported his wish to believe that global warming is not a catastrophe that can threaten the human species. He may or may not be right, but there are so many holes in his reportage that I am simply not convinced.

Chris Aylott says

A paleoclimatologist presents a deep dive into how the Earth's climate is shifting and what it might look like over a very long period of time. This is less about describing the world of the future and more about explaining the various mechanisms affecting it, starting with carbon dioxide levels and working outward to changes in temperature, ocean chemistry and rainfall.

I find the science fascinating, and oddly reassuring. On the one hand, the die is already cast. Carbon dioxide levels will continue to rise and the only real question is how much. Even in the lowest-impact scenarios, we've already altered the climate of the planet for thousands of years to come. On the other hand, these are slow processes, and in the long term they are unlikely to change the planet's overall biomass and biodiversity. Earth and its resident species will be different, but that's happened before and will happen again.

So the question becomes: will we moderate our carbon output and arrive at a reasonable medium between preventing the next ice age (overall a good thing) and causing misery for the next thousand generations (not so good)? We may not live to see the answer, but our kids probably will.

Phil says

This is a very well-written book split into logical sections. Reading it 8 years after publication it comes

across as a little dated and laid back. Curt Stager doesn't seem to think climate change is as urgent as the media seem to say, he believes humans will live on for millennia and ride the rides of new climate regimes. That approach aside its a fascinating and in-depth look at the possible future states the climate will move into, with great examples from the past he paints a vivid picture of future climates and the response of the climate system to what we've already done in terms of emissions.

Some are quick to criticise his laid back approach but given that the media does saturate climate news with the sensational fatalism he mentions it's a balanced view, and he's used to thinking in terms of millennia rather than decades which climate news tends to focus on.
I do agree with him that models shouldn't focus on 2100 and should project farther into the future (a few centuries). I do disagree that humans will be ok in the end, but he presents science which is fascinating. The opinions present are of less interest to me, even if I disagree with them.

Overall a great read, with great science explained in terms to layperson can understand.

Lianne Burwell says

Deep Future: The Next 100,000 Years of Life on Earth is an interesting look at climate change. For one thing, instead of just looking at what will happen in the next hundred years or so, it actually looks at things like how long it will take to restore the climate after that. It also refrains from a lot of the hand-wringing, extreme predictions that make people run away with their fingers in their ears singing "lalalala".

It also look at what the world might be like by looking through geologic history to find past eras that might approximate what is coming, and looks at how it affected life at the time. (The author is a paleoclimatologist, which means he studies the evidence of Earth's climate long before humans). He also looks hard at the current data and the ways that it could be deceptive.

All in all, the author comes across as a very balanced scientist. He doesn't tip one way into the 'climate change isn't real, or we aren't responsible', but he doesn't tip into the rabid 'we're destroying the planet!' point of view either. The end verdict in the author's eyes is that there will be massive changes, but relatively slowly (centuries, not years), but humans will adapt, and hopefully the planet's plant and animal life will as well, although large extinctions are innevitable.

Charles Dull says

One of the better books on the science and reality of carbon pollution and how it is changing the environment based on human domination of the planet. We have not been the best caretakers but the doom and dire predictions are not immediate either.

Brent says

As a paleoclimatologist, Stager understands the massive changes that our planet has already gone through and pairs that with current research to fully examine what it will mean not just for our life times, but for dozens of millenia to come. I appreciated Stager's ability to stress how serious the situation is while keeping

the complexity of geography and climate in perspective. His region-by-region examination of future changes was helpful, and his perspective on how current global warming may stave off an even more devastating future climate change (the next cycle of ice ages) was fascinating. There were a few sections that I wish were tighter, but overall I took countless notes and this is a book I will recommend to many.

Alex Telander says

The only people who haven't come to accept the fact that global warming and climate change is happening are those who are not facing reality, deluding themselves; and while many of us have ideas, thoughts and concepts of what climate change may bring over the next century, Deep Future goes one giant step further for Earth. Curt Stager is an ecologist, paleoclimatologist and science journalist, who has written for National Geographic and Science magazine. In Deep Future he goes into detail on what effect climate change will have on our planet not just over the hundred years, but over the next hundred thousand.

Stager makes clear two things early on in the book. One is that the likelihood of the world falling into an ice age any time soon are pretty much impossible, as the required level of carbon dioxide in the atmosphere was far exceeded some time ago, regardless of whether the Gulf Stream stalls or not. The other is that we are now living in a new age, which is coming to be known as the Anthropocene, better known as the Age of Humanity or the Age of Humans. It is the age in which everything we have done and everything we do has a long-lasting effect on our planet. Eleven detailed chapters with titles like: "Beyond Global Warming," "Oceans of Acid," "The Rising Tide," and "An Ice-Free Arctic," Stager doesn't hold back in giving the grim news of the future of our planet. The point that he makes clear is that this isn't going to happen tomorrow; it's going to take hundreds and thousands and tens of thousands of years. We are also coming towards the end of our fossil fuels, meaning we will eventually not be able to continue heating up the planet any more. A plateau will be reached in the far future, and then the earth will eventually return to normal in the very distant future.

While many of the devastating effects discussed in Deep Future will not come to fruition for a long time, they are nevertheless fascinating and disturbing to discover, and Stager is sure to keep readers informed of what they can do now to alleviate some of these seemingly inevitable events.

Originally written on March 4, 2011 ©Alex C. Telander.

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Melissa says

The title of this is highly reminiscent of a book published 25 years ago by Jonathan Weiner, "The Next Hundred Years: Shaping the Fate of Our Living Earth". In fact, I did a double take when I saw the book, thinking it might have been the latter.

Weiner's book was among the first to alert us to the looming threat of climate change. In it, he chronicled the pioneering work of Charles Keeling, whose obsession of tracking atmospheric CO2 was the first inkling of the rapid changes occurring in the biosphere. Weiner's title alluded to the limited amount of time available to

address the rapidly increasing CO2. However, even Weiner hadn't envisioned rates of CO2 emissions exploding over the next 20 years as they have, nor the utter failure of developed nations to address this issue.

Stop here if you haven't read Stager's book yet, as the rest will be a spoiler.

The more I read Stager's book, the angrier I became at his much too rosy and, in my mind, dangerously sanguine outlook. He almost appeared to be preaching to those who, totally oblivious to the sociological implications of changing coastlines, oceans, temperatures, precipitation and their effects on agriculture, are actually eager for things get warmer and for the supposed growth-enhancing effects of greater atmospheric CO2.

Stager actually applauds the fact that there will be increased economic activity from open sea lanes in the Northwest Passage and from the resultant mining and other extractive industries made possible through the loss of summer sea ice in the arctic. In the far future he actually imagines future people living on a nearly ice free Greenland worrying about the threat of global cooling.

While his paleoclimatological credentials are unimpeachable, I find Stager's cavalier attitude toward the future of humanity highly naive. He foresees humans continuing throughout the upheavals to come, with changes so subtle and so gradual that we people will have adequate time to adapt, move whole cities and infrastructures, and change. In some ways, his outlook harkens back to Charles Lyell's gradualism - that changes to the earth and species only happened slowly. However, these ideas were debunked with the discovery of plate tectonics. Similarly, we now know that Earth's climate has radically shifted from one state to another via various 'tipping points' in the past, often over very short periods of time.

We modern 21st century humans are heading into uncharted territory, having grown up with conveniences unimaginable two centuries ago. We are largely abstracted from the elements, except when they appear in the extreme. With climate change, it's as if an amplifier has been permanently left on: rain will fall heavier with more intensity, bringing more flooding; conversely, droughts will become longer and more intense. Patterns will shift, bringing boon to some areas and bust to others; and previous cycles and timings will no longer be reliable, wreaking havoc for farmers.

Perhaps indigenous peoples in some pockets of the planet will survive. They will have the skills, connection with the earth and a much decreased dependence on modern conveniences than many of us have. This is where, to a small degree, some groups like the Transition Town movement are anticipating what may befall us and are taking steps to, as much as possible, begin to educate and prepare communities and neighbours for what lays ahead.

Bradley Jarvis says

The title of this book suggests that it is a narrative of the next 100,000 years, but it is more of a discussion of HOW we know what we do about this subject. Its author is an expert in the ecosystems of the distant past and how climate has influenced life. That experience is on full display as he walks through relevant analogs to the present geological epoch, the "Anthropocene" or Age of Humans, and shares what experts in other fields have to say about how present-day species (including our own) may adapt - or not - to what will likely be tens of thousands of years of human-modified climate change.

THE FOLLOWING CONTAINS SPOILERS:

While clear about the negative ramifications of increased carbon pollution, Stager blames other aspects of human ecological impact for exacerbating its effects. For example, habitat fragmentation interferes with other species from moving when local climate becomes too difficult to live with. Also, the speed of current climate change is far faster than many species can evolve to match. The result is an unacceptable increase in the global extinction rate, on land and in the oceans.

Stager is careful to point out the gaps in what we know, and the uncertainties involved in projecting with too much detail. He also summarizes the strengths of the theoretical and observational science, especially about the large scale trends. As a scientist, he tries to present the most reliable picture of the dynamics involved, with as much resolution in their consequences as the science warrants. He is therefore inclined to have a properly informed, rational (rather than panicked) discussion of the consequences of various alternatives, particularly their timing, so we collectively don't cause more problems than we solve.

One such consequence, involves the onset of another ice age due to variables that have caused them before. A positive effect of the greenhouse effect has been the delay of such an event, which could easily be far worse for all species than global warming. It's better to leave reserves of coal and gas in the ground so future people would burn them as necessary if the ice threat appears again. The current approach, including plans to exploit reserves under the melting Arctic, would both accelerate the negative consequences of warming (rising water levels, ocean acidification, and extreme weather, to name a few), and limit future options.

As someone who has been scared to the extreme by studying this subject, I found some sense of hope in Stager's treatment. In the year since his book came out, a lot of new research has suggested that the worst-case scenarios are more likely; I would be interested in his take on that, but in the mean time I feel a lot more grounded in the science so I can better assess what else I'm reading.

Idiosyncratic says

In reading this book, the word "sanguine" came to mind. But, given that the word implies some optimism, I guess I'd simply have to go for the word "neutral". Stager has little time for hand-wringing over the future of humanity -which he doesn't really seem to think about very deeply. Fair enough. His viewpoint is the big, BIG picture. Geologic changes come and go, weather comes and goes, species populations (including human) come and go, some things get better and some things get worse. There is some thought that the world population of Homo sapiens may have been as low as 1,000-10,000 people about 70,000 years ago. https://en.wikipedia.org/wiki/World_p... . While I do experience considerable anguish about the future of the world within the next few hundred years, and believe we must do everything possible to minimize present and future climate-change-related dangers, in the bigger picture, we as a species will face the same kinds of vicissitudes as we have throughout the deep past. It seems to me that Stager accepts that, and that he writes from that viewpoint. (I do, however, completely disagree with him when he rails against scientists who he writes "purposely exaggerate the dangers of global warming". He says that "if people stop listening to scientists because they seem to take sides unfairly, then we're all in trouble". We'll also all be in trouble if people stop listening to scientists because their style of presentation is so modulated and flat that the message comes as across as "here's some info, folks - but, hey, no big deal". Scientists often become so obsessed with rationality that they forget humans are highly prone to the kinds of nonsensical attitudes that behavioural economics has brought to light.)

John says

Curt Stager, author of "Deep Future: The Next 100,000 Years of Life on Earth" (2011) jumps head-first into an obviously controversial subject area. So he can be forgiven if he builds his case with extreme care, documenting the known and the unknown future effects of global warming, atmospheric carbon buildup, cumulative human pollution, sea level rise, and the long-term consequences on the planet and on the human race.

He examines the scientific record, and probes meticulously for possible inaccuracies or false assumptions. He gives due time to both those who support findings and those who doubt them.

For example, on the issue of rising sea levels, he challenges the very idea of a "mean" sea level mark upon which all subsequent research depends. He questions the infallibility of equipment calibrations and radar measurements from satellites. Then he painstakingly examines evidence of how much of our planet's water is currently held in ice, and how quickly it is likely to melt. He goes back millions of years, matching up sea levels with global temperatures. And then finally, he hazards a "best guess": sea level has risen 7 inches between 1900 and 1999,and will likely rise 14 - 21 inches more from 2000 and 2099. Then he wryly notes that credible scientific estimates range from zero rise to a 20 foot rise.

Which brings us to some valid criticisms of this book. Another Goodreads reviewer, Andrea McDowell, gives this book only two stars, contending that the author errs on the side of optimism in the face of scientific evidence, by expressing his hope that we humans will succeed in reducing our future carbon footprint. Andrea is right: there is, unfortunately, no real basis for such optimism.

But that criticism in no way detracts from this well-researched book.

One thing is painfully certain: we are long past the point of no return. It is already preordained that millions of people (and other life forms) around the globe are going to suffer in future centuries for climate changes already in progress. If you have any doubt about that statement, you definitely need to read Stager's book.

Fredrick Danysh says

Ignoring the climate changes of the past, the author projects his version of what the planet Earth will be like in 100,000 years. He is a member of the global warming school of thought.
