



January 22, 2003

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Original Report



Charting Doomsday

New Theory Emerges on How the World Will End

By Lee Dye
Special to ABCNEWS.com

Due to an ever-brightening sun, Earth's days are numbered. And there's a relatively short window of time when complex life can exist. (Digital Vision)

Jan. 22 —The Earth has probably already peaked as a haven for plants and animals and begun its long descent into oblivion, according to scientists at the University of Washington who have plotted out the future of our planet.

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These are not prophets of doom who have mounted the podium to warn us that we are killing ourselves through bad stewardship.

They are scientists who say all good things must come to an end sometime, and at best we've got no more than half a billion years left.

After that, the planet will return to its ancient past, inhabited only by bacteria and single-celled organisms, just as it was in its earliest years. But in time even those will vanish as the Earth is reduced to a lifeless chunk of rock, or swallowed entirely by an expanding Sun.

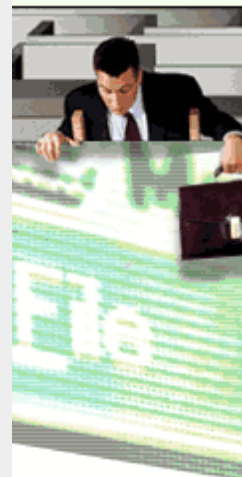
And if you believe astrophysicist Donald Brownlee and paleontologist Peter Ward, there's not a whole lot we

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can do about it. They have laid out the grim facts in a new book, *The Life and Death of Planet Earth*, published by Times Books.

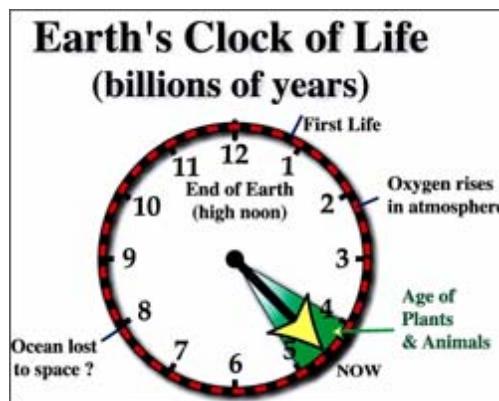
Time Is Ticking

Here are the essential nuggets in their findings:

- Like any star, the Sun won't last forever.
- There's a short window of about 1 billion years when it's possible for plants and animals to survive on Earth, and that's probably true of any planet. We're already about half way through it.
- Planets like this may be quite rare in the universe, so we better take care of what we've got. (With such dire predictions, you've got to allow these guys a little time on the soapbox.)

To simplify a very complicated story about the "devolving" of planet Earth, Brownlee and Ward have reduced its 12-billion-year lifespan to 12 hours, with the end coming at high noon.

It's only 4:30 a.m. in Earth's "day in the sun," as they put it, but by 5 a.m. the 1 billion-year reign of plants and animals will come to an end. By 8 a.m. the oceans will vaporize.



It's only 4:30 a.m. on the 12-hour clock of Earth's existence. But scientists say the end is sure to come.

By noon it will all be over, about 7.5 billion years down the road.

It's not a pretty story, the two admit, but "Mother Nature wasn't designed to make us happy," according to Brownlee.

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(Donald Brownlee and Peter Ward, University of Washington)

for a happy ending, here's the worst part. This is the

BEST-case scenario.

Brightening Sun

Long before the Earth dies a natural death, we could get knocked off by an asteroid, or blown away by a nearby exploding star. As the scientists themselves note, there are a couple of ways for people to die. They die of old age, or they get run over by a truck.

"Either way, the vital signs are the same," Brownlee says.

The sun is constantly growing brighter, and is about 30 percent brighter today than it was in its infancy, he says. That alone should have made life on this planet a bit difficult, but the Earth is blessed with a complex atmospheric system that has kept the climate reasonably stable, except for an occasional ice age, for 4.5 billion years.

"How is it possible that the Earth has had a reasonably constant environment in spite of the fact that the sun has gotten 30 percent brighter?" Brownlee asks. "It's amazing, but the Earth's systems have conspired to do this. As the sun has gotten brighter, the composition of the atmosphere has changed."

The key, he says, is carbon dioxide and other greenhouse gases. Early on, when the sun was much fainter, these gases kept the temperatures tolerable. As the sun warmed up, weathering processes removed carbon dioxide from the atmosphere and deposited it in the soil as carbonates.

"The warmer the Earth is, the more rapid the removal process becomes," Brownlee says.

So despite the fact that the sun has gotten much brighter, the Earth has remained fairly consistent because of a gradual reduction in carbon dioxide.

"That's the magic thing that has kept the Earth as nice as it is," he adds.

This may seem a bit confusing because of the current concern over global warming resulting from an increase in

carbon dioxide in the atmosphere, but Brownlee says that's just a brief blip in the grand scale of things.

"In the short term, that's a big problem," he says. "But in the longer term, hundreds of millions of years, it's a decline of carbon dioxide that's really the major problem."

Going Down in a Blaze of Glory

Carbon dioxide is the "food of life," providing the critical nutrient that allows plants to grow, which in turn are consumed by animals.

The plants, thus, will starve to death because of a lack of carbon dioxide. And the animals won't be far behind.

He says the end won't come suddenly. Some critters will retreat into the sea in an effort to escape the rising heat, thus reversing the evolutionary process as we move back towards green slime, or wherever we came from.

But even the seas will be doomed. The sun will continue to expand, turning into something astronomers call a "red giant," and the Earth will become so hot that the oceans will gradually evaporate.

That process will take a few hundred million years.

Then, the prospects get really grim, according to Yale University solar physicist Sabatino Sofia. For awhile, the sun will contract, then expand rapidly into a red supergiant as it blasts off about a third of its mass through "thermal pulses."

That exploded material will become super hot as it expands, probably engulfing the Earth, and the sun's inner core "will settle down as a hot, nuclearly inert, dense object, a white dwarf star," according to Sofia.

The sun will be about the size of the Earth at that point, and at the end of its evolution. It will "slowly cool and darken to forever disappear from the view of our galactic neighbors.

"This dark cinder and the even darker outer planets that have not been swallowed up by the sun during its expanding stage, are all that will remain of our solar

system," Sofia has written.

And our brief moment in the sun, so to speak, will be over.



Lee Dye's column appears weekly on ABCNEWS.com. A former science writer for the Los Angeles Times, he now lives in Juneau, Alaska.

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