The Days Are Getting Longer Each Year — But Very, Very Slowly

The moon is 45,000km further from Earth than it was 1.4bn years ago

By Ian Sample | The Guardian

If the day never seems long enough to get everything done, be grateful at least that times have changed. According to fresh calculations, a day on Earth was a full five hours and fifteen minutes shorter a billion or so years ago, well before complex life spread around the planet.

Scientists used a combination of astronomical theory and geochemical signatures buried in ancient rocks to show that 1.4bn years ago the Earth turned a full revolution on its axis every 18 hours and 41 minutes.

The number means that, on average, the length of the day on

Earth has grown by approximately one 74 thousandths of a second per year since Precambrian times, a trend that is expected to continue for millions, if not billions, of years more.

As the Earth's rotation gradually winds down, the moon moves further away. Writing in Proceedings of the National Academy of Sciences, Stephen Meyers at the University of Wisconsin-Madison and Alberto Malinverno at Columbia University in New York calculate that over the past 1.4bn years the moon has drifted about 44,000km from Earth to a distance of 384,400km.

Meyers and Malinvern set themselves the task of reconstructing changes in the distance between the Earth and the moon, and variations in Earth's orbit, along with wobbles and tilts known as Milankovitch cycles, further back in time than ever before. Until now, it has been hard to work out reliable figures for more than 50m years ago.

Because Milankovitch cycles affect how much sun reaches the planet's poles, they are prime drivers of climate change over timescales ranging from tens of thousands of years to millions of years. To pin down the frequency of the cycles in Earth's deep history, the scientists looked at copper and aluminum ratios linked to climate change in the 1.4bn-year-old Xiamaling marine sediment in northern China, and the 55 m-year-old Walvis ridge in the south Atlantic, and fed these into a model.

"We were interested in reconstructing the Milankovitch cycles because they provide a powerful tool for evaluating the history of our planet, and the solar system. They are like signposts on a trail, allowing us to navigate geological history," said Meyers. "For example, the identification of Milankovitch cycles in sediments spanning the past million years has revolutionized our understanding of the nature of ice ages, the instability of ice sheets, and how Earth's climate system works."

As for the moon, it will not retreat from Earth forever. At some point in the far future, it will reach a stable distance when it will be visible only from one half of Earth, and never seen from the other.

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