Could asteroids bombard the Earth to cause a mass extinction in 10 million years?

June 22 2017, by Sanna Alwmark And Matthias Meier

Credit: AI-generated image (disclaimer)

Scientists have spent decades debating whether asteroids and comets hit the Earth at regular intervals. At the same time, a few studies have found evidence that the large extinction events on Earth – such as the one that wiped out the dinosaurs 66m years ago – repeat themselves every 26m to 30m years. Given that there's good evidence that an asteroid triggered

the dinosaur extinction, it makes sense to ask whether showers of asteroids could be to blame for regular extinction events.

The question is extremely important – if we could prove that this is the case, then we might be able to predict and even prevent asteroids causing mass extinctions in the future. We have tried to find out the answer.

Today, there are approximately 190 impact craters from asteroids and comets on Earth. They range in size from only a few meters to more than 100km across. And they formed anywhere between a few years ago and more than two billion years ago. Only a few, like the famous "Meteor crater" in Arizona, are visible to the untrained eye, but scientists have learned to recognise impact craters even if they are covered by lakes, the ocean or thick layers of sediment.

But have these craters formed as a result of regular asteroid collisions? And if so, why? There have been many suggestions, but most prominently, some scientists have suggested that the sun has a companion star (called "Nemesis") on a very wide orbit, which approaches the solar system every 26m to 30m years and thereby triggers showers of comets.

Nemesis would be a red/brown dwarf star – a faint type of star – orbiting the sun at a distance of about 1.5 light years. This is not an impossible idea, since the majority of stars actually belong to systems with more than one star. However, despite searching for it for decades, astronomers have failed to observe it, and think they can now exclude its existence.

Meteor crater, Arizona. Credit: Kevin Walsh/wikipedia, CC BY-SA

Difficult dating

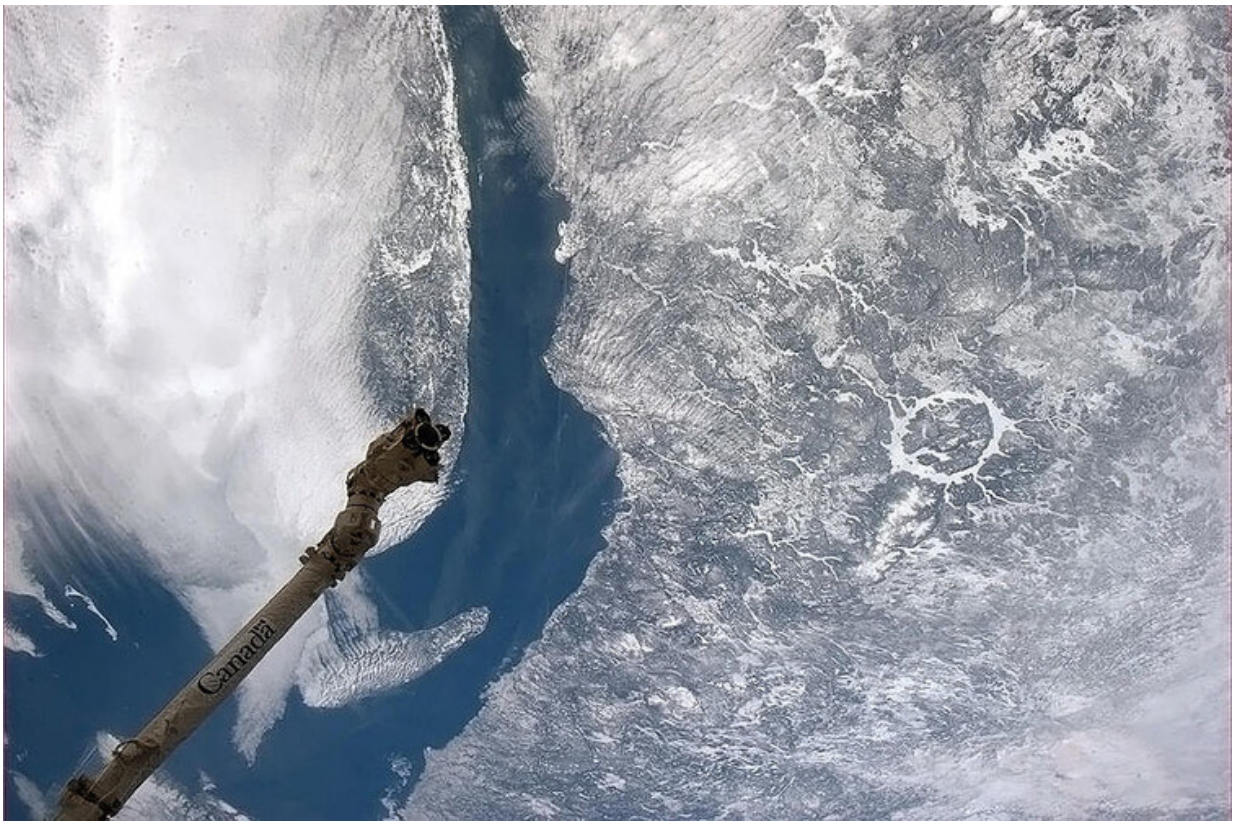
Yet, the idea of periodic impacts persists. There are other suggestions. One idea is based on the observation that the sun moves up and down slightly as it orbits the galaxy, crossing the galactic disk every 30m years or so. Some have suggested that this could somehow trigger comet showers.

But is there any evidence that asteroid impacts occur at regular intervals? Most research so far has failed to show this. But that doesn't mean it isn't the case – it's tricky getting the statistics right. There are a lot of

variables involved: craters disappear as they age, and some are never found in the first place as they are on the ocean floor. Rocks from some periods are easier to find than from others. And determining the ages of the craters is difficult.

A recent study claimed to have found evidence of periodicity. However, the crater age data it used included many craters with poorly known, or even incorrect and outdated ages. The methods used to determine age – based on radioactive decay or looking at microscopic fossils with known ages – are continuously improved by scientists. Therefore, today, the age of an impact event can be improved significantly from an initial analysis made, say, ten or 20 years ago.

Another problem involves impacts that have near identical ages with exactly the same uncertainty in age: known as "clustered ages". The age of an impact crater may be, for example, 65.5 ± 0.5m years while another is be 66.1 ± 0.5m years. In this case, both craters might have the same true age of 65.8m years. Such craters have in some instances been produced by impacts of asteroids accompanied by small moons, or by asteroids that broke up in the Earth's atmosphere.



The Manicouagan crater in Canada seen from the International Space Station. Credit: NASA/Chris Hadfield

The double impact craters they produce can make it look like they hit a time when there were lots of asteroid impacts, when actually the craters were formed in the same event. In some cases, clustered impact craters are spaced too far apart to be explained as double impacts. So how could we explain them? The occasional collision of asteroids in the asteroid belt between Mars and Jupiter might trigger short-lived "showers" of asteroids impacting the Earth. Only a few of these showers are necessary to lead to the false impression of periodicity.

Fresh approach

In contrast to previous studies, we restricted our statistical analysis to 22 impact craters with very well defined ages from the past 260m years. In fact, these all have age uncertainties of less than 0.8%. We also accounted for impacts with clustered ages.

Our article, recently published in *Monthly Notices of the Royal Astronomical Society*, shows that, to the best of our current knowledge, asteroid impacts do not happen at regular intervals – they seem to occur randomly.

Of course, we can't be sure that there isn't any periodicity. But the good news is that, as more impact craters are dated with robust ages, the statistical analysis we did can be repeated over and over again – if there is such a pattern, it should become visible at some point.

That means that there is presently no way to predict when a large asteroid collision may once again threaten life on Earth. But then when it comes to facing the apocalypse, maybe not knowing is not so bad after all.

This article was originally published on The Conversation. Read the original article.

Provided by The Conversation

Citation: Could asteroids bombard the Earth to cause a mass extinction in 10 million years? (2017, June 22) retrieved 9 April 2024 from https://phys.org/news/2017-06-asteroids-bombard-earth-mass-extinction.html