Earth-Venus smash-up possible in 3.5 billion years: study

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This undated handout illustration provided by Nature Publishing group shows what a collision between Earth and Venus might look like. A force known as orbital chaos may cause our Solar System to go haywire, leading to possible collision between Earth and Venus or Mars, according to a study.

A force known as orbital chaos may cause our Solar System to go haywire, leading to possible collision between Earth and Venus or Mars, according to a study released Wednesday.

The good news is that the likelihood of such a smash-up is small, around one-in-2500.

And even if the planets did careen into one another, it would not happen before another 3.5 billion years.

Indeed, there is a 99 percent chance that the Sun's posse of planets will continue to circle in an orderly pattern throughout the expected life span

of our life-giving star, another five billion years, the study found.

After that, the Sun will likely expand into a red giant, engulfing Earth and its other inner planets -- Mercury, Venus and Mars -- in the process.

Astronomers have long been able to calculate the movement of planets with great accuracy hundreds, even thousands of years in advance. This is how eclipses have been predicted.

But peering further into the future of celestial mechanics with exactitude is still beyond our reach, said Jacques Laskar, a researcher at the Observatoire de Paris and lead author of the study.

"The most precise long-term solutions for the orbital motion of the Solar System are not valid over more than a few tens of millions of years," he said in an interview.

Using powerful computers, Laskar and colleague Mickael Gastineau generated numerical simulations of orbital instability over the next five billion years.

Unlike previous models, they took into account Albert Einstein's theory of general relativity. Over a short time span, this made little difference, but over the long haul it resulted in dramatically different orbital paths.

The researchers looked at 2,501 possible scenarios, 25 of which ended with a severely disrupted Solar System.

"There is one scenario in which Mars passes very close to Earth," 794 kilometres (493 miles) to be exact, said Laskar.

"When you come that close, it is almost the same as a collision because the planets gets torn apart."

Life on Earth, if there still were any, would almost certainly cease to exist.

To get a more fine-grained view of how this might unfold, Laskar and Gastineau ran an additional two hundred computer models, slightly changing the path of Mars each time.

All but five of them ended in a two-way collision involving the Sun, Earth, Mercury, Venus or Mars. A quarter of them saw Earth smashed to pieces.

The key to all the scenarios of extreme orbital chaos was the rock closest to the Sun, found the study, published in the British journal Nature.

"Mercury is the trigger, and would be be the first planet to be destabilised because it has the smallest mass," explained Laskar.

At some point Mercury's orbit would get into resonance with that of Jupiter, throwing the smaller orb even more out of kilter, he said.

Once this happens, the so-called "angular momentum" from the much larger Jupiter would wreak havoc on the other inner planets' orbits too.

"The simulations indicate that Mercury, in spite of its diminutive size, poses the greatest risk to our present order," noted University of California scientists Gregory Laughlin in a commentary, also published in Nature.