

*"Long before it's in the papers"*

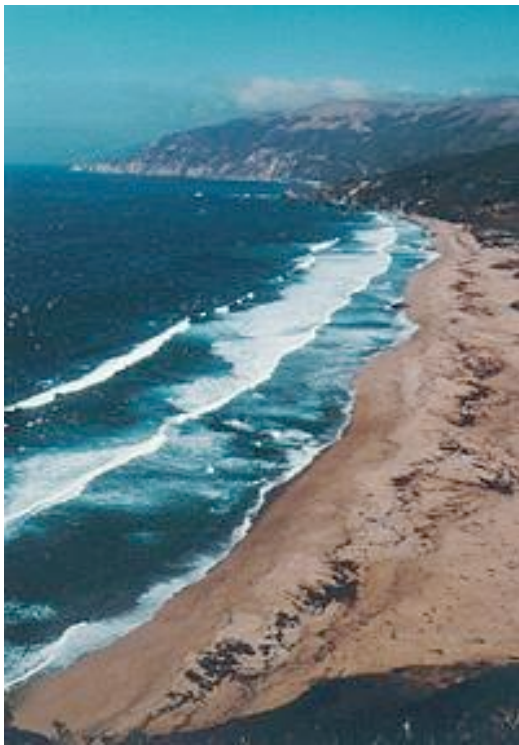
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## Our oceans, extraterrestrial material?

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Courtesy CNRS - French National  
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**Contrary to conventional views, the atmosphere and the oceans were perhaps not formed from vapors emitted during intense volcanism at the dawning of our planet, a scientist says.**

**Instead, he proposes that the water comes from ice-covered asteroids that reached the Earth around a hundred million years after the birth of the planets.**



The atmosphere and the oceans were perhaps not formed from vapors emitted during volcanism, but came from space, a scientist says. (Image courtesy California Environmental Resources Evaluation System)

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**Francis Albarède of the Laboratoire des Sciences de la Terre at Claude Bernard University in Lyon, France, argues that this effect could have resulted from turbulence in the outer Solar System caused by giant planets.**

His research appears in the Oct. 29 issue of the research journal *Nature*.

Around 4.5 billion years ago, the Earth had enough water for oceans to form and for life to find niches in the seas and on the continents thanks to plate tectonics, the movement of the continents. In comparison, the Moon and Mercury are dry, mortally cold deserts, Mars dried up very quickly and the surface of Venus is an inferno.

According to books, the ocean and the atmosphere were formed from volcanic gases and the Earth's interior is the source of elements that go into the water. However, the rocks of the Earth's mantle, beneath the crust, have very little water, Albarède notes. The same is true on Earth's "sister planets," Venus and Mars.

The main reason proposed by Albarède is that, during the Solar System's formation, the temperature never dropped enough between the Sun and the orbit of Jupiter for water to be able to condense with planetary material. The arrival of water on Earth therefore happened later, he said.

It is widely accepted that terrestrial planets are formed over several million years by the agglomeration of smaller chunks of material, increasing in size over time. The arrival of the last of these large objects corresponds to a huge lunar impact, 30 million years after the formation of the Solar System, Albarède argues. Initially, this hurly-burly took place between planetary objects located between the Sun and the asteroid belt. This space, swept by the electromagnetic winds of the young Sun, was then too hot for water and volatile elements to condense within it.

The major delivery of volatile elements on our planet could have corresponded to a phenomenon that occurred some tens of millions of years after the lunar impact: the big "clean up" of the outer Solar System initiated by the giant planets, Albarède claims. Due to their very strong gravity, they would have sent the final ice-rich planetary rubble in all directions, including in our own. Penetrating into the mantle through the surface, the water could then have softened the Earth and made it less brittle. Plate tectonics would then have begun and with it the emergence of continents, conditions probably necessary for life.