

## Moons

### *A very Nice model*

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One of the biggest mysteries that's left over from the American Apollo programme-- where astronauts went to the Moon and brought back samples-- when they brought back the samples, they were fully expecting the Moon to be this ancient world and all these samples to be about four and half billion years ago. But instead, most of the rocks they brought back were not that old. And common ages, they found, were about 3.8, 3.9, four billion years ago. And so the question was, why were we missing all this early lunar history? And one of the things that they tried to do was to suggest maybe some planets didn't form where we see them today.

The Nice model was originated because a lot of the work that was done on this was done in Nice, France. The Nice model is based on the idea that the giant planets started in a more compact configuration. This would stay stable for hundreds of millions of years. And then after that time, something very interesting would take place. So you're looking at a top view of the Solar System. Jupiter, Saturn, Uranus, and Neptune are all on very circular orbits. But they're also in a much more tight configuration. But what's happening is gravitationally, the comets are being perturbed by the giant planets. And that's causing some of these comets to rain out of that population. But in the process, the Solar System went kablooey. Comets were sent all across the Solar System, asteroids were sent all over the place, Jupiter and Saturn take on new orbits, Uranus and Neptune actually enter into this comet disc. You have everything in the outer solar system almost immediately getting beat up by lots and lots of comets. And in the process, this makes some of the biggest impact craters we can see on the Moon. And it explains why many of the samples we brought back from the Moon have ages which are very similar to about four billion years ago, or so. And they seem to be timed to this major event that happened that basically was a reorganisation of the solar system.