

Where did the Earth come from?

Earth formed from debris orbiting around our sun about 4 ½ billion years ago. That is also the approximate age of the sun, but it is not the beginning of our story. The story really begins with the Big Bang nearly 14 billion years ago, which spewed hydrogen atoms throughout the universe.

The hydrogen atoms are not perfectly distributed, leaving some areas that are denser and others that are more rarified. The denser areas tend to become more dense as gravity brings atoms together. The atoms fall toward each other. Falling objects convert potential energy, the energy of height, into kinetic energy, the energy of motion. When atoms coalesce in the local center of mass, their speed is converted again, this time into heat. Eventually, about 200 million years later, so much heat forms that the atoms start to fuse, forming helium, releasing energy, and a star is born.



Fusion is a process that makes heavier elements out of lighter ones. It has a limit, though, at iron. Iron is happy just the way it is, and it will not fuse. When a star builds up enough iron, the iron interferes, or poisons the star's fusion, and the star dies. A large enough dying star forms a nova, or even a supernova. These are huge explosions that scatter the matter of the star into space.

Iron, with its 26 protons, is less than a third of the way down the natural periodic table of elements. The rest of the natural elements, from cobalt to uranium, are formed during the explosion. This stuff is also blasted into space.

The star birth and death cycle repeats itself time and again. After a few cycles through this process, there is enough material in the neighborhood of stellar nurseries that the debris around stars forms rings and eventually planets. That is where Earth came from.

We are truly stardust, well, except for our hydrogen, the majority of our atoms came from the Big Bang. Only recently have we discovered that planets seem to be the rule, not the exception, around stars in our universe.

GMcD 7/20/2017