Space 100: The Rock We Live On

Earth, the Blue Marble, 3rd Rock from the Sun … Home

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Honey, We Need to Talk About Our Sun

Our sun is just a star, and, as stars go, it is relatively young (approximately 5bn years old). Our star formed after the Universe had been doing its thing for 6+ billion years. When our Sun formed, it did so in a debris field of rocks and gas, which orbited the Sun, because of Gravity. As these rocks (let's call them 'Asteroids') orbited the Sun they occasionally banged into each other. Big Asteroids just absorbed debris, dust, and really small rocks. Sometimes two Asteroids got too close to each other and formed another Asteroid in a rocky kind of relationship. The progeny rock then stayed close to one of the progenitor Asteroids, and it was named "Moon." Moon stayed close to Mother Earth ever since. On Orbit, not in the basement, but not exactly independent.

Close to the Sun were these Asteroids. Four dominant Asteroids emerged, which we now call 'Planets.' Meet Mercury, Venus, Earth, and Mars. Farther afield from Mars is a belt of unorganized Asteroids, which may (or may not) form a planet in another couple billion years. Farther still from the Sun was a bunch of gas and debris, which also developed significant Gravity as big groups collected smaller pieces. These clusters formed the four gas giant planets we call Jupiter, Saturn, Uranus, and Neptune. And if you REALLY want to get into it, beyond the gas giants is the Kuiper Belt of icy asteroids and detritus that formed the infamous "Pluto."

The Atmosphere at Home: Where is the line?

Keep in mind that anything with *Mass* has *Gravity*. Weird, because no one has a good 'feel' for what Gravity actually is, but we know how to measure the force of it. (Thank Sir Isaac Newton for that inverse square formula.) So, we're standing on a mass of rock that is held together by gravity. ALSO, the air we breathe is really just a cloud of gas that is held to Earth by gravity, and we call this cloud the "Atmosphere." (Thank you Denis Pagan for THAT eye-opening perspective, in '*Understanding the Sky.*') And everything is spinning, but the mass of rock spins faster than the cloud of gas so it creates hot pockets in the Sun, and we get Weather. Basically. And that's all we'll say about the weather. The critical thing to keep in mind is that our Atmosphere is just a cloud. Because of gravity it is denser closer to the ground, and gets thinner the higher you climb. The atmosphere is too thin to support a jet plane much higher than 100km elevation, but still exerts enough friction to impact satellite orbits out to ~600km. So, the majority of satellites orbit above 500km; high enough to avoid most atmospheric friction, but low enough to keep their sensors close to the earth (for better resolution, etc.).

(More about specific orbits later!)