Matthew Morfea
11/17/20

Solar System Homepage:

Welcome:

Welcome to my Tour of the Solar System homepage. On this website I briefly go through a bunch of different planets and objects that orbit in our Solar System. This is just a brief summary, it would be nearly impossible to put together a website on all of the objects we have discovered and researched in our Solar System. We also have a long way to go...

Drop of Water in the Cosmic Ocean:

Our Solar System, our home, is our local cohort of planets and other objects, gravitationally bound to our star, The Sun, at the center of our Solar System. In a way it's a kind of small street in a larger city that we call the Milky Way Galaxy, where there are many other Systems around other stars, some of which may even possibly have planets or other objects that could support life. Our Solar System orbits the center of the Milky way Galaxy and in turn our Milky Way is connected to the Local Group of galaxies, the galaxies “Nearby” to our home.

Taking Inventory:

Our Solar System is made of different objects in kind of inventory, although no object in our solar System is the same as one another. We have discovered our Solar System to house 8 different planets and over 200 moons, along with millions of objects in our Asteroid belt and many many more in the further reaches beyond Neptune orbits in and past our Kuiper belt.

Our planets are broken down into 2 categories. The Inner rocky Terrestrial planets, like Earth, and the outer gassy Jovian planets.

What does it all mean?

As we continue to research more and more about our Solar System, we learn more about ourselves and the role we play on our planet. By using telescopes and satellites we can map the skies and we can explore new worlds. Worlds that will hopefully show us what it means to be human.

Our Sun:

Our Sun, also known as the G-class Star sitting at the center of our Solar System, is in short a huge ball of mostly Hydrogen and Helium gas that is the main source of energy for our Solar System. It makes up about 99.86% of our Solar System's mass.

The Solar Structure:

The Sun can be roughly broken down into several parts, most notably the inner layers and outer layers of the sun.

Inner Layers: The core of the sun is where nuclear fusion takes place and where energy and photons are first created in our star. This is the hottest and most dense portion of our sun and thus our entire Solar System. The Radiative Zone of our star is where photons tend to live most of their young lives bouncing around each other trying to escape the sun. The convection zone is where heat from the sun rises and falls like a pot of boiling water, this is where the photons can finally get released.

Outer Layers: The outer layers are mostly regarded as thinner and thinner areas of gas. The first of which being the Photosphere and the Chromosphere, which is where light is finally seen escaping the inner layers, a nice area to split the two sections of our sun. The Chromosphere displays beautiful red light due to Hydrogen emissions of light. Next up is the Corona, the upper atmosphere of our sun. This is where solar winds are created as thin layers of gas can swing away from the gravitational pull of our sun, it's hot bright and a beautiful sight to see with the right equipment, this is what you would see during a full solar eclipse.

Our sun also produces a huge and twisting magnetic field due to negatively and positively charged ions in the inner layers. This creates a lot of different blemishes on the sun, some commonly known as Sunspots, Prominences, and Solar Flares, all visible on the Photosphere / Chromosphere.

Powerhouse of the Solar System:

Early Days: Our sun started out as a cloud of gas and dust probably, leftovers from a previous star's materials, and through the process of gravity and clumping our sun grew out of the dust into a protostar. As our young stars accretion disk continued to grow, it had now formed an adolescent version of the sun we see today.

Powerhouse of the Solar System: Energy creation is a key component of how our sun formed. Our Sun uses processes like fusion to fuse Hydrogen into Helium and other elements as well as producing energy in the form of solar radiation, also known as photons or light. These processes of fusion have helped the sun's core remain intact from all of the pressures of the outer layers pushing on it through the force of gravity.

Later in Life: However, one day the sun will run out of material to continue the processes of fusion and the sun will eventually die, going through a stage of being a Red Giant due to outer layer expansion and inward core contraction. This means the sun will become a white dwarf, a stellar corpse of once was our powerhouse of the Solar System. The outer layers will

reach out well past the orbit of Earth, which will likely be our demise for any life on Earth as we know it.

Mercury:

Mercury is the closest planet to our sun in the solar system and also the smallest planet in our solar system. The metal workers dream world, Mercury is composed of about 70% metals and 30% silicates / rocks. However, you may find it hard to breathe there as Mercury has a very small atmosphere with even less oxygen to go around. Mercury is the 2nd most dense planet in the solar system, only second to our home Earth. It takes Mercury about 88 days to go around the sun and about 59 days to spin on its axis, and you thought days felt long enough on Earth.

Mass: 3.3011 x 10^23 kg
Diameter: 4,879 km
Density: 5.427 g/cm^3
Temperature: Low: -280°F | High: 800°F
Orbital Period: 88 Earth Days
Average distance from Sun: 0.4 AU

Venus:

Venus is the 2nd closest planet to the sun and oh boy is it warm over there. Venus is often regarded as Earth's twin. Venus is similar to Earth in a lot of ways including similar Mass, Diameter, Density, as well as a very circular orbit. When you try to look at the surface of Venus from the outside you mostly see huge clouds of gas and a big atmosphere. Venus is a good example of what a runaway greenhouse effect looks like. Most likely due to the planet falling out of the habitable zone a few million years ago. One more interesting fact is that Venus spins counter clockwise compared to all of the other planets spins, the sun rises in the west and sets in the east on our twin. Personally, I think Venus sounds like Earth’s evil twin.

Mass: 4.867 x 10^24 kg
Diameter: 12,104 km
Density: 5.243 g/cm^3
Temperature: Average: 867°F
Orbital Period: 224.7 Earth Days
Average distance from Sun: 0.7 AU

Earth:

Home sweet home, Earth is the 3rd planet from the sun and it’s our loving home. Earth is the only planet we have found life as we know it and has a strong atmosphere and systems to support such life. Earth’s magnetic field protects us from radiation, Earth’s Atmosphere helps regulate temperatures and allows us to breathe, everything we come to know is because of our studies on Earth. A nice and stable environment sitting on the inner edge of our solar system's habitable zone. We have a balanced greenhouse gassing effect on our planet that is self regulating and it's our job as Earthlings to continue to maintain a hospitable living environment for all we hold dear.

Mass: 5.972 x 10^24 kg
Diameter: 12,742 km
Density: 5.514 g/cm^3
Temperature: Low: -128.5°F | Average: 57.2°F | High: 134.0°F
Orbital Period: 365.256 Earth Days
Average distance from Sun: 1 AU

Mars:

Mars is the 4th planet from the sun and is cold and red. With a mass and size smaller than Venus and Earth, Mars is still a calm yet cold planet that might just be the next place humans could inhabit in our Solar System. Mars is a “fixer upper” as it has a significantly weaker atmosphere than Earth and a weaker magnetic field, although it does contain Water Ice, that if used correctly and given a lot of time could eventually create a bootleg Earth like planet for humans to move into. Mars is pretty red due to iron oxides on the surface and is famous for a couple good novels and songs that come to my mind.

Mass: 6.417 x 10^23 kg
Diameter: 6,779 km
Density: 3.934 g/cm^3
Temperature: Low: -226°F |
 Average: -82°F | High: 95°F
Orbital Period: 686.971 Earth Days
Average distance from Sun: 1.5 AU

Jupiter:

The 5th planet out on our list and the largest planet in our Solar System, Jupiter is big and bad. Along with having a huge atmosphere due to its gassy nature, Jupiter harbors the biggest storm ever recorded in the Solar System known as the mysterious Great Red Spot. Along with the Red Spot, Jupiter also holds the record of most sizable moons in the Solar System, holding 79 moons in its gravitational grasp. It's hard to tell what's under all of those clouds of gas on Jupiter and some argue there isn't even a sizable solid core to the planet. As we research more and more about the moons of Jupiter it may seem that its moons are more intriguing than the planet itself.

Mass: 1.898 x 10^27 kg
Diameter: 139,820 km
Density: 1,326 g/cm^3
Temperature: Average (Clouds): -234 °F
Orbital Period: 11.862 Earth Years
Average distance from Sun: 5.2 AU

Saturn:

Our Solar System's 6th planet and one of the most stunning ones by far. Saturn holds onto some beautiful rings in its gravitational surroundings, composed mostly of Ice particles, rocks, and dust. It's the 2nd largest planet in our Solar System behind Jupiter, although its density makes it extremely light. If you were to find a swimming pool to fit Saturn in it would float as its mean density is actually less than the density of water. Don't let the oversized pool toy metaphor fool you however, as Saturn has strong weather and wind patterns the same as its other Jovian counterparts. Saturn has an estimated amount of 82 solar moons, although only 53 have been confirmed and named.

Mass: 5.683 x 10^26 kg
Diameter: 116,460 km
Density: 0.687 g/cm^3
Temperature: Average (Clouds): -288 °F
Orbital Period: 29.457 Earth Years
Average distance from Sun: 9.5 AU

Uranus:

Uranus is the 7th planet in our Solar System and first of the two "Ice Giants". Unlike the two gas giants that came before it, Uranus is primarily made up of Ices that contain water, ammonia, and methane. Uranus has about 27 moons and a smaller ring system around the planet. One other interesting fact about Uranus is that it spins on its side where its rotation is almost aligned with a right angle from the sun. This gives Uranus the most extreme seasons. If you thought the winters in New York were bad then you wouldn't believe what Uranus would have in store for you.

Mass: 8.6810 x 10^25 kg
Diameter: 50,724 km
Density: 1.27 g/cm^3
Temperature: Average: -357 °F
Orbital Period: 84.02 Earth Years
Average distance from Sun: 20.1 AU

Neptune:

The farthest known planet in our Solar System, Neptune is the second “Ice Giant” in our Solar System. Deep out here in space you would think it would be more calm and silent, however, Neptune has been shown to have huge storms / vortexes disrupt its surface. Contrary to Uranus, Neptune is actually warmer on its surface than its counterpart mostly due to internal heating occurring from the core of this planet. Neptune seems to be the final major planet in our Solar System although that doesn't stop astronomers from trying to find more planets further out past this water / Ice heater of a planet.

Mass: 1.024 x 10^26 kg
Diameter: 49,244 km
Density: 1.638 g/cm^3
Temperature: Average: -353 °F
Orbital Period: 164.8 Earth Years
Average distance from Sun: 30 AU

Tools and Technology:

NASA Satellites

WISE/NEOWISE:

WISE, which was later given a new name NEOWISE, is best described as a NASA brand CCTV camera, used for Earth’s surveillance and safety. NEOWISE is used to scan the Solar System for potentially hazardous Near-Earth Objects (NEOs). NEOWISE can be compared as Earth’s technological watchdog as it allows us to sleep at night knowing that there are not any hazardous objects hurling towards Earth. If we found dangerous objects near our orbit NEOWISE may be the first to detect the hazard. It is currently still in our orbit scanning for objects today, along with 10 years under its belt.

SOHO:

SOHO is a satellite used to originally learn more about our sun and obtain evidence of processes in and around the sun. This ranges from the Corona, Solar winds, Chromosphere, and the sun's internal structures and dynamics. In fact, this satellite has confirmed a lot of what we know today about the sun and helped us determine and monitor solar winds and forecasts of the magnetic field of our sun. SOHO is acting as our in the field solar weather man, who has been running for 24 years and is still running today.

Voyager 1:

Voyager 1 is simply put, one of the most incredible feats of engineering in almost all of human history. As it continues to fly out further into interstellar space, Voyager 1 gave us some of the best images of Jovian moons and planets to date and helped us discover many new moons, Jovian ring bands, and countless other objects in the outer Solar System. The Voyager missions still run today and Voyager 1 has been operating since 1977, over 43 years!!! We owe a lot of our knowledge of the outer Solar System to Voyager 1 and Voyager 2, voyager 1's sister project.

Hubble Space Telescope:

One of the most important telescopes for direct imaging of the Solar System and beyond is the Hubble Space Telescope. From pictures of our planets to the Hubble Deep Field Image displaying all of the visible universe, this telescope has told us a lot and given us some beautiful images in all different spectrums of light. I may have some personal bias as I remember my mom showing images taken by Hubble, but as far as images and research go I think Hubble is my personal favorite telescope but out by NASA. Still working today and its been active for over 30 years!

For more information on Satellites, Telescopes, and future missions and projects, please go to this link to learn about the history and future of technology in Astronomy.

Work Cited:

https://solarsystem.nasa.gov/planets/overview/

https://en.wikipedia.org/wiki/Solar_System

https://en.wikipedia.org/wiki/Lists_of_planets

https://en.wikipedia.org/wiki/Sun

https://www.nasa.gov/image-feature/images-of-the-sun-from-the-goes-16-satellite

https://www.w3schools.com/css/

https://getbootstrap.com/docs/4.5/getting-started/introduction/

Bartholomew, Amy. "Exploring The Solar System." 205. 2020, SUNY New Paltz, SUNY New Paltz.

https://solarsystem.nasa.gov/missions/?order=launch_date+desc&per_page=50&page=0&search=&fs=&fc=&ft=&dp=&category=

https://solarsystem.nasa.gov/missions/hubble-space-telescope/in-depth/

https://solarsystem.nasa.gov/missions/voyager-1/in-depth/
https://solarsystem.nasa.gov/missions/soho/in-depth/

https://solarsystem.nasa.gov/missions/wise-neowise/in-depth/