Astronomy Term Project Andy He

**Earth like Planets**

Have you ever wonder if there are extra-terrestrial life forms out there other than us on earth? It always questions me, if earth can have life forms why can’t other planets in other solar systems support life? Which solar system will they be in? How will that planet look like? Will the planet look similar to earth where water makes up a majority of our planet? How similar are they as in do they have the same atmosphere? What about the surface of the planet? What is the interior of the planet made of? How old is the planet? These questions have been floating through my mind ever since I started getting interested in extra-terrestrials. Space has always been a mystery and always will be. There has been many questions that can’t be answered, things that are unexplainable even with knowledge of science and the technology with have as of today. We are one step closer to finding other life forms out there in other solar systems. Well according to astronomers, they have found Earth like planets. There are many other planets they have discovered that are similar to Earth and are in the habitable zone. If they are in a habitable zone, then that planet should be able to sustain life and have liquid.

The primary goal of the Kepler mission is to find Earth-sized planets in the habitable zone. According to NASA, NASA’s Kepler mission has found and confirmed its first planet in the so called “habitable zone”. The habitable zone is the region where liquid could exist on a planet’s surface. Kepler has also found more than one thousand new planets. Out of these one thousand planets, ten of those are near Earth’s size and orbits in the habitable zone. On December 5, the Kepler team announced the discovery ok Kepler 22-b in the habitable zone of its parent star. The new planet is called Kepler-22b. Kelper-22b is about 2.4 times the radius of Earth. Scientist doesn’t know if Kepler-22b has a rocky, gaseous or liquid composition. It is also located six hundred light years away. Even though the planet is larger than earth, its orbit of 290 days around a sun-like star is a lot like our world. The star that is host to the Kepler-22b belongs to the same class as our sun, call G-type. Even though it falls under the same class, the star is slightly smaller and cooler. Out of the fifty four habitable zone planet candidates that were reported in February 2011, Kepler-22b is the first to be confirmed. It was a milestone to be published in The Astrophysical journal. On December 5, the Kepler team announced the discovery

The first Earth-size planets orbiting a sun-like star outside our solar system are called Kepler-20e and Kepler-20f. These two planets are too close to their star, so therefore it’s not in the so called habitable zone. Kepler-20e is smaller than Venus and is measuring 0.87 times the radius of earth. Kepler-20f is slightly larger than Earth, measuring 1.03 times its radius. Both of these planets are approximately 1,000 light-years away. Kepler-20e orbits its star every six days and Kepler-20f orbits its star every nineteen days. Because the orbital periods are very short, these planets are very hot and inhospitable worlds. Therefore it is should not be able to support life forms. Kepler-20f is at eight hundred degree Fahrenheit, and is similar to an average day on the planet Mercury. The surface temperature for Kepler-20e is more than one thousand four hundred degrees Fahrenheit. Because Kepler-20e is so hot, it would melt even glass. This gives you a genuine idea of how hot the planets are and why it’s inhospitable. The Kepler science team uses ground-based telescopes and the Spitzer Space Telescope to review observations on planet candidates that the spacecraft finds. Kepler observed the constellations Cygnus and Lyra. It can only be seen from ground based observations in spring through early fall. Other observations help the Kepler science team determine which candidates can be validated as planets. To validate Kepler-20e and Kepler-20f, astronomers used a computer program called Blender. What the program does is that it runs simulations to help eliminate out other astrophysical phenomena masquerading as planet.

Kepler discovers planets and planet candidates by measuring dips in the brightness of more than one hundred fifty thousand stars to search for planets that cross in front or “transit” the stars. It is required of at least three transits to verify a signal as a planet. The inaugural science conference held at Ames on Dec 5-9, announces one thousand and ninety four new planet candidates. The total number of planet candidates identified by Kepler has increased by 89% and now has a total of two thousand three hundred twenty six planet candidates. Out of two thousand three hundred twenty six planet candidates, two hundred and seven are approximately Earths size, six hundred eighty are super Earths size, one thousand one hundred eighty one are Neptune’s size, two hundred and three are Jupiter’s size and fifty five of them are larger than Jupiter. Based on the observations conducted from May 2009 to September 2010, it shows a dramatic increase in numbers of smaller-size planet candidates. The number of Earth size and super Earth size candidates has increased by more than two hundred and one hundred forty percent since February. There are forty eight planet candidates that are in their star’s habitable zone. It is a decrease from the initial fifty four reported in February. The reason behind the decrease is because the Kepler team has applied a stricter definition of what constitutes a habitable zone in the new catalog, with the warming effect of the atmospheres.

Some of the technology the scientist used is Kepler, Spitzer Space Telescope, The Hubble Space Telescope, CoRoT, and Large Binocular Telescope Interferometer. The Kepler was launched on March 7, 2009 by NASA. The Kepler mission searches for exoplanets using the transit method. The Kepler is monitoring about one hundred thousand stars near the constellation Cygnus for signs of exoplanets. Kelper’s goal is to create a statistical survey that predicts how many Earth like, Earth size planets exist in our galaxy. The Spitzer Space Telescope was launched on August 25, 2003 by NASA too. The Spitzer Space Telescope job is to observe objects in the infrared spectrum. It is a revolutionary tool in the characterization of exoplanets. The Spitzer Space Telescope is the first instrument to directly detect light from an exoplanet. The data reveals the composition, temperature, and even likely wind patterns on faraway exoplanets. The Hubble Space Telescope was launched on April 24, 1990 by NASA. The Hubble Space telescope takes images and astronomers study these images for exoplanets. CoRoT was launched on December 27, 2006 by CNES/ESA. The CoRot was designed to search for transiting exoplanets. CoRoT’s strong emphasis on exoplanetary characterization has produced some of the most detailed exoplanet studies yet published. The Large Binocular Telescope Interferometer was first operated on December 7, 2010 by University of Arizona. The Large Binocular Telescope Interferometer is the largest single mount telescope in the world. The telescope is a cutting-edge interferometer that will be able to observe planetary dust disks that are the birthplace of stars, as well as Jupiter size exoplanets orbiting at distances from their stars similar to Earths. These are just some of the technology they use to explore, observe and study about space in order to find other solar systems, planets, stars and anything else.

 As for me, I strongly believe that there is another planet out there in other solar systems that can sustain life but we just haven’t discovered it yet because of the limited factors we have. You might be asking why you believe in such a radical idea. The reason why I believe there are other life forms other than ourselves is because if we are able to live on Earth, shouldn’t there be other planets where it can actually be sustain life forms? There are tons and tons of other solar systems that we have yet to discover. Space seems to have no end to it. If space seems to have no end, then the amount of solar systems might be endless. We have only discovered a certain amount of solar systems with the technology we have today. We found thousands of Earth size planets already. If we are able to find this much Earth size planets with the technology we have today, how about in the next ten years? It will increase dramatically. As our technology continues to develop we will be able to discover new things, solves mysteries we have as of right now. It will even bring forth new mysteries and maybe prove wrong what we already know. Maybe one day we might actually find other life forms and another sustainable planet. Space is all a mystery and the possibilities are endless. We might never be able to solve all the mysteries we have about space.