CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)

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Project Number

34063

Project Title

Testing the Habitability of Exoplanets

Abstract

Objectives/Goals

The project objective was to determine out if there are any Exo-planets that could potentially support life.

Methods/Materials

Three criteria tested the planet#s habitability. The criteria are the Habitability Zone Composition (HZC), Atmosphere (HZA) and Distance (HZD). The HZC predicts whether a planet is likely to have soil. The HZA predicts whether a planet can hold an oxygen-based atmosphere. The HZD predicts whether the planet can hold liquid water based on the planet#s temperature. Data from the Exo-planet database was analyzed with the Habitability Zone criteria from the University of Puerto Rico at Arecibo Planetary Habitability Laboratory to find planets that could potentially support life.

Results

Out of 4,210 candidate planets in the database, only 2,740 had the sufficiently complete data to test all three criteria. There were 2,021 planets meeting the HZA, 1,403 meeting the HZC, and 51 meeting the HZD. I found 10 Exo-planets meeting all of the habitability criteria simultaneously. This was only 0.4% of the 2,740 planet candidates.

Conclusions/Discussion

Based on my results, I believe that there are planets that could be habitable. Since 10 planets met all three criteria, then there is a possibility that there is life out there. If I apply my finding to the entire galaxy, then I find something really interesting. Astronomers believe there are 100 billion stars in our galaxy. If you assume that every star has at least one planet around it and 0.4% of all of those planets meet the HZ criteria, then you discover there are about 400 million opportunities for life.

Summary Statement

In this project I sought to determine if Exo-planets could support life and discovered that 0.4% of 2,740 Exo-planet candidates analyzed met all three Habitability Zone criteria.

Help Received

My father helped with the excel spreadsheet analysis. I used data from the Exo-planet database. I consulted with Dr. Abel Mendez regarding my research. Equations were adopted from the University of Puerto Rico at Arecibo Planetary Habitability Laboratory.

Preliminary