Participatory Exploration for Inspiration and Education (12)
Educating the Next Generation (2)

Author: Ms. Kyla Borders
Peninsula High School, United States, prplegrl95@gmail.com

Dr. Kareen Borders
University of Washington, United States, kareenborders@comcast.net
Dr. Michelle Thaller
National Aeronautics and Space Administration (NASA), Goddard Space Flight Center, United States, michelle.thaller@nasa.gov
Dr. Marge Plecki
University of Washington, United States, mplecki@uw.edu
Dr. Bryan Mendez
University of California, United States, bmendez@ssl.berkeley.edu
Dr. Robert Winglee
University of Washington, United States, winglee@ess.washington.edu
Dr. Margery Ginsberg
University of Washington, United States, ginsbm@u.washington.edu
Mr. Matt Condit
Peninsula School District, United States, conditm@psd401.net

STRENGTHENING THE CONNECTION BETWEEN SPACE AND SOCIETY: A COMPARATIVE ANALYSIS OF SUPERNOVAE DISTRIBUTION IN THE ANDROMEDA GALAXY FOR SECONDARY SCHOOL STUDENTS

Abstract

In order to prepare students in grades 4-12 for a global workforce, NASA supports and offers science, technology, engineering, and math (STEM) immersion education for secondary students. Secondary schools, through the NASA Explorer School program, the Spitzer Space Telescope, the National Optical Astronomy Observatory, and the WISE (Wide Field Infrared Survey Explorer) Telescope Teacher Ambassador program, offer authentic research opportunities for students. Spitzer and WISE studied the sky in infrared light. Among the objects WISE studied are asteroids, the coolest and dimmest stars,and the most luminous galaxies. The lessons learned from the NASA Explorer School program and the Spitzer and WISE teacher and student programs can be applied to other programs, engaging students in authentic research experiences by using data from space-borne and earth-based observatories such Kitt Peak Observatory. Several ground based telescopes at Kitt Peak Observatory study visible light from objects such as novae. Utilizing a student research immersion philosophy along with data analysis skills learned from the Spitzer and WISE student research programs, an analysis of novae rate with respect to location in the Andromeda galaxy was conducted using images of the Andromeda galaxy taken from the WIYN 0.9 meter telescope on Kitt Peak. The Andromeda galaxy was divided into sixteen fields and rate of novae was compared between fields. A comparison was made between the 12 outer fields (spiral arms) and the 4 inner fields (central bulge). Novae were found by "blinking" images of the each field throughout 100 epochs of data. Blinking is a technique used to compare images of fields and noting brightness (via x,y coordinates) in one field that is not visible in the same field during a different epoch. Although the central bulge would be expected to contain more novae due to stellar density novae proximity of stars to

each other, analysis of data indicates that the greatest concentration of novae appeared in outer regions. The most concentrated distribution of novae was in feld 2 (upper left edge) with an average of 11.3 novae. The least novae were in area 7 (central right) with an average of 1.3 novae. It is probable that the collective intensity of light emerging from the central core obscured the brightness of the novae. The novae may correlate with the pattern of the spiral arms in Andromeda. In addition, we will discuss secondary education infrared and visible light outreach activities and extensions.