**Abstract**

An asteroid impact is believed to be the primary cause for the most devastating mass extinction event in history, in which 90% of all marine species and 70% of all terrestrial vertebrate species went extinct, as well as the most recent mass extinction event, which laid waste to the dinosaurs just 65 Ma. Even today, asteroids pose a clear danger to the continued survival of life on Earth, including humans. The detection and characterization of near-Earth asteroids is the only way in which we can hope to discover and potentially deflect asteroids that may pose a threat in the future. In our asteroid search with the Pan-STARRS Asteroid Search Campaign, headed by the International Asteroid Search Collaboration (IASC), we made provisional discoveries of two asteroids, 2012 FF7 and 2012 GB7.

**Background**

Most of the asteroids in our solar system do not have orbits that intersect with Earth’s orbit, and as such are not immediate threats to our planet. However, there are small numbers of detected and undetected asteroids that could collide with Earth in the future due to their intersecting orbits. To better prepare humanity for this danger, asteroid search programs have been developed to discover Near-Earth Objects (NEOs) that could harm our planet. Three students in the SUNY Oneonta Physics & Astronomy Department took part in the Panoramic Survey Telescope and Rapid Response System (Pan-STARRS) Asteroid Search Campaign, directed by the International Asteroid Search Collaboration (IASC). This program introduces students to astronomical data analysis and object identification through the field of view. Second, the magnitude (apparent brightness) had to be constant; this parameter is indicated in the figures below as "R." If the magnitude fluctuated by 1 or more, it was rejected. Third, it had to move at a constant speed. Most objects were found manually, so the speed is not labeled in the picture, but when a “Moving Object Detection” search was done, the speed was given. Fourth, the SNR (Signal-to-Noise Ratio) had to be greater than 5, indicating that results which were derived from the data are dependable and accurate, and not a spurious detection. Finally, the light profile had to resemble a Gaussian curve to distinguish between the distribution of light from a true object and a cosmic ray.

**Methods**

To find these asteroids, we were given data sets with images taken from Hawaii. Using the program Astrometrix, we were able to process and measure these images. There were certain criteria that a detected candidate needed to have. First, it had to demonstrate linear motion through the field of view. Second, the magnitude (apparent brightness) had to be constant; this parameter is indicated in the figures below as "R." If the magnitude fluctuated by 1 or more, it was rejected. Third, it had to move at a constant speed. Most objects were found manually, so the speed is not labeled in the picture, but when a “Moving Object Detection” search was done, the speed was given. Fourth, the SNR (Signal-to-Noise Ratio) had to be greater than 5, indicating that results which were derived from the data are dependable and accurate, and not a spurious detection. Finally, the light profile had to resemble a Gaussian curve to distinguish between the distribution of light from a true object and a cosmic ray.

**Data**

**Results**

We observed 21 known asteroids and 37 novel moving objects in 33 data sets. The observations of the previously known asteroids has allowed for a more complete understanding of these asteroids’ orbits. None of our novel observations have been considered preliminary discoveries, which are initial discoveries of previously unknown moving objects. Two of our novel observations were considered provisional discoveries, which confirm preliminary discoveries. These are the asteroids 2012 FF7 and 2012 GB7. The Pan-STARRS Asteroid Search Campaign as a whole found 60 asteroids that are now considered provisional discoveries.

The other 35 novel observations are not new discoveries. These asteroids, although detected in previous surveys, were not cataloged in the Astrometrix software, leading to the appearance of new discoveries when they were in actuality the confirmation of previous observations. Since the search for NEOs is an ongoing mission, Pan-STARRS is holding additional searches in the coming months and years that will seek to further our understanding of NEOs.