The Fremont Peak Observer
Bringing Astronomy to the Public

Vol 29 No. 3 Fall 2012

From the President

By President Rick Morales

I hope this winter season finds you all well. This President's Message will be my last one. I decided shortly before the Board election at Star-B-Que in July that I would not run again after having been on the Board for a very long time. When this organization was started almost thirty years ago with the plan to build the observatory, I was a representative to the FPOA Board from State Parks. Since then, I think I've been to 95% of all the Board meetings, maybe more. I have held positions for almost all the offices at one time or another: Secretary, Treasurer and President. I was the principal liaison between State Parks and the FPOA during my tenure as resident ranger at the Peak and after I left the State Parks for other opportunities, I was voted in as an official Board member. It has been an honor to work with the Board for all these years and our list of accomplishments is long, beginning with establishing the association, building the Observatory, maintaining it and showing tens of thousands people, the night sky.

I am leaving the Board but I'm not leaving the association. I still have work to do there. I have been assisting Peter Jenniskens with the NASA meteor photography efforts by checking out the cameras and computers on a regular basis. (The cameras are easy to keep operating…the computers are something else.) I'll also will be around to help with maintaining the observatory. I'm a hands on type who doesn't mind getting dirty and I like working with my hands so I'll be around for Spring and Fall maintenance work days and I'll be up observing through the Challenger telescope.

It has been a very high point in my life being a part of this organization and the people who are associated with it. Thank you all for the many memories I am taking with me.

Rick Morales

FPOA Programs 2013 (Tentative)

Saturday Evening Programs

Apr 6, 13, 20 May 4, 11, 18
Jun 1, 8, 15, 29 Jul 6, 13
Aug 3, 10, 31 Sept 7, 28
Oct 5, 12, 26

Solar Programs

Mar 9 Apr 13 May 11 Jun 8
Jul 6 Aug 10 Sept 7 Oct 5

Board Meetings

Jan 12 Feb 9 Mar 9 Apr 13
May 11 Jun 8 Jul 6 Aug 10
Sept 7 Oct 5 Nov 2

Special Events

Star–B–Que Aug 10
Member Appreciation Night Sept 7

Please check http://www.fpoa.net/schedule.html for changes or updates to this schedule.

AutoCams

By Dave Samuels

In 2010, Petrus Jenniskens, of NASA/SETI and author of the book, "Meteor Showers and their Parent Comets", asked me if I could use my Watec 902H2 Ultimate camera to start collecting data in what would be the first of a world-wide network of amateur **CAMS** stations.

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A Remarkable Triple

By Pat Donnelly

On the evening of December 13 Ron Dammann and I went to the Fremont Peak Observatory to observe some Geminid meteors. Since there was time to do some other observing before the meteor shower viewing would begin, we used the Challenger Telescope to check out several objects. The first object we viewed was a truly remarkable triple, 40-Eridani (Omicron-2 Eridani).

Omicron is a true triple system consisting of a yellow dwarf primary, a white dwarf secondary, and a small red dwarf tertiary. The configuration of this system is similar to the Earth-sun-Moon configuration, except that the masses are similar. Thus, the motions about the centre of mass are more complicated. Through the 30" telescope the colours are quite obvious. The white dwarf secondary is a true "White Dwarf" type star and is the easiest of these old age stars to see in small telescopes. The separations of the three (3) components are quite comfortable with A-B (83") and B-C (8"). The apparent magnitudes are +4.5, +9.7, & +10.8, and the system is only 16 light-years from the earth. The system is well placed this time of the year, just west of Rigel and is a fine sight in just about any amateur telescope.

AutoCams

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My camera was the same model as the cameras used in the 20-camera arrays atop the Fremont Peak observatory (the first CAMS array), and at Lick Observatory and a station in Sunnyvale. The requirements were to get a 12mm f/1.2 lens, an adapter, and to use a computer I wasn't really utilizing. I happened to be in the middle of moving from Pleasanton to Brentwood in July, so my system finally saw first-light on August 3, 2011. I'm proud to say that my CAMS station has collected data almost every night since then except for a few nights where things just broke down and weren't working. For the first year, the system was set up on a camera tripod on my back porch.Since then, Dr. Jenniskens has put me in charge of the EasyCAMS global amateur network.

CAMS is an acronym for "**Cameras for All-sky Meteor Surveillance**". It is a project run by Dr. Jenniskens. There are three main all-sky CAMS array sites set up in the Northern California network at **Fremont Peak**, **Lick Observatory**, and **Sunnyvale**. NASA/SETI is allowing amateurs to contribute to this science by setting up single-camera CAMS systems at their homes, schools, etc. and this will provide a level of redundancy against fog and other breakdowns as well as providing improved accuracy in the data (See the September 2012 **Sky and Telescope** magazine article about CAMS). The amateurs are being credited for discoveries and measurements made by their CAMS stations. For additional information, see "**http://cams.seti.org/easyCAMS.html**". There is a user support group on Yahoo Groups that you can join by emailing:"**seticams-subscribe@yahoogroups.com**". Once you subscribe, you enter your site information into the "CAMS Locator Table" Database and use the Database to find others in your local network. Peter calls the amateur systems "**EasyCAMS**", based in part on the use of the EzCAP capture card. We're finding that this card is less than optimal for the price and I'm now using the Orion Capture Card. I created a menu system that is now called **AutoCams**.

Why are we doing this?

A meteor shower is caused when the Earth passes through the dust trail of a comet or asteroid that has previously passed through Earth's orbital path without colliding with the parent comet. A meteor shower implies the presence of a potentially hazardous comet. If the dust trail can hit the Earth, so could its parent comet. The dust trail shares the same orbital path as its parent body. One could say that it is just a matter of time before Earth collides with each of these parent bodies.

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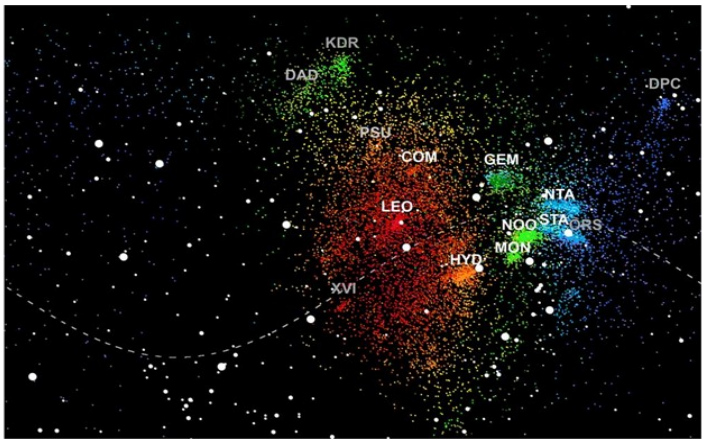
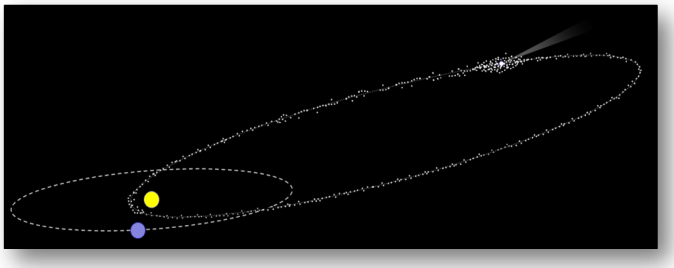


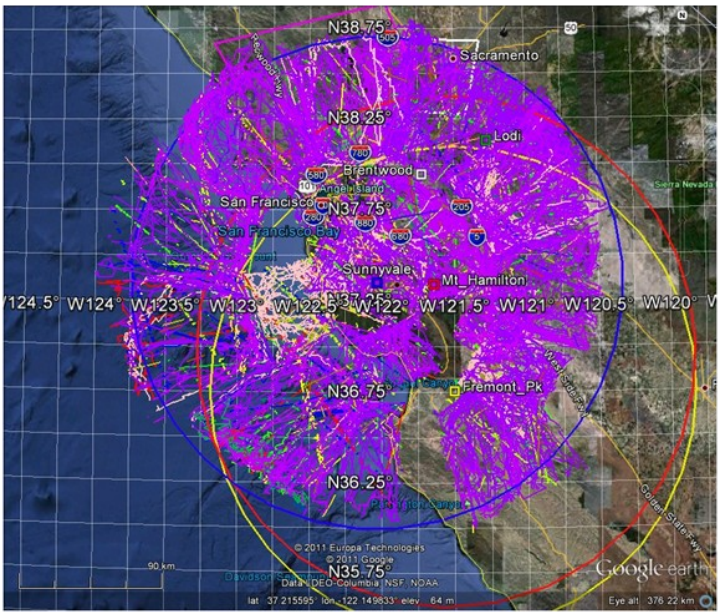
Meteor Showers of Early December, 2011.

The dust trail shares the same orbital path as its parent body. One could say that it is just a matter of time before Earth collides with each of these parent bodies. In principle, it will be possible to guard against such impacts by looking along the meteoroid particle stream orbit to those spots where the comet would be in such a dangerous position - possibly providing a few years of warning. There is no real need to find all the comets associated with all the meteor showers, only those comets that would be in the position to impact Earth need to be located.



There are almost 400 or more known meteor showers. 300 of those are not confirmed. The purpose of the NASA/SETI CAMS project is to confirm the known meteor showers and discover new ones. You can visit "**http://www.ta3.sk/IAUC22DB/MDC2007/**" or just Google search "**Meteor Data Center**". The old method of registering meteor showers involved visual observations that were highly inaccurate. These visual observations involved association of the meteors in a shower from a single point of origin in the sky, known as a *radiant*.

While the radiant provides a good way to help us identify and name the meteor shower, what are actually needed are the orbital elements of the meteoroid particles. Only those particles that share the same orbital elements should be considered part of the same particle stream/meteor shower. We are constantly bombarded. This shows the meteor tracks from one night detected by one 20-camera array (a few cameras were down that night)



My work on the AutoCams system

An AutoCams system takes video from dusk until dawn every night using highly sensitive video cameras at 30 fps and searches for signs of meteors in the video frames. The meteor detection is done locally using software that is provided at no cost. Reducing the data locally reduces the volume of files sent back to NASA/SETI. Data, in the form of small text files (about 1 MB - 5 MB per camera per night) is sent back to a central coordinator at NASA/SETI where triangulation (coincidence) from other sites is performed. Coincidence processing ascertains additional information, such as speed, angle of attack, altitude, and finally the orbital elements of the particles. When two or more cameras capture the same meteor, we can determine the orbital elements of the particle stream. They need to be separated by a baseline of practically 20-100 miles. The more cameras that can detect the same meteor, the more accurate the orbital data becomes - as well as providing a higher meteor count for all overlapping stations. Also, having more cameras can increase the overall sky coverage - increasing the probability to detect a meteor in another part of the sky belonging to the same particle stream.

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AutoCams *from page 3*

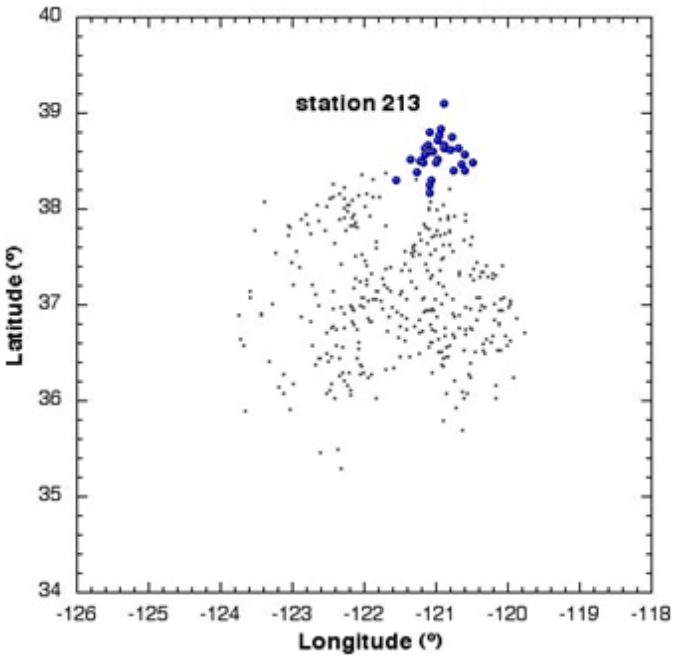
It quickly became evident that the system needed to standardize on process and workflow. The calibration routines were somewhat confusing and I feared that the lay person would have a lot of problems and that difficulty would cause issues in submitting good data to NASA. So I wrote my first script to automate the daily startup, passing parameters to the programs. Many of the programs didn't accept command-line parameters, so Pete Gural, was quick to add the ability.

After a year and a half of testing and evolution of the process, workflows, bug fixes, and so on, the programs have been enhanced, and I've written over 30,000 lines of script code to automate things so that a normally responsible lay person could run their system on a daily basis with minimal effort. Much work was done to focus on being able to leave for a two-three week vacation and the system runs itself autonomously during that time-period. This includes turning the power on to the cameras, calculation of the correct time to commence recording, stopping the recording in the morning, calibrating the field of view against background stars, detection of streaks in the images, adjusting the detections to match the calibrations, shuffling the data around to get it ready for submission, creation of the zip file, and finally uploading the zip file to NASA. This is all finished before sunrise each morning for weeks on end - unattended - until the hard drive is full.

Current coverage area of the CAMS stations in the Northern California network.

In the first 6 months, my single camera system turned in about 24,000 confirmed meteors. In the May/June timeframe, I added a second camera and I'm now capturing about 26 hours of data each night. I've lost track of how many confirmed meteors.

In the beginning, the workload was a little onerous. I'd have to ensure that everything started correctly each night. In the morning, I'd have to perform all the calibration and other workflow procedures manually. As the scripts have matured, I spend less time each day working on the AutoCams system.



Here is an example of what a single CAMS station can provide. On Aug 15, 2011, my camera 213 captured over 70 events that night. When combined with the other 60 cameras, my one camera added 31 more coincident meteor tracks to the network. It also added data for some that were only picked up by one station. The blue dots are the meteors specifically made possible by adding my camera to the network.

On October 17, 2012, a near earth asteroid collided with earth and the fireball was seen throughout the Bay area. The fireball went right through the FOV of the San Mateo College station 210. With the help of Dean Drumheller, I was able to locate his captured files with the asteroid, make movies, and verify the asteroid in several seconds of frames as it moved in front of the camera. Using the data from camera 210 and one from a camera just a few miles away, a lot of manual calculations were needed to ascertain the meteor track and predicted the strewn field to be over Novato to St. Helena.

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The information was correlated in time for the evening news. The next day, after reading an article in the Chronicle describing the NASA/CAMS meteor trajectory impact area centered on Novato, Lisa Webber remembered hearing the sound and went outside to search for the rock that hit. It was the first of many Novato meteorites found.

Having amateur systems with quick access to the data and the internet has proven to be very useful. These stations are doing just as well as the sites situated on a mountain top. The amateur network has expanded to a local network in the Netherlands, one in Maryland, and one in Tennessee (still looking for a partner). Other interested parties in Mexico, Georgia, Spain, and Australia have expressed interest and we hope they will join soon. I've also recently worked with an ornithology researcher adapting the CAMS concept to studying nighttime migration of birds. That system is being tested in New York this season. In the first year of operation, reduced about 47,000 orbits. In addition, a few discoveries were made, including the **February Eta Draconids** and the February delta Aquarids. There are other discoveries that are awaiting confirmation. Also, the mystery of the zodiacal light was solved.
I've done a lot of work to support this research effort and hopefully my scripts and work will continue to help expand the network.

Dave

2013 Membership Renewal

Renewals are easy. You can use the forms on the membership page http://www.fpoa.net/membership.html to pay with either PayPal or via a credit card. For those preferring paper you can just send a check (that has your current correct address) to : FPOA Membership, c/o Rob Hawley, 1233 Hillcrest Dr, San Jose CA 95120
If you email has changed then please be sure to include that in either the PayPal payment as a comment or a note with your check.

EMAIL DELIVERY OF THE OBSERVER

Dear FPOA Members,
We have been delivering the Observer via email for the past several issues. This obviously saves the Association postal expenses, and assures the quickest delivery to you. However, several of you no longer have valid email addresses, due to ISP changes, moves, etc. If you would like to continue to receive, or begin to receive, notification of the Observer via email, please send your current email address to membership at fpoa.net

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The Fremont Peak Observer is published four times a year (Winter, Spring, Summer, Fall). Articles from members are encouraged and should be emailed to ron.dammann at lmco.com. Articles should be in plain text or MS Word format. Deadlines are Feb. 1, May 1, Aug. 1 and Nov 1, respectively.

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