SBIG Astronomical Instruments

Memo

Meteors, Satellites, and UFOs
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I have been fascinated by peculiar events that happen in the sky since I was a young child (got my first telescope at age 11). With my 80 mm refractor I was once looking at the moon when I saw a small irregular tumbling object pass before it, taking a few seconds to pass across. At the time (circa 1966) I thought it was simply a spent space booster, but now I realize I may be the only person in history to have seen an asteroid pass before the moon. I was also captivated by UFO lore and such. Now I am older, president of an astronomy company, and can indulge my interests more deeply. I recently took one of our ST-9XEI cameras and mounted a 3.6 mm focal length C-mount lens to it, set it up in a weatherproof box with a heated red filter above it, and wrote some special software, and now I have a meteor camera. The camera takes an image every 30 to 60 seconds, and automatically detects all streaks in the image that were not in the previous image, and logs images with streaks to disk. Unfortunately, I find myself logging a lot of aircraft traffic in and out of LAX, so I still have to go through the saved images manually, but I have gotten some hits. In Figure One I show a nice Geminid meteor on a night with drifting clouds (they have soft edges because they move during the exposure). The moon is a problem, particularly since I run all night on a clear night. Figure Two shows a very bright Geminid. I managed to capture 27 Geminids in 3 nights of monitoring, but when there is no meteor shower I typically only see a meteor about once every 10 hours. They have to be quite bright to be detected. The plane traffic is obvious since it leaves a nice uniform streak with a consistent length. I did get one UFO, which is probably a glint off a satellite in polar orbit. This object is shown in Figure Three. It is odd that there was a dropout in the glint in the middle of the streak.

The lens-CCD combination has a field of view of about 110 degrees, and can show the Milky Way in only a second or two. In a light polluted area, the red filter reduces the sky glow dramatically. The readout and processing time takes about 3 seconds, so the system has about 5% dead time for one minute exposures. One minute is about the maximum one can use or the star positions change so much frame-to-frame my software cannot reject them. My algorithm works quite well, and only has a false alarm issue with cirrus clouds moving overhead, since they tend to have linear features. Unfortunately the system is not sensitive enough to see a faint satellite going over. I am pretty sure it will see the space station and the shuttle, but I haven't verified that yet.

Figure One: Nice Geminid

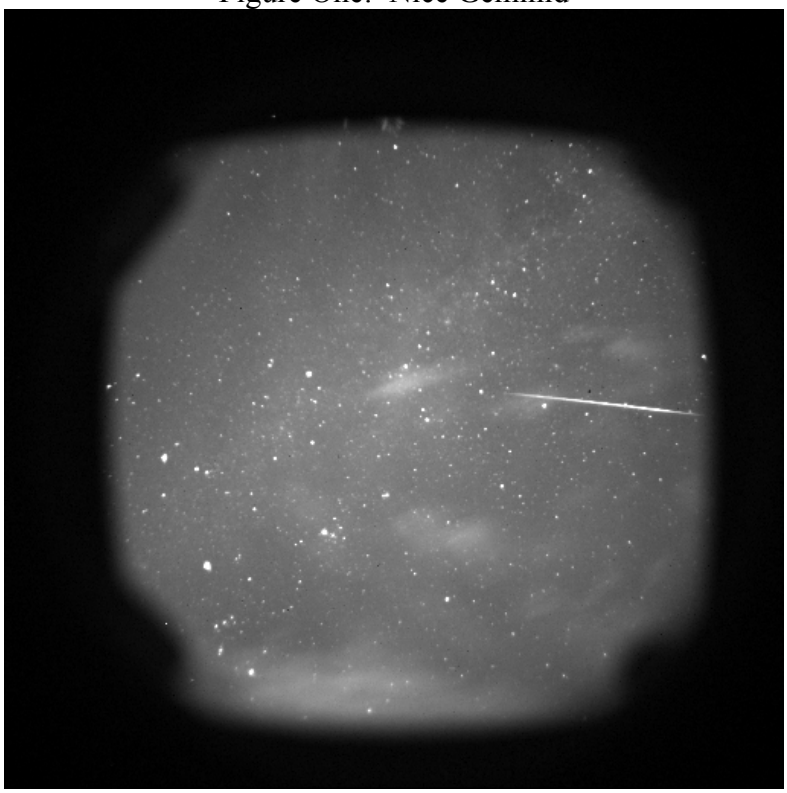


Figure Two: Bright Geminid near Full Moon

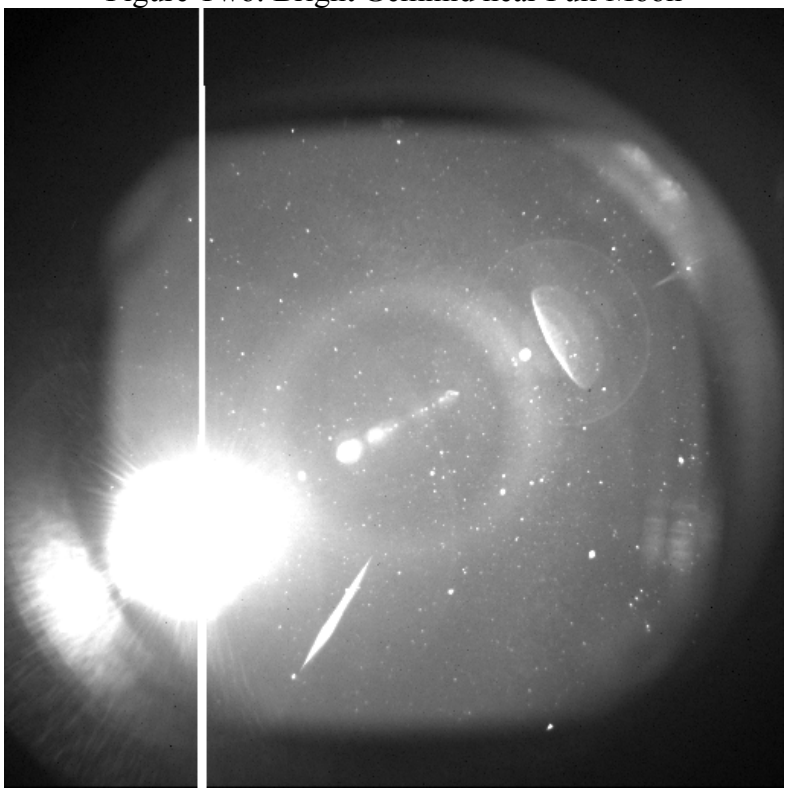
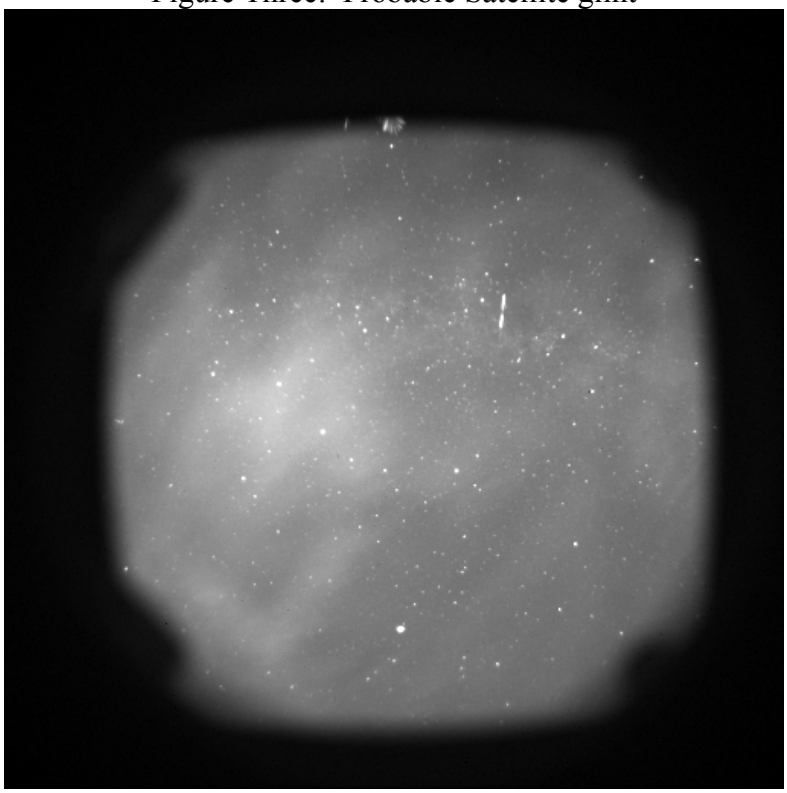


Figure Three: Probable Satellite glint



I do get some satisfaction in knowing that if something happens overhead at night while I sleep I will capture a record of it. I also enjoy being able to indulge my hobby without having to be up late or sit out in the cold. I don't get that feeling I'm wasting a clear night when I'm too tired to open up my observatory. My original intent when developing this system is that it would be of interest to educational institutions, where a pair of schools 10 to 30 miles apart could each have a system and, using triangulation, measure the altitude of objects simultaneously detected. I believe the idea of capturing and resolving unusual transient events would be very interesting to school children. Sometimes what I find interesting has little appeal to others (I tend to like data and science more so than pure imaging). So, this is an appeal to any of our users that if you would find such a capability valuable let us know. My direct e-mail is alanh@sbig.com. If we receive enough interest this could become an addition to our product line. For those of you who think there is an educational market for astronomy related products such as this one, we would be most interested to hear from you.