Ed Majden Observatory 2004 June 3 Fireball Report

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A major fireball event was recorded by a Sandia Convex All-sky Camera located in Courtenay, British Columbia, Canada, at Longitude: 125° 00' 36".2 West, Latitude: 49° 40' 36".4 North, Altitude: 31 metres, at 02:40:12 P.D.T. = 09:40:12 UTC. An alert went out to our other West Coast Stations but the camera at Courtenay was the only one in operation.

The West Coast Sandia Bolide Detection Network went into operation in June 1998. Four convex all-sky cameras were provided by Sandia Research in the USA with cameras located at Courtenay, B.C., Nanaimo, B.C., Victoria, B.C. and Woodinville, Wa. For technical reasons the Station at Courtenay was the only one in operation on the night in question. Previous to this the only other dual station record was of a −10 or brighter fireball recorded on 1998 August 14 which was given the designation EMO980813. This event was recorded by a Sandia All-sky by the Courtenay Station and a Victoria Station. David Balam and Jeremy Tatum concluded that if this fireball dropped a meteorite it landed in the Pacific.

The 3rd June fireball was in the early morning hours as noted. Only three visual reports were received at Courtenay. One fellow was on a boat, one was in a car and the other was very near the location of the all-sky camera so no interviews were conducted. The fireball was very near my SE horizon, the latter part of the trail obstructed by some trees. This low elevation presents a problem arriving at a good elevation for the start and end point of the fireball.

Convex all-sky cameras suffer from a geometry problem where angles near the horizon are squeezed together. Fortunately the Moon was recorded providing a single elevation reference point. Two iridium flares secured on other nights were also submitted to provide additional data points. Jeremy Tatum has evaluated the geometry problems of the convex system but he would like more data points as a check on this. Copies of the fireball video were sent to Robert Matson and he will attempt to coax out background stars that could be used as data points. His last email stated that he is confident in his az/el position calculations. The all-sky video provided an accurate time for the fireball and this time is very useful when evaluating seismic records of the sonic boom obtained at various stations. The people involved will post the methods used to do this.

A second video record was obtained by a second generation Sandia All-sky fisheye camera recording on VHS tape without a time/date stamp at the Courtenay observation site. A copy of this video has been sent to Matson for evaluation. This fisheye system does not suffer from the geometry problems of a convex all-sky but it still probably has its own lens distortions that need to be evaluated. One interesting note is that the fisheye video camera is quite a bit more sensitive than the convex video camera.

When the fireball turned darkness into near instant daylight the camera went off line for a second. Then AGC circuits cut in and the camera resumed normal operation. This makes one wonder what would have happened had this very bright fireball been high in the sky. It is a good thing that we had both systems operating at the same time. Not having a good background in mathematics I leave the evaluation of this event up to others. I hope that the video records secured at my station provide a contribution to this study.

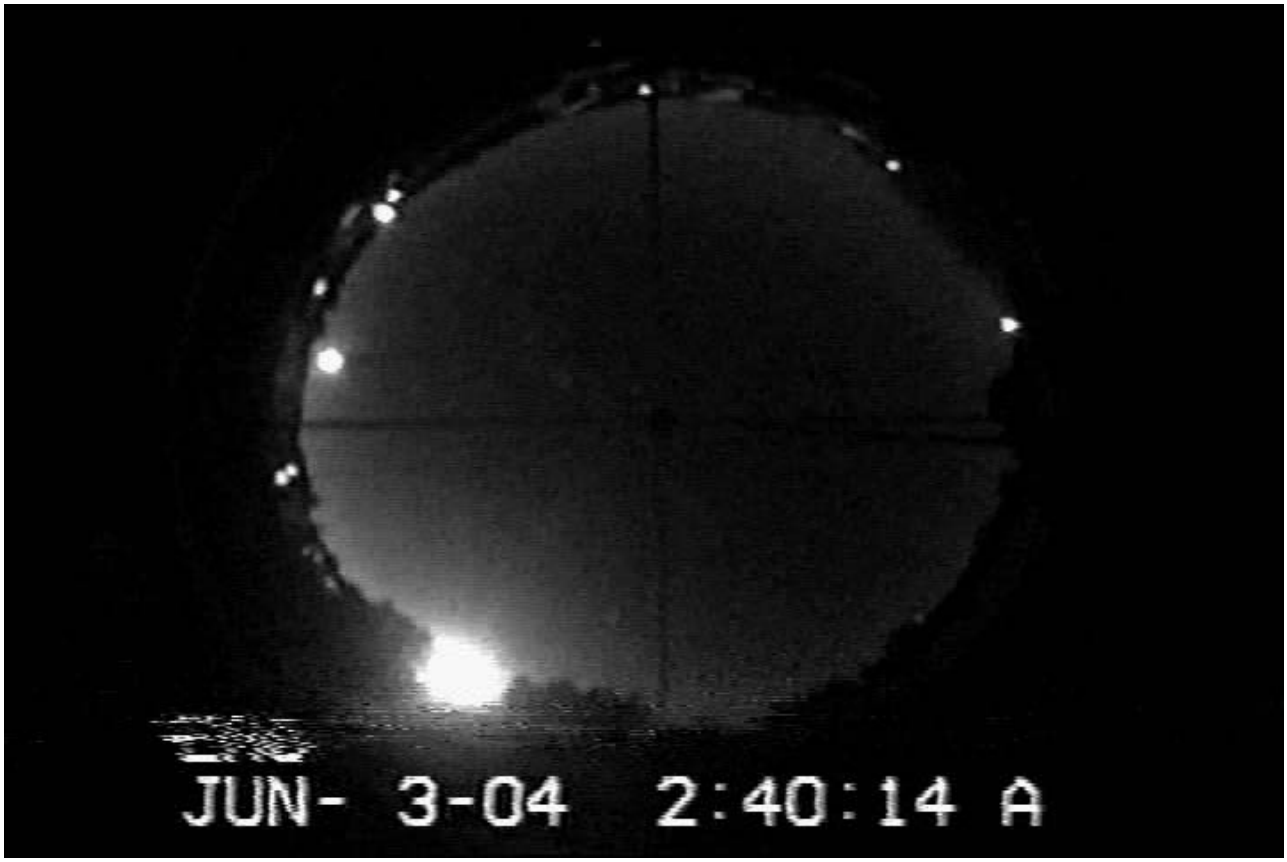

FIGURE 1. The bright terminal flare of the fireball is noted at the bottom left of the photograph. The all-sky camera orientation is North to the right with East at the bottom. The Moon is visible slightly West of due South and was used, along with two Iridium flares recorded earlier, to calibrate altitude and azimuth for the video. The time on the time/date stamp is Pacific Daylight-saving Time (PDT) with a two-second error. Subtract two seconds for the correct time. This was determined by listening to WWV time beeps against the time/date stamp. This should be accurate to ¼ second. Add seven hours to PDT to obtain UTC – Coordinated Universal Time as broadcast by WWV at 5 MHz short wave radio broadcast.

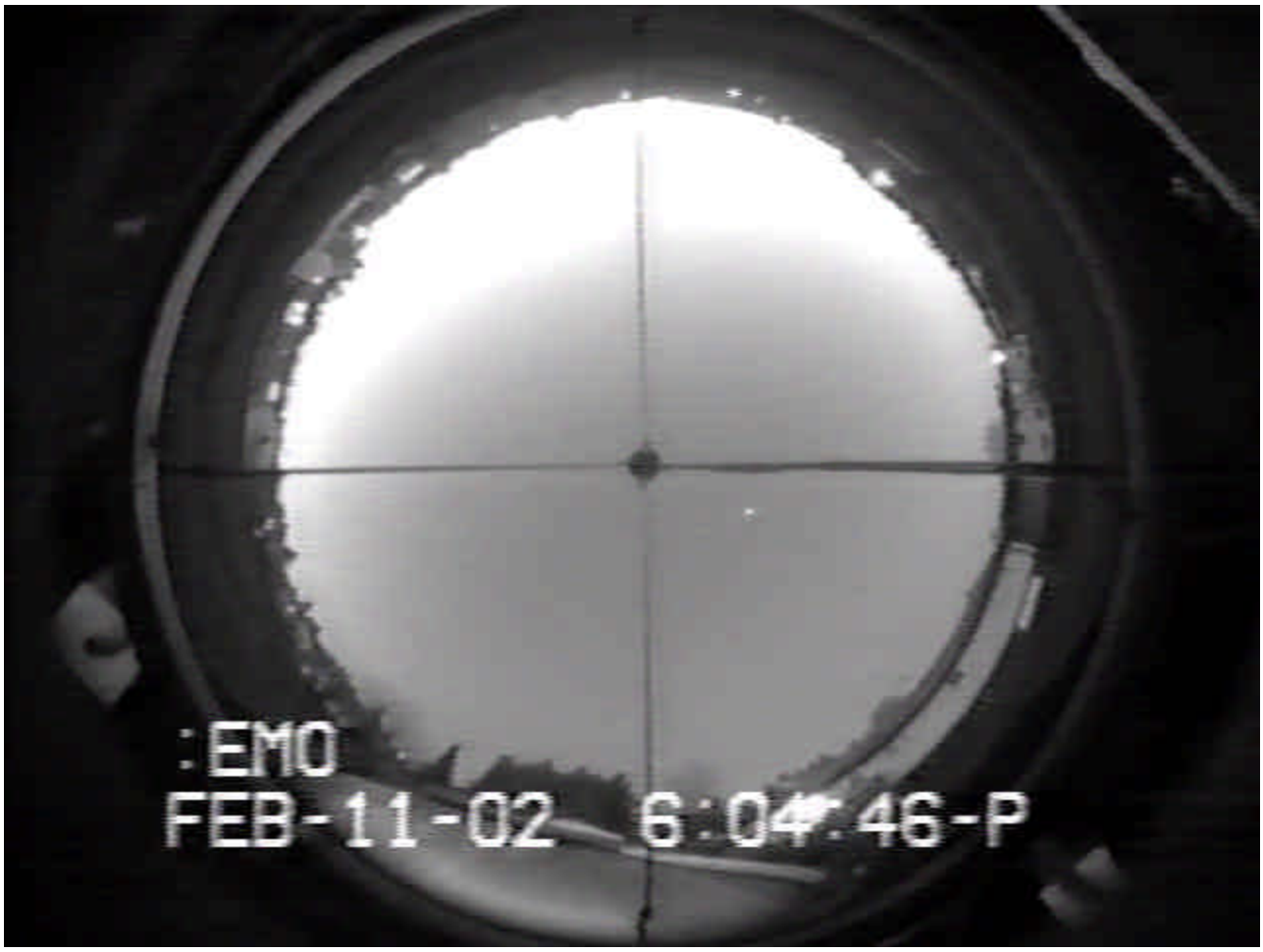

FIGURE 2. This Iridium flare photograph was taken on February 11, 2002, at 06:04:46 p.m. Pacific Standard Time (PST). Add eight hours for UTC. The predicted position was obtained from the Heavens Above Web site, and is at altitude $+66^{o}$, azimuth 31^{o} eastward from the north point of the horizon. Since the all-sky camera is not sensitive enough to record background stars, Iridium flares are recorded, with their positions used to calibrate the all-sky convex camera system.

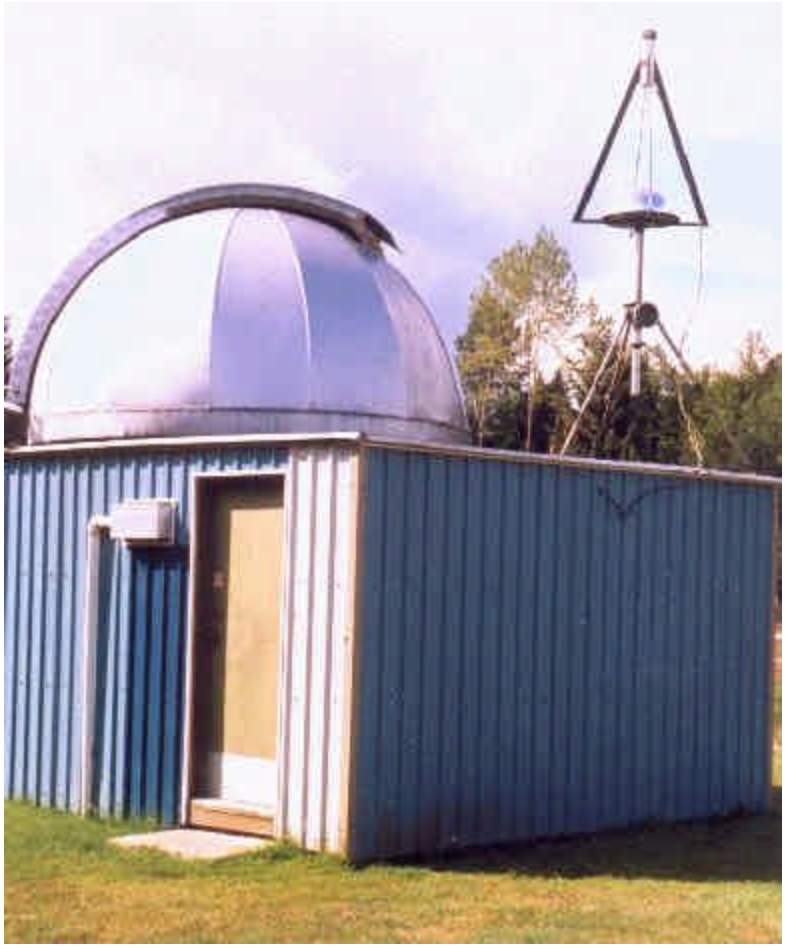

FIGURE 3. Ed Majden Observatory. The observatory is a work in progress built with the help of friends. The dome is 10 feet in diameter built by cutting arcs out of 3/4 inch plywood with a router on the end of a trammel arm. These arc sections form the skeleton of the dome which was then covered with 1/4 inch masonite sheeting. This was water-proofed with roll-on sundeck coat and then painted silver. The observatory houses a Celestron C14 Schmidt Cassegrain on a fork type mount. The Sandia convex all-sky camera is mounted on the observatory roof on a surplus TV camera tripod. The unit feeds two standard VCRs in the basement of my home via an underground coax cable. Resistive heaters are provided under the convex dome to prevent dew buildup at night.