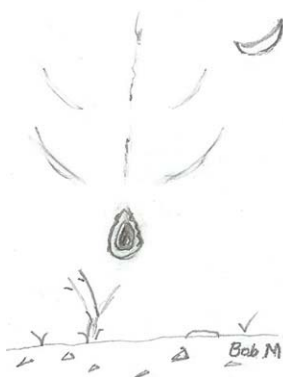


Cosmic Fireworks - Pacific Fireball of 2005

By Bob McGown

It was a better than average night for observing, as about 60 members of the Rose City Astronomers gathered on a hill six miles east of the Kah-Nee-Ta resort in the Oregon desert. Every year we get permission from tribal authorities to hold a special Messier Marathon amateur astronomy event in the early spring.

A small group of us were observing, about 7:44 p.m., photographing the AV- 2 lunar ring around Moon and checking out possible super novae candidates, when I noticed a point of light about 10 degrees above the Moon and to the left. Before we saw the fireball, we had been observing Mercury, which had just set. We were standing around Bob Hern's scope discussing supernovae while the crescent moon, the fireball appeared to descend slowly from 40 degrees above the horizon. It got brighter and brighter until I could see a bright green nucleus, shimmering florescent green with plasma like yellow cloud. The outer yellow envelope may have made the fireball look green instead of blue. Dareth Murray gave a shout to alert everyone and continued to watch as it plunged down past the Moon. It became bigger and brighter, glowing and pulsating. It had almost no "tail" behind it and I watched it as it disappeared over the horizon. Because of the lack of a tail, I guessed that it had a latitudinal component to the trajectory. Immediately after it disappeared, I saw a very bright light, almost like sheet lightning. It seemed to come in about three "waves". Long after it was gone, I could still see that unearthly green object and visualized it creating a remake of the 1908 Tunguska event in the Oregon coast range nearby knocking down 100 square kilometers of trees.



Pacific fireball/bolide
sighting at Kah-Nee-Ta
2005

There was an undulating plasma-like cloud as if the meteor was broken up and was possibly a group of smaller meteors within the nucleus. There was an inner green pod-like shape like a teardrop, with a undulating squared off bottom nearly the width of the thin crescent moon, setting on its back. The fireball/bolide of March 12, 2005 descended earthward relatively slowly like it had a very flat trajectory. It was easy to compare the object against the silver of the crescent Moon since the meteor passed within about 10 degrees south of it. There was no dew in the desert sky to limit the magnitude. There was a slight aurora glow in the northern horizon at the time. The western horizon had 5.5-6th magnitude stars down to the horizon within one degree, with almost no light pollution. Overhead the limiting magnitude stars were 6.2-6.4 in Ursa Minor.

As the meteor came in there was a crescent-like cloud-like structure that followed about 6-10 degrees behind the meteorite that was about $\frac{3}{4}$ second or so behind the green meteor. Possibly the KNT transparent horizon was above the actual horizon by about 3 degrees or so and may have acted as a large occulting bar allowing us to see the shock wave structure. However, I believe other reports thought the uniform shock waves were multiple meteors. After the KNT fireball/ bolide passed below the horizon, immediately following it was a wide shock front that was about 5-6 degrees either side from the meteorite. The first shock wave although it was behind the meteor it seemed to travel faster than the meteor itself, at low altitude. The compressional shock wave large-scale structure looked like sheet lighting except not as bright. I had seen the lenticular shock front of an F-14 Tom Cat. Perhaps the shock fronts were a sound barrier breaking wave. Immediately behind the meteor there was a second shock wave that passed about 3 degrees

behind the first shock wave about 5-6 degrees on each side of the meteor. I made a sequence drawing of the event. As each compression wave went by there was an amazing interference wave that caused an intermediate atmospheric-like shock wave that was independently confirmed by Chuck Dethloff and me. Not counting the interference we observed 6 shock waves, two in pairs $\frac{3}{4}$ second apart, three on each side of the KNT bolide and two flashes with one paired anti wave. There even seemed to have a charged particle glow that lasted up to 3-4 seconds after the bolide disappeared below the horizon. We listened for sounds immediately after it disappeared below the horizon, but didn't hear anything.

The bolide, a meteor that is nearly as bright as the full moon and ends in an explosion, was about at -8 magnitude overall surface magnitude as judged by seasoned observer Chuck Dethloff and I. As an integrated magnitude it would have approached a three-quarter gibbous Moon since the full Moon is about -13 magnitude. It would have appeared as a "normal" fireball if it weren't for the three shock waves that followed. The fireball/bolide seemed to descent slower than a regular meteor, more like a Roman candle gone astray, as described by RCA member Scott Turner. I saw a glowing plasma-like cloud around the undulating green core. The meteorite core was a fluorescent green. Because of its slow descent, Chuck Dethloff and I first thought it was space debris, possibly because of the complex shockwave events that followed its disappearance over the horizon.

Larry Deal, an active RCA observer, averted his eyes as to not "ruin his night vision", thinking it was fireworks. Immediately afterward, the tribal police came to check out the situation. They thought someone had let off some fireworks! We soon found out from Scott Turner, an RCA member, who talked to an Oregon State Policeman that reports were coming in from all around the state.

After talking about it with some of the people at the observing site, I put a call in to my friend Dick Pugh, with the Cascade Meteorite Laboratory, to report the event and the complex shock wave that happened after the meteor disappeared. Bob Hern, a friend from MIT, discussed with me the complex shock wave structure that was created. Steve Jaynes, an RCA member, and I independently measured the descent at 285 deg off of true north. The descent seemed to drift one degree to the south if at all.

Tom Billings on the Lunar Base Research Team called and told me that there was a news media trailer on TV that said a bolide fell off the Oregon coast. I called the Coast Guard and triangulated the space fall with amateur astronomer David Sandage who got a rough triangulation from Astoria, Oregon. We were also looking for waves that were abnormally high on the Oregon coast. The meteor went over a boat 109 miles off shore. There were many reports of emergency flares going off. With a possibly angular descent trajectory, the meteor could have ablated to a low speed, although the charged particle rebound and shock wave direction was apparent off of the ocean surface. Tom Hanna, a member of Oregon L-5, suggested it could have been a Russian launched Parus #96 data relay satellite on a Kosmos 3M launcher in late January 05. The flight path was a 60 to 65degree elliptical orbit. It's possible what was viewed and reported as a meteor could in fact be remains from either the launcher, or the satellite itself. Deorbiting satellites are presently being traced by NORAD and other agencies.

I e-mailed Dr Olsen, University of Alaska Fairbanks, to see if had possibly been detected by the Infra Sound Array. I also contacted Joseph Long, a grad student at OSU Oceanic and Atmospheric Lab, about downloading NOAA data. After downloading the data I found it only has significant wave height (average of the highest one third waves in a 20-minute time series) and this typically only works with a wave spectrum that is generated from a 20-minute time series (Fourier Transform.) I am in the process of data mining for more information.

The OSP Ochoco space debris impact was a similar type of event. This happened when an object that looked like a deorbiting rocket fuselage came down over the Oregon desert in 1999.

Another impact in Oregon was the fireball of 1985, when a meteor landed in the Mt Hood National forest but was never found. The 2005 fireball, shared by those who were lucky enough to observe it, was truly a-once-in-a-lifetime experience!