Leonids 2001 - Experiences from Keams Canyon

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After I swapped places and belongings with Pavel Koten in the second Camper we headed off to find a location for the Northern station at just after 14:00 local time on 19 November. With me were Pavel Spurny and his wife Anina, and our driver Pavel Trepka.

Keams Canyon

Pavel Spurny had computed that the ideal location for us would be around 120km distant from the Southern station in a North-Westerly direction (ideally the azimuth from the Southern station would be 330°). This would put us somewhere in the Hopi and Navajo Indian Reservation. We had noticed that there were several small campsites marked on our map, which looked as if they might be suitable for us.

Pavel Trepka took us on a leisurely drive with frequent stops for photographs. Eventually we reached State Highway 264 and began the search for a site in earnest. Unfortunately, two of the campsites marked on our map didn't exist and the third in the small settlement at Keams Canyon was at the bottom of the valley with the view of the sky obscured by trees. The time was now approaching 17:00 local, and with just over one hour of daylight remaining, we held a hasty conference to decide our best course of action. We decided that our only option was to continue on the Highway in the hope of finding a place to pull-in off the road.

A short distance out of the valley of Keams Canyon we saw a dirt track leading off the road, with a small area just big enough for the Camper. Pavel Spurny thought that this would be a suitable place to observe, but since we just a few metres from the quite busy Highway this seemed less than ideal. As we turned off the road, we had seen a house at the end of the dirt track and it seemed best that we ask the people in the house if it would be OK with them to park the Camper by the road and explain to them what we were hoping to do. I had expected that we might be refused permission - after all we were a bunch of 'crazy foreigners' who would be staying up all night watching the sky.

As it turned out, the Hopi family who lived on the land were very welcoming and they suggested that there was a much better place to observe some distance away from the road and the house. This was at the end of another dirt track, which at first sight did not look to be suitable for a Camper, but thanks to Pavel Trepkas' driving skills, we managed to get there and settled into our location just as darkness was descending. Having agreed with the film crew that they could return later to film us setting-up our equipment, we settled down in teh comfort of the Camper.

First observing night

As the sky became truly dark, it was obvious that we had been very lucky in finding this location. The sky was completely unobstructed and black from zenith to horizon. This was partly due to the altitude of 1978m and partly to the complete lack of any light interference from nearby houses or from towns further away (the nearest settlement of any real size was Tuba City which was around 60km distant). The Zodiacal Light was brilliant in the two hours before dawn on both nights we observed. As an added bonus, when we checked the co-ordinates of the site with the GPS receiver, we found that we were situated virtually perfectly with respect to the Southern station.

Back to the first night. The film crew duly returned at around 23:00 local time, just as we were finishing a leisurely evening meal. Since we were due to start observations at 23:30 with the video equipment and at 00:00 with the conventional cameras, I was starting to get slightly uneasy about not having enough time to get the equipment set-up properly. The video equipment was easy to set-up however, and I began to think I was worrying unnecessarily. The film crew were recording me setting out the camera boxes, connecting the power cables and starting the rotating shutters. It was 23:50 and everything was going perfectly. The controlling command-back had been programmed earlier in the day, and it just remained for me to plug-in the connecting leads between the boxes. With the film crew still recording, I plugged the first connecting lead into the low battery and all 9 cameras fired simultaneously, even though they were all switched-off. Some choice Anglo-Saxon expletives came to mind, but remembering that I was still being filmed I mumbled 'that wasn't supposed to happen'.

I spent about an hour trying to locate the problem, but in the dark, and with interest from the rest of the group waning, eventually I had to admit defeat. I was on the verge of giving-up completely, when I suddenly remembered that Hans had told me that he had provided 3 of the 23 cameras

with command-backs, as a back up in case of the failure of one unit. I tried fitting one camera with a command back on each of the three boxes and set 'self' to 1, 2 and 3 minutes on each of the command backs. I started the command backs at 1-minute intervals and breathed a big sigh of relief when all 23 cameras fired simultaneously at the correct time. Fortunately just less than 1 hour of exposure was lost on the first night.
Because our cell phones didn't work (both stations were outside network coverage), we couldn't let the other station know the problems we had experienced and we were blissfully unaware of the drama that was unfolding to the South.
Leonid rates were quite respectable on the first night and the highlight was a mag -6 fireball low in the South just before dawn. We packed away the equipment and we were in bed by

Touring again

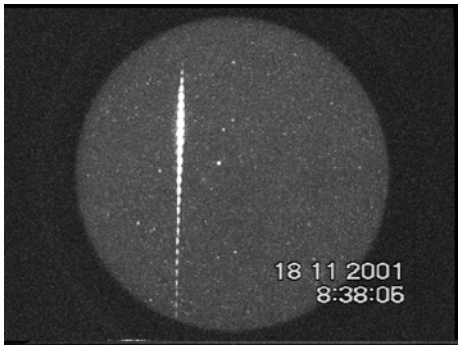
07:30. I was expecting to sleep until at least midday, but the Czechs have boundless energy and we were up again after just 3 hours and off for some more sightseeing. When we returned in the afternoon and my colleagues caught-up on lost sleep, I changed the film in the cameras ready for the coming night, and eventually got into bed just as it was starting to get dark!

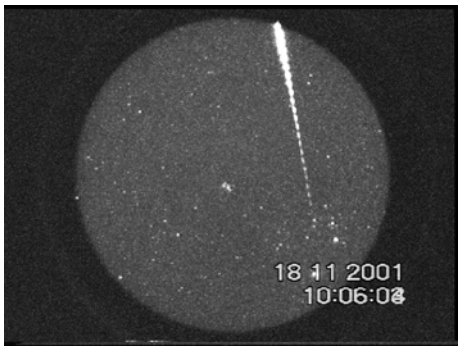
The second night

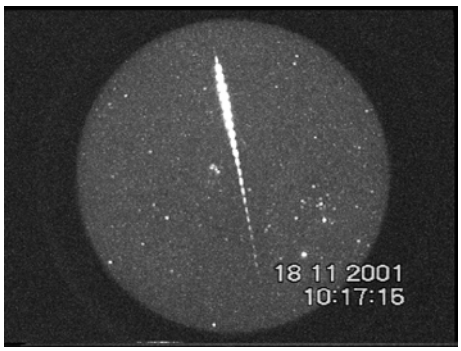
We did have a minor problem in setting up the cameras on the second night. One of the cameras on the low battery did not start exposure, but since the other 22 were exposing without problems I decided not to touch anything and accept that one film would be lost. When we started observations, the sky had held some patchy cirrus cloud, but this quickly disappeared, and the rest of the night remained fine.
The Leonids did not disappoint us. Many, many bright meteors and fireballs were seen throughout the night. Most of the brighter Leonids left long enduring trails and some fine photographs were secured. None of our team made systematic visual observations, but my impression was that at highest activity (between 03:00 - 04:00 local time) the visual rate was between 50-60% of that I had observed in 1999 from the Algarve, but there were many more bright Leonids. Because of this, the sky seemed to be constantly filled with meteors, which probably lead to over-estimates of the actual rate.
The highlight of this night again occurred just before dawn in the shape of a slow, fragmenting Taurid fireball of mag -5 or -6 low in the Northwest. The low velocity of this meteor was in marked contrast to the swift Leonids we had observed. As the sky brightened, the silence of the night was broken by the sound of a pack of coyotes howling in the distance - an amazing experience! We went to bed very tired, but very happy.

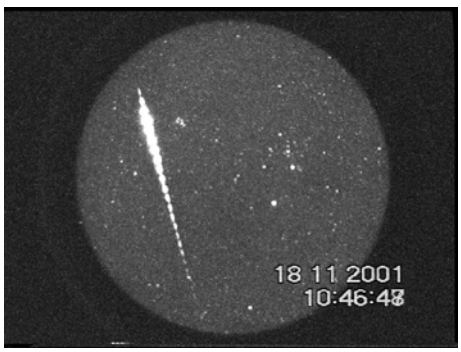
Back home

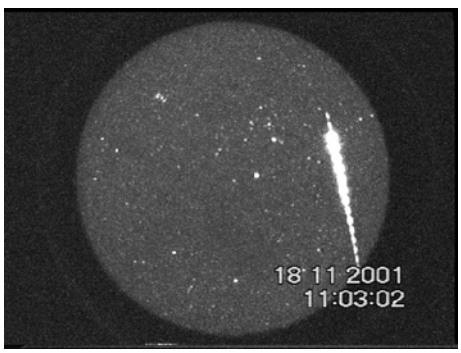
After 'breaking-camp' on the afternoon of November 19 and saying goodbye to the Hopi Indians who had been so hospitable, we headed Northwest towards the Grand Canyon. We reached the Park just before sunset and after taking some photographs of this awe-inspiring natural spectacle we spent the night in the campsite in the Park. Next morning we were at the Canyon rim just before sunrise and we were treated to more spectacular views.
From the Grand Canyon we headed South towards Meteor Crater, stopping at Sunset Crater on the way. This is yet another of the natural wonders of Arizona and is in fact an extinct volcano which last erupted in the middle of the 12th Century. The very dry climate of Arizona has meant very little weathering and erosion has occurred and the lava flows are in virtually the same condition as when they formed 800 years ago.
Meteor Crater is of course the first meteorite impact-crater to be identi-

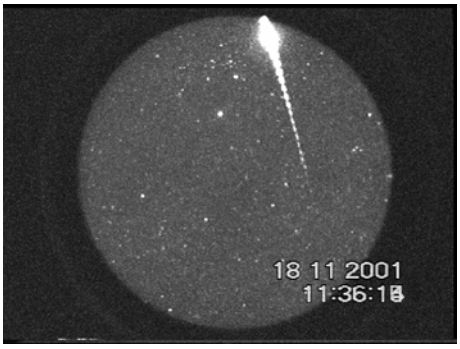




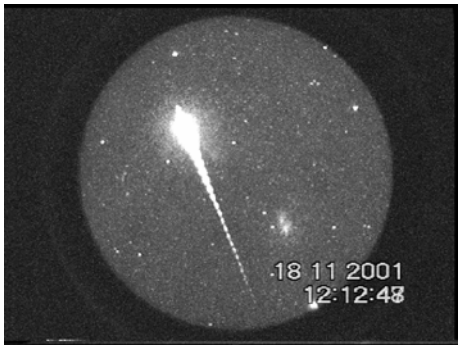








fied and is a popular tourist attraction. There is an excellent Visitor Centre that allows some superb views of the crater. We were again very lucky with our photo opportunities. We arrived just 45 minutes before the Centre closed, just as the sun was setting and the shadows gave the crater an extra dimension. We left Meteor Crater in twilight with the intention to stopovernight near the Arizona/New Mexico border, but Pavel Trepka was as ever full of energy. With just a short break, we drove nearly 500 kilometres back to Albuquerque and arrived back at the KOA campsite after midnight, meeting up with the other team the next morning.



Video meteoren met zeer hoge beeldsnelheden

Peter Jenniskens

De hieronder weergegeven plaatjes zijn van een meteoor die bij 1000 frames/s zijn vastgelegd. Dr. Hans Nielsen had een snelle beeldversterker ontworpen voor sprites. Ik had hem uitgenodigd deel te nemen in Leonid MAC met het doel om "snapshots" van Leoniden te verkrijgen. Toen het niet lukte om buitenlanders mee te laten vliegen in de actie dit jaar heeft Hans toch waargenomen vanaf zijn normale basis in Alaska. Met dit prachtig resultaat! Het geeft voor het eerst een beeld van waar het licht van meteoren vandaan komt. Het meest licht komt inderdaad van een helder gas net achter de meteoor. Een schok golf zich ontwikkeld op het moment dat de gaswolk rond de meteoroïde groter wordt dan de vrije weglengte op die hoogte. Ik vermoed nu dat die boeggolf verantwoordelijk is voor geioniseerde emissies die in heldere Leonides worden gezien.