Polish Automated Video Observations (PAVO)

Mariusz Wiśniewski[1*], *Piotr Kędzierski*[2*], *Krzysztof Mularczyk*[3*] *and Kamil Złoczewski*[4*]

We describe the current status of video observations of meteors in Poland. The setup contains four very low light CCTV cameras. The video system has so far made 185 hours of observations. Most of the data comes from Leonids nights. We decided to use the METREC program for video tape analysis. The data will be fully reduced and presented soon. We made a visual inspection of tapes of the period 03^h04^m– 04^h13^m UT from the night 2002 November 18/19. We detected a rapidly growing number of meteors near the start of the predicted maximum of the Leonid shower. At 04^h13^m UT clouds fully covered the sky at the Ostrowik Observatory.

33 Introduction

Polish meteor observers have been collecting nearly two thousand hours of visual observations per year in recent years, but until now they could only dream of video observations. The cost of an image intensified video system was similar to one year's income for a typical amateur astronomer in Poland. The only way to start video observations of meteors was to find an institution which would cover the equipment costs.

The largest institution which supports science research in Poland is KBN - the State Committee For Scientific Research. In January 2001 we submitted an application for a grant dedicated to observations of meteors with a video camera. We planned to buy a camera with an image intensifier and a computer with a Matrox Meteor II frame grabber for the automatic detection of meteors by the METREC software designed by Sirko Molau (Molau, 1999).

Our application was turned down. Even for KBN, the cost of only one camera was too high. Fortunately, technical progress in the construction of video cameras lead to an increase in their sensitivity to a level useful for meteor observations. The first camera of such a kind was the WATEC 902H.

We decided to submit another grant application, but this time instead of one camera we wanted to buy three WATEC cameras. In 2002 January our application was accepted and finally we could start to gather the equipment.

In the meantime a new generation of CCDs had been created by SONY. The new SONY ExView HAD (R) is characterized by very high sensitivity, low noise and lower price than the WATEC 902H. Each pixel on this kind of CCD has its own small lens which increases the sensitivity of the chip.

We wanted to order everything as quickly as is possible but we ran into bureaucracy everywhere. At first we waited five months for the approval of the committee to start working. Then we waited a month for the money. In the middle of July we could order the equipment, but summer is the worst time to do so. Most video equipment dealers were on their vacation or had no low light cameras in stock. In September, the Polish Comets and Meteors Workshop organized the International Meteor Conference in Frombork, so we had no time for video. Finally we received the cameras in October 2002. We also ordered the Matrox Meteor II but we had to wait two months for delivery.

34 Polish Automated Video Observations of meteors (PAVO) setup

We bought four TC-3181-62B cameras made by TAYAMA. They had 480 TV lines and SONY 1/3″ ExView HAD CCD chips. Their sensitivity is 0.001 lux with an $f/1.4$ lens. The cameras work on the 230V power supply. They have their own microphones. Typically they can run at $-10°$ C, but they worked even at $-20°$ C! Our lenses have a focal length of $f = 12$ mm and $f/1.2$. During good weather conditions in continuous frames we can detect stars of even magnitude 6 on the screen. The limiting magnitude of a single frame is around magnitude 4.

We bought four LV2798 6-head video tape recorders made by LG. Everything was connected with 40 meters of 75Ω co-axial cable for the video signal and 40 meters of audio cable (10 meters for each camera).

Observations are recorded on TDK HS 240 (High Quality Standard) video tapes designed for frequent recording. Each camera is mounted on a common board – each one on a separate mounting bracket. This makes it easier to transport and install cameras at the observation site (see Figure 1).

The project was called Polish Automated Video Observations (PAVO) and the cameras were called Polish Automatic Video Observer with a number: PAVO1, PAVO2, PAVO3 and PAVO4. Up till now we have recorded 185 hours of observations. We will use the METREC software (Molau, 1999) for the reduction of observations collected on the video tapes.

35 Leonids 2002 in PAVO data

Observations of Leonids by PAVO were conducted in Ostrowik at the Observing Station of Warsaw University Astronomical Observatory. We collected 65 hours of observations from November 16 to November 19. Vi-

[1] email mwisniew@astrouw.edu.pl
[2] email virtek@ds2.uw.edu.pl
[3] email kmularczyk@ds2.uw.edu.pl
[4] email kzloczewski@ds2.uw.edu.pl
*Warsaw University Astronomical Observatory, Al. Ujazdowskie 4, 00-478 Warsaw, Poland

sual (Olech, 2003) and photographic observations were performed in parallel.

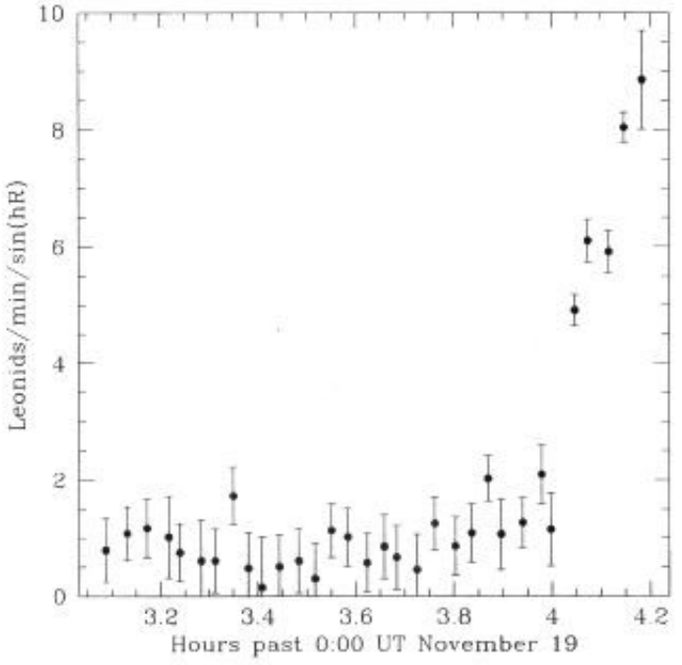

Figure 2 – Preliminary results of an analysis of the activity near the Leonid shower maximum 2003 November 19, obtained from the PAVO system. The number of recorded meteors per minute was multiplied by the sine of the Leonid radiant altitude (h_R).

Unfortunately, we were not lucky enough to see the maximum of the Leonid shower. The weather was poor until midnight. Then we started to observe, but at about 04^h00^m UT we could see a rapidly growing number of meteors and clouds in the sky. For the next 13 minutes I tried to point cameras at those fields where clouds were absent, but at 04^h13^m UT the sky was totally covered.

The recorded material from period 03^h04^m–04^h13^m UT was inspected visually. The cameras captured 239 meteors in this period. Preliminary results of Leonid shower activity from PAVO data are presented in Figure 2. The real values of activity could be even higher for the last minutes of observations because there were a lot of clouds in the cameras' fields of view.

Acknowledgments

This work was supported by the KBN grant number 2 P03D 022 22 to M. Wiśniewski.

References

Molau, S. (1999), "The meteor detection software METREC", Proc. Meteoroids 1998 ,131-134.

Olech, A. (2003), "2002 Leonids in Poland - Preliminary Results", *WGN* **31:2**, .

Figure 1 – Polish Automated Video Observations of meteors (PAVO) setup: four TAYAMA low light CCTV cameras called PAVO1, PAVO2, PAVO3 and PAVO4, four LG LV2798 VCRs, one old TV set for monitoring the video signal and a lot of TDK HS 240 video tapes. The rotating shutter for photographic observations is visible behind the cameras. Also in picture are (from left) on top: Konrad Szaruga, Piotr Kędzierski, Arkadiusz Olech; bottom: Mariusz Wiśniewski and Andrzej Skoczewski. The picture was taken after observation of the Leonid shower maximum.