Lyrids

2004 Lyrids in CMW's visual observations

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The results of the Polish Comets and Meteors Workshop (CMW) visual observations of the 2004 Lyrids are presented. Observations show that the maximum started near $\lambda_\odot = 32\,^\circ\!.05$. Combined CMW and IMO data show a clear maximum at $\lambda_\odot = 32\,^\circ\!.16$. It is possible that a minimum appeared between $\lambda_\odot = 32\,^\circ\!.0$ and $32\,^\circ\!.1$.

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1 Introduction

The Lyrids are active between 16 and 25 April. Dubietis & Arlt (2001) show that the Lyrid maximum occurs from $\lambda_\odot = 32\,^\circ\!.0$–$32\,^\circ\!.45$.

The preliminary results of the 2004 Lyrids were presented by Rainer Arlt (2004). Unfortunately, the analysed data did not cover the whole maximum and did not contain observations before $\lambda_\odot = 32\,^\circ\!.16$. Presumably, the main peak occurred near $\lambda_\odot = 32\,^\circ\!.16$ ($00^{\rm h}00^{\rm m}$ UT, April 22) with ZHR=21±3.

2 Observations

The analysis includes observations from the period 2004 April 14/15–26/27 (Table 1). The effective time was 86.66 hours. In all, 94 Lyrids and 586 other meteors were found.

3 Analysis of activity

The analysis of activity was made using the COMZHR program (Olech & Jurek, 2003). The ZHR profile was calculated by the standard procedure (e.g. Dubietis & Arlt, 2003):

$$\mathrm{ZHR} = \frac{NFr^{6.5-\mathrm{lm}}}{T_{\mathrm{eff}}(\sin h)^\gamma}\ , \qquad \Delta\mathrm{ZHR} = \frac{\mathrm{ZHR}}{\sqrt{1+N}}$$

where T_{eff} is the effective observing time, lm and F are the limiting magnitude and cloudiness coefficient, N – the number of meteors, r – the population index ($r = 2.1$ (Arlt, 2004)), h – the radiant height and γ – the zenith exponent, here set to 1. The results are presented in Figure 1. The right panel shows observations around the maximum. The point at $\lambda_\odot \approx 32°$ and ZHR≈ 5 on the left panel is the average of the cluster of observations from $\lambda_\odot \simeq 31\,^\circ\!.9$ to $32\,^\circ\!.1$, i.e. all except the rightmost point at $\lambda_\odot \approx 32\,^\circ\!.13$, ZHR≈14, which also appears on the left panel.

The Polish data are not sufficient to define the maximum of the peak. The reason is insufficient observations during the maximum and too wide a period applied (about one hour). However, we can see the activity profile before and after the maximum. At the beginning it is almost flat. The profile after the maximum was exponential in (Dubietis & Arlt, 2003). Our data only show a decrease. A minimum with ZHR∼ 3 is shown in the right panel.

Neither the Polish nor the IMO's observations cover all the activity period, so we decided to combine them. The result is shown in Figure 2.

The combined data show a clear profile with a maximum at $\lambda_\odot = 32\,^\circ\!.16$. The main peak reached ZHR $= 21 \pm 3$. This agrees with (Arlt, 2004). We do not have observations from the period $\lambda_\odot = 31\,^\circ\!.3$–$31\,^\circ\!.9$ and we cannot say what happened then. It is possible that another maximum appeared at that time. It is very interesting that in the Polish observations a minimum is visible at $\lambda_\odot \approx 32\,^\circ\!.05$ before the main peak, shown in the right panel of Figure 1. The first point is the average of observations performed by three persons, the second and fourth points represented one observer and the rest of points were produced by two persons. Observers applied 1 and 0.5 hour intervals and each of them included at least two meteors. These data were produced by experienced observers so we may assume minimal errors in performed observations. However we have to consider that the observations at $\lambda_\odot = 31\,^\circ\!.99$ were made when the Lyrid radiant was only 20° above the horizon. This can introduce large errors in observations and in the computed ZHR.

4 Conclusion

Thanks to CMW's and IMO's data we got a clear profile of the 2004 Lyrids. The maximum at $\lambda_\odot = 32\,^\circ\!.16$ reached ZHR=21±3. Polish observations show a minimum in Lyrid activity at $\lambda_\odot \approx 32\,^\circ\!.05$. The data also show another maximum before the main peak, but we had too few observations to say what exactly had happened then.

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Table 1 – Lyrid observations made by members of CMW. N_{plot} - number of plotted meteors, N_{notpl} - number of un-plotted meteors, N_{Lyr} - number of Lyrids

Observer	$T_{eff}[h]$	N_{plot}	N_{notpl}	N_{Lyr}
Ewa Zegler (ZEGEW)	33.43	288	2	10
Anna Lemiecha (LEMAN)	17.50	137	11	19
Dariusz Dorosz (DORDA)	15.00	78	69	55
Przemysław Żołądek (ZOLPR)	11.16	35	0	3
Kamil Złoczewski (ZLOKA)	5.57	37	1	2
Tomasz Fajfer (FAJTO)	2.00	13	3	5
Dominika Łacheta (LACDO)	2.00	6	0	0
	86.66	594	86	94

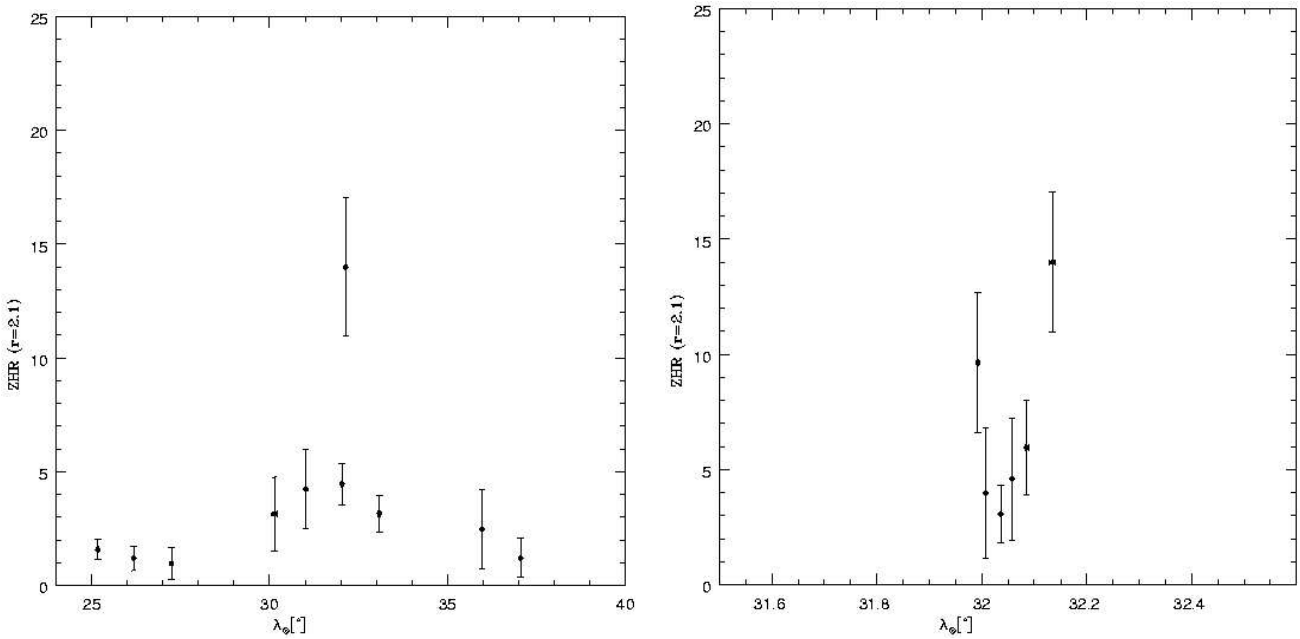

Figure 1 – Lyrids activity profile in the CMW data. Left panel – all activity. Right panel – near the maximum.

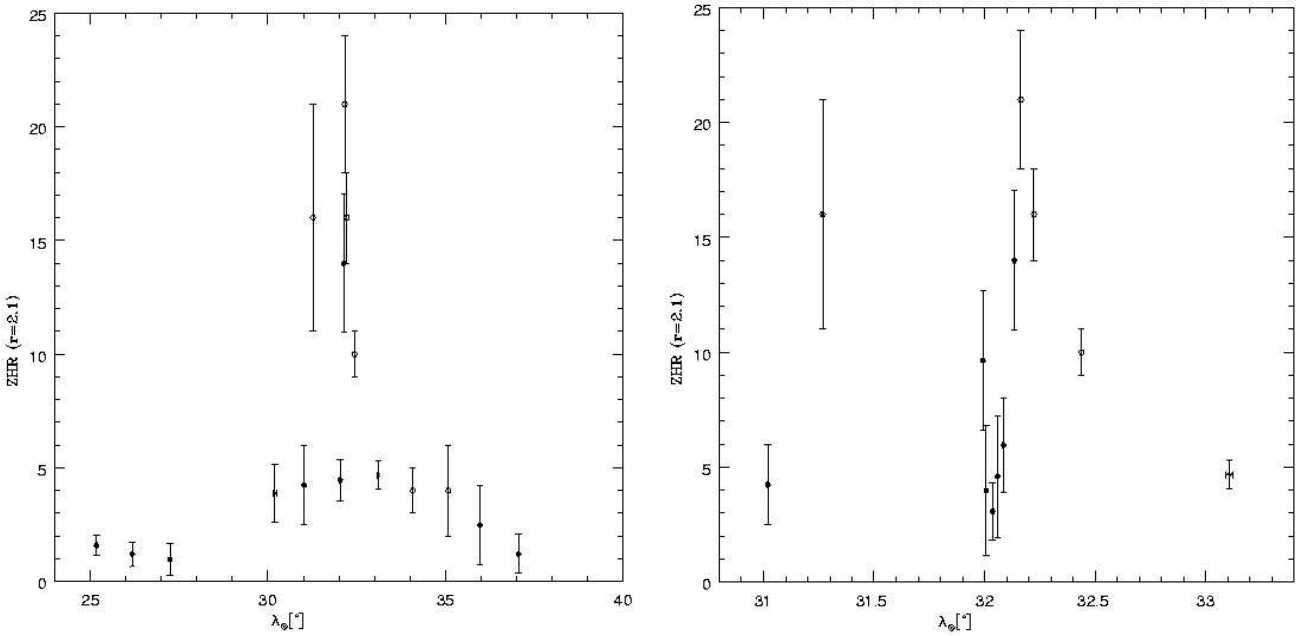

Figure 2 – Lyrids profile in CMW and IMO's data. Left panel – all activity. Right panel – near the maximum. Open circles – CMW's observations, black circles – IMO data, crosses – average of CMW and IMO's data.

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