

# Perseids 2020 revisited

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Additional visual observational data from the Canadian meteor observer, Pierre Martin, brought more evidence for a secondary peak at solar longitude  $141^\circ$  in the ZHR profile of the Perseid meteor shower.

## 1 Introduction

A few weeks after the publication of (Miskotte 2020a; 2020c), another set of observations had become available online on the IMO website of the experienced meteor observer Pierre Martin from Canada. An extensive description of these observations with many beautiful photos can be found on MeteorNews<sup>10</sup> (Martin, 2020).

It is clear that there was something special going on. His observations describe well the experiences of Paul Jones, who observed from Florida (USA) at the same time. Unfortunately, Paul Jones was unable to produce an observational report for analysis due to widely varying weather circumstances (Miskotte 2020a; 2020c).

## 2 Pierre Martin's observations: population index $r$ and ZHR

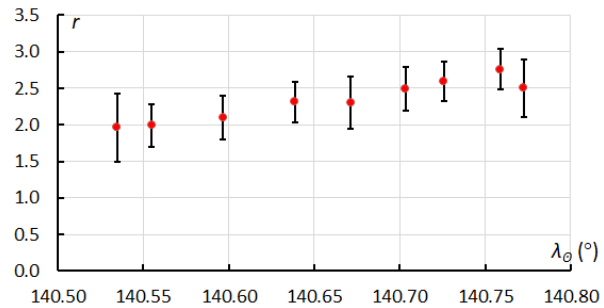
Pierre Martin's observations can be found on the IMO site<sup>11</sup>.

Pierre wrote about his observations: “*What a great night with a lot of action! As soon as my cameras were up and running, I started visual observing soon after 10:00pm (EDT) and I continued until 5:00am the next morning, for a total of 6 hours of observing (excluding breaks). In that time, I counted 296 meteors (252 Perseids, 7 South delta Aquariids, 4 Anthelions, 4 North delta Aquariids, 2 kappa Cygnids, 1 eta Eridanid and 26 sporadics). PER hourly rates were: 35, 30, 54, 45, 51 and 37 (the final count was a little less than an hour in brightening twilight). These rates were better than I expected especially due to the fact that the traditional peak was expected to occur nearly a day earlier. There was a mix of both bright and faint Perseids. The brightest Perseid was a -5 fireball seen at 12:51am that had a terminal flash and a 12 seconds train*”.

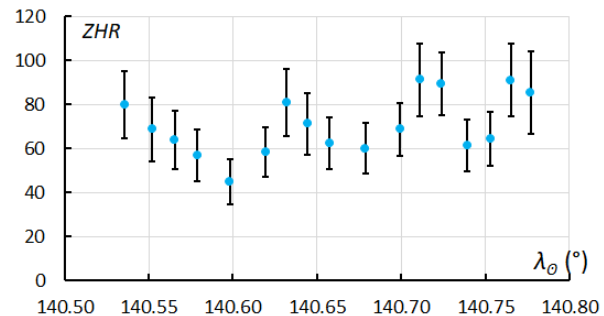
During 5.48 hours effective observing time he counted 296 meteors, 251 of which were Perseids. This under decreasing circumstances due to the rising Waning Crescent Moon from Lm 6.8 to 5.5. He mentioned a striking number of faint and bright Perseids.

The population index  $r$  was first calculated from the observational data. Overlapping periods have been calculated. The outcome is somewhat surprising. Although

Pierre speaks of many faint and bright Perseids, the population index  $r$  has an interesting trend. This runs steadily from low (= many bright meteors) to high (= many faint meteors). See *Figure 1* for the result.



*Figure 1* – Population index  $r$   $[-2;+5]$  calculated from the observational data of Pierre Martin. The timescale shown is roughly August 13, 2020 between 2<sup>h</sup>00<sup>m</sup> and 9<sup>h</sup>00<sup>m</sup> UT.



*Figure 2* – ZHR Perseids calculated from Pierre Martin's observational data. The period runs from August 13 between 02<sup>h</sup>00<sup>m</sup> and 09<sup>h</sup>00<sup>m</sup> UT.

For the ZHR, periods of 0.500 to 0.666 effective hours have been calculated, a single period is slightly longer and, as with the population index  $r$ , overlapping periods were used. Three peaks appear to be visible; the result is shown in *Figure 2*.

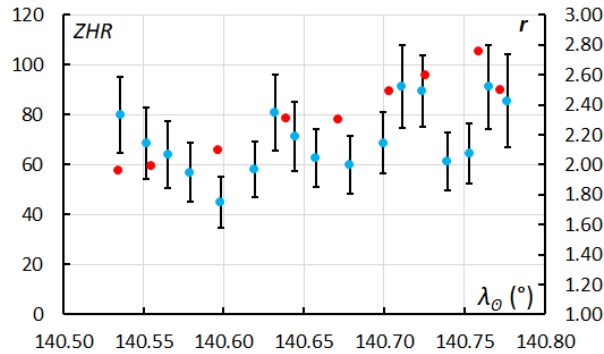
First, we see a decreasing activity, perhaps decreasing annual activity. A first peak occurs around  $\lambda_\theta = 140.63^\circ$  (ZHR 80), then a slightly stronger peak  $\lambda_\theta = 140.72^\circ$  (ZHR 90) and the third peak appears at  $\lambda_\theta = 140.77^\circ$  (also ZHR 90). During the last peak, a -8 or brighter Perseid appeared, not directly visually but a 20 second luminous trail was seen

<sup>10</sup> <https://www.meteornews.net/2020/10/23/observations-august-11-12-and-12-13-2020/>

<sup>11</sup> [https://www.imo.net/members/imo\\_vmdb/view?session\\_id=81140](https://www.imo.net/members/imo_vmdb/view?session_id=81140)

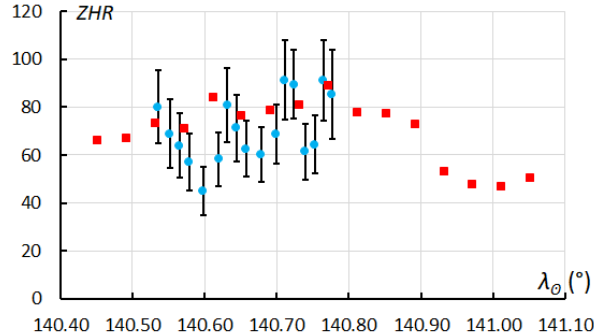
just next to the Moon! In *Figure 3* the  $r$  value and the ZHR are combined.

It is clearly noticeable here that the lowest  $r$  values coincided with the decreasing ZHR after the annual peak. This also seems to fit a bit into the picture with the 2019 outburst. In the run-up to  $\lambda_{\odot} = 141^{\circ}$ , an increase of bright Perseids was noticeable over western Europe towards dawn. Due to the increasing twilight, it is not clear whether the  $r$  value subsequently increased during the course of the 2019 peak (Miskotte, 2020b).



*Figure 3* – ZHR and population index  $r$  based on data from Pierre Martin.

Then we also looked at the radio ZHR. Pierre Martin’s ZHR curves are combined with Hirofumi Sugimoto’s radio ZHR curve. A reasonably similar picture, see *Figure 4*.



*Figure 4* – The radio ZHR curve combined with the visual ZHR curve.

Pierre Martin’s observational data is a nice visual confirmation of the peak of activity observed in the radio ZHR curve. It is unfortunate that the data from Florida observer Paul Jones could not be used in this analysis (Miskotte 2020a, 2020c). The 2020 peak fell as much as 0.17 degrees (4 hours) earlier in solar longitude than the 2018 peak (Miskotte, 20219) and even 0.25 degrees (6 hours) earlier in solar longitude than the 2019 radio ZHR peak (Miskotte, 2020b).

This is interesting: in 2019, in the run-up to the (radio) peak, many bright Perseids were observed from Western Europe. The peak was not observed visually itself, or only under very poor conditions. Also, in 2020 in the run-up to the peaks also some more bright Perseids occurred, weakening during the peaks.

The question is also whether this is the same structure we see, because of the considerable spread of the maximum. It remains to be seen whether we see a peak in activity again in 2021. So, observing is the motto!

## References

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