

# How to test whether the magnitude distribution of the meteors is exponential

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IMC 2019, Bollmannsruh, Germany

October 3 to 6, 2019



# About me

- Living in Berlin, Germany,
- I studied mathematics and physics in Dresden,
- I like programming, stochastics and meteors,
- I'm not a scientist and I'm not working at an institute,
- this is my first public talk in English.



- We usually assume an exponential meteor magnitude distribution.
- Is that really true?
- How can you check this, also on the basis of results of visual observations?



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To make it easier for you and me \*

When I talk about meteor magnitudes, I am speaking about their difference to the limiting magnitude.

\* also for mathematical reasons



# Assumptions

- The magnitude distribution of the meteors is exponential and
- all observers have similar perception probabilities.



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## Conclusions from the assumptions



# Conclusions from the assumptions: ZHR

$$ZHR = C \frac{N}{T_{eff}} r^{6.5 - lm}$$



# Conclusions from the assumptions: mean magnitude

If two observations each have the same mean meteor magnitude, then both observations have the same population index.



# Conclusions from the assumptions: mean magnitude

- This is also true for observations with different limiting magnitudes.
- It is used to estimate the population index  $r$ .
- Finally, it gives us now a possibility to define a stochastic test.



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# Examples



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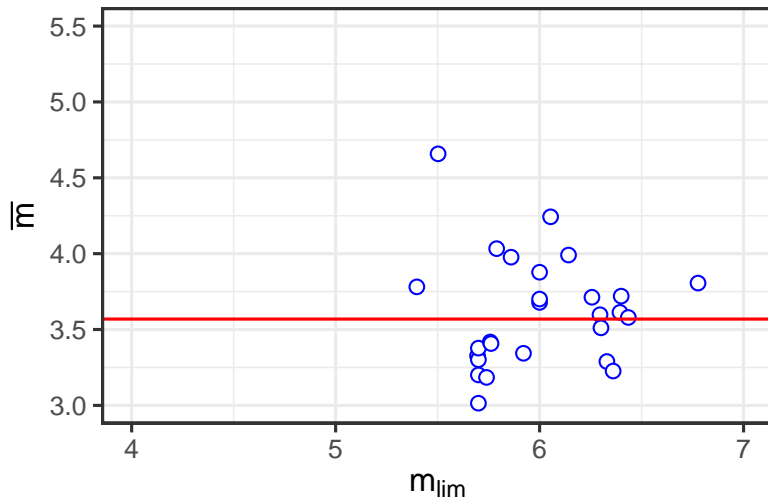
	Example 1	Example 2
Shower	LEO	PER
Year	1999	2015
Solarlong	235.5 – 235.6	138.5 – 141.5
Total of meteors	30903	28674
Total of observers	65	315



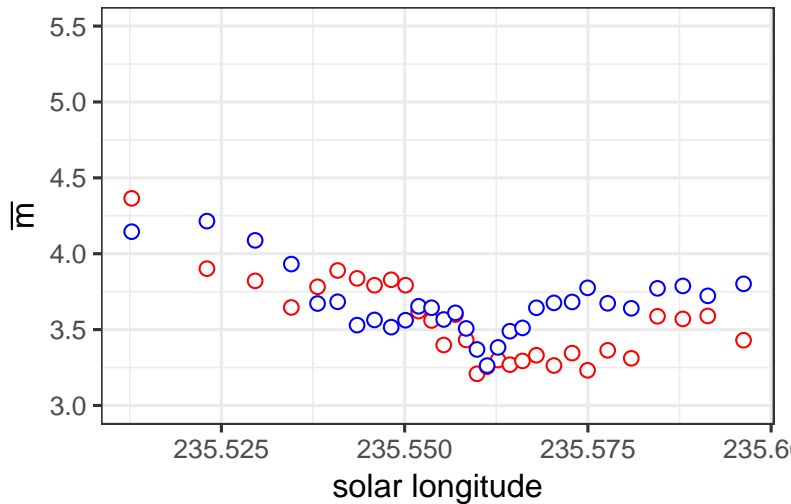
## Leonids 1999



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- The assumptions were not refuted.
- Also, it doesn't confirm our assumptions.



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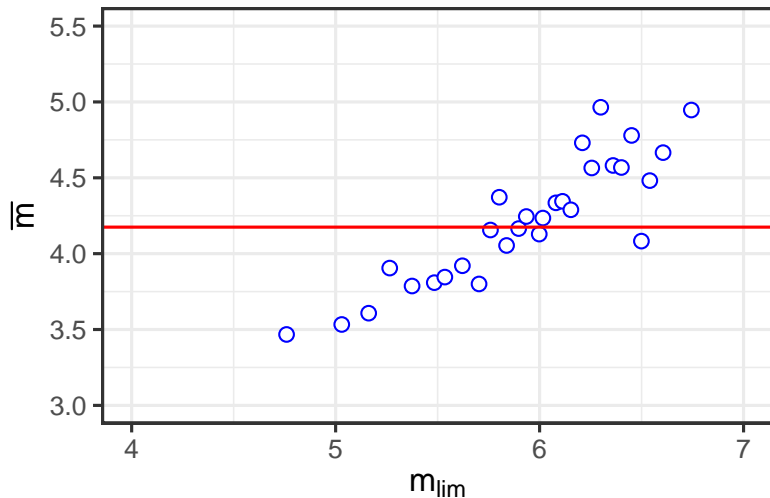




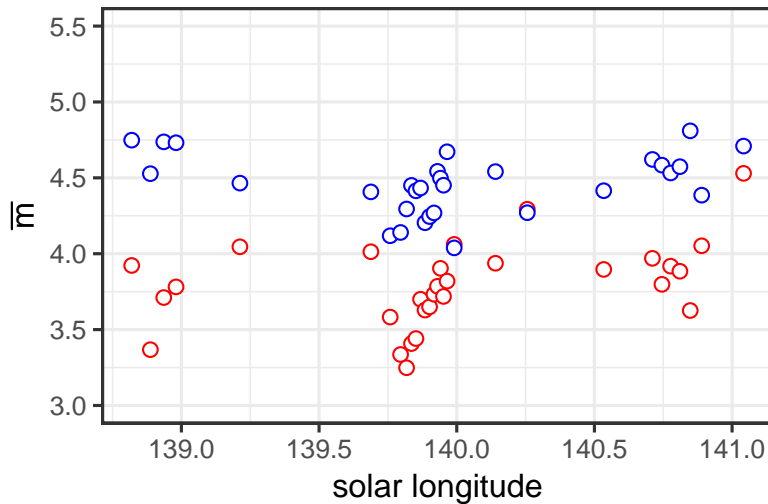
## Perseids 2015



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$$ZHR = C \frac{N}{T_{eff}} r^{6.5 - lm}$$



# Conclusions



## Important

Whenever possible, check the assumptions  
before using them!





# Conclusions

- The previously used method does not require any knowledge about the concrete values of the perception probabilities.
- It does not work for observations with more or less the same limiting magnitude.
- But there are also other methods of testing the assumptions.
- If no check is possible, then you can only rely on the assumptions.



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Any questions?



# Finally

# Thank you!

