SCAMPI - Single Camera Measurement of the Population Index

Work in progress

Prof. Dr.-Ing. Peter C. Slansky
University of Television and Film Munich
Department II Technology

www.peter-slansky.de
**SCAMPI: Development of a Project**

4CAMPI: Perseids 2016: 4-Camera Measurement of the Population Index

SCAMPI 1.0: Perseids 2016: Single Camera Measurement of the Population Index

3CAMPI: Perseids 2018: 3-Camera Measurement of the Population Index

SCAMPI 2.0: Geminids 2018: Single Camera Measurement of the Population Index

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Population Index Theory

\[ r = \frac{n_{X+1 \, mag}}{n_X \, mag} \]

- The PI is an observational factor
- The PI describes the magnitude distribution of meteor streams
- The PI is a constant
- The PI is mostly between 2.0 and 3.0
- The PI is needed to calculate the Zenital Hourly Rate

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Ideal-theoretic Population Index
Critique of the Population Index

- The „PI“ cannot be constant because this would mean an infinite number of ever fainter meteors
- The „PI“ does not describe the true brightness distribution of meteor streams correctly
- The „PI“ is mostly between 2,0 and 3,0 because of circular arguments

$r = f(mag)$?
4CAMPI: Perseids 2016

Failed

4 detecting thresholds:

Cam 1: Canon ME20S-FH
ISO 1,400,000
F = 2.0
Reference sensitivity

Cam 2: Canon ME20S-FH
ISO 175,000
F = 2.0
- 3 stops

Cam 3: Sony α7S
ISO 160,000
F = 5.6
- 6 stops

Cam 4: Sony α7S
ISO 20,000
F = 5.6
- 9 stops

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SCAMPI 1.0: Perseids 2016

Cam 1: Canon ME20S-FH
ISO 1.400.000
25 fps
f = 35 mm
F = 2.0

6:25 hours video records, analyzed with MetRec by Sirko Molau:

906 Meteors over all, among them
549 Perseids
287 Sporadics and Anthelions
These results contradict strongly to a constant Population Index (of 2,5)
Ideal-theoretic Population Index

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SCAMPI 1.0: Four Interpretations

1 a: Error from meteor photometry
1 b: Error from meteor detection

2 a: Real result: The Perseids 2016 were extraordinary
2 b: Real result: There is no constant PI
**3SCAMPI: Perseids 2018**

3 detecting thresholds:

3x Sony α7S, all set to 25 fps
T = 1/25 s
ISO 409.000

with identical lenses:
Canon FD 1.4/50mm
F = 1.4

3 sensitivity thresholds via grey filters:
Cam 1: no filter
Cam 2: ND 0.6 filter, - 2 stops
Cam 3: ND 1.2 filter, - 4 stops

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3SCAMPI: Perseids 2018

3 detecting thresholds:

3x Sony α7S, all set to 25 fps
T = 1/25 s
ISO 409.000

with identical lenses:
Canon FD 1.4/50mm
F = 1.4

3 sensitivity thresholds via grey filters:
Cam 1: no filter
Cam 2: ND 0.6 filter, -2 stops
Cam 3: ND 1.2 filter, -4 stops
3SCAMPI: Perseids 2018

3 detecting thresholds
**3SCAMPI: Perseids 2018**  
*first draft results*

These results contradict to a constant Population Index of 2.5
Conclusions

• Circular observatory effects for should be considered
• Instead of a constant Population Index the definition of a variable „Brightness Distribution Function“ $x = f (mag)$ seems to be appropriate
• Especially faint meteors should be investigated
• Meteor video observations with high sensitivity, high resolution and wide field are required
• Parallel or sequential multi-camera observations with different ND filters can avoid the detection threshold problem
Outlook: SCAMPI 2.0

ARRI Alexa Mini
Professional film camera
with high speed film lens
Zeiss Superspeed 1.3/18mm
Outlook: **SCAMPI 2.0**

ARRI Alexa Mini
Professional film camera

with high speed film lens

Zeiss Superspeed 1.3/18mm
ARRI Alexa Mini
Professional film camera with high speed film lens
Zeiss Superspeed 1.3/18mm
Fast liquid crystal element in the lens mount, synchronized with the sensor output
> Fast changing ND filter, resulting in an exposure sequence film recording
> 3 or 4 sequential detecting thresholds

Outlook: SCAMPI 2.0  Geminids 2018 ??

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Bibliography:

• Richter, Janko: About the Mass and Magnitude Distributions of Meteor Showers; WGN journal of the IMO 46:1, P. 34 – 38
• Rendtel, Jürgen; Arlt, Rainer: Handbook for Meteor Observers, IMO 2017
• Slansky, Peter C.: The Efficiency of Cameras for Video Observation; WGN journal of the IMO 46:1, P. 24 – 29
• Slansky, Peter C.: Meteor Film Recording with Digital Film Cameras with large CMOS Sensors; WGN journal of the IMO 44:6, P. 190 – 197