METEORS IN NEAR-INFRARED

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Introduction

- first visual-NIR experiments on 12/13.08.2006.

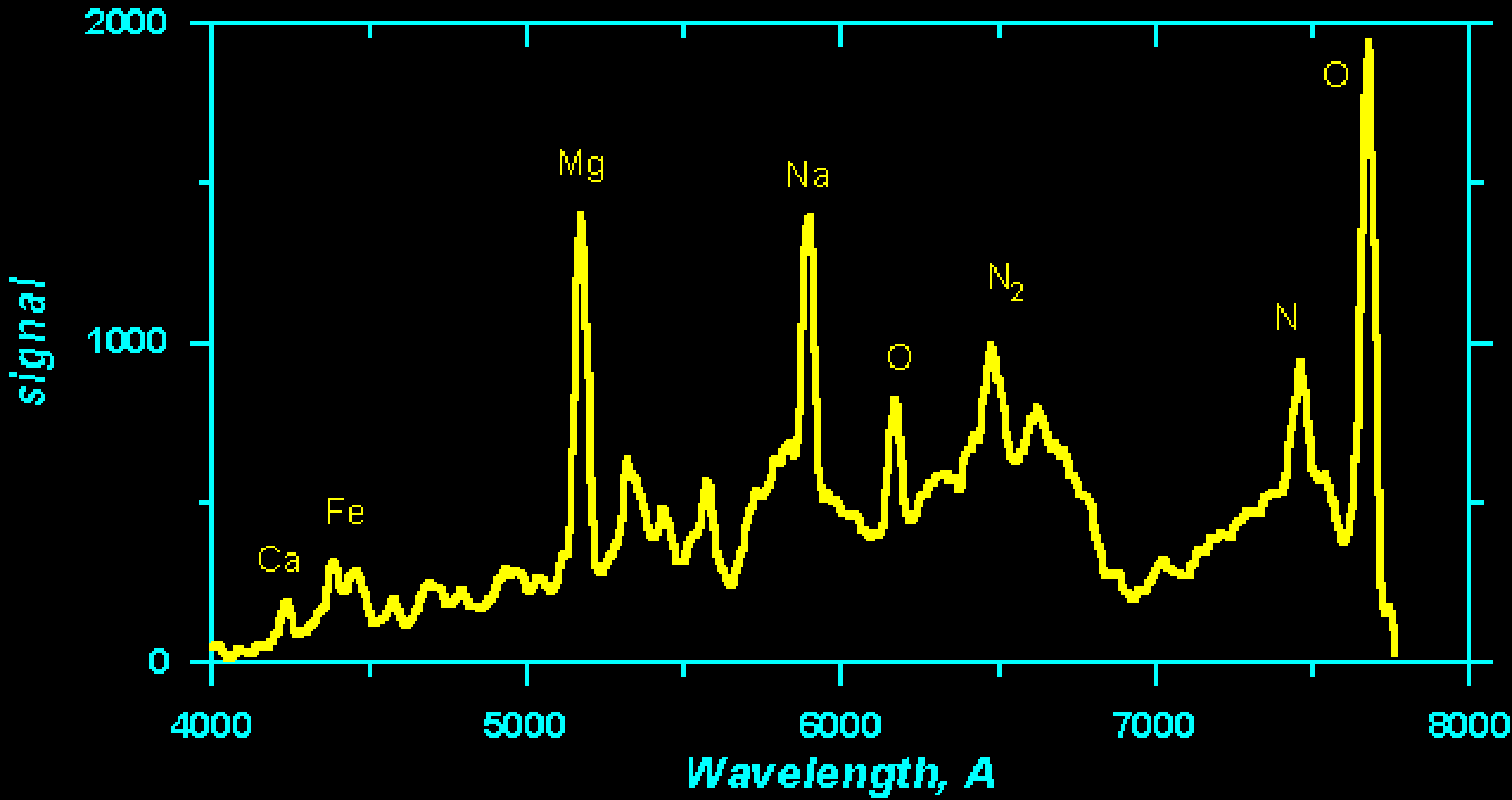
- possible to capture meteors in NIR only?

- comparative tests during 2009. Perseids maximum

- more observations during August 2012.

- are there any benefits from video NIR observations?

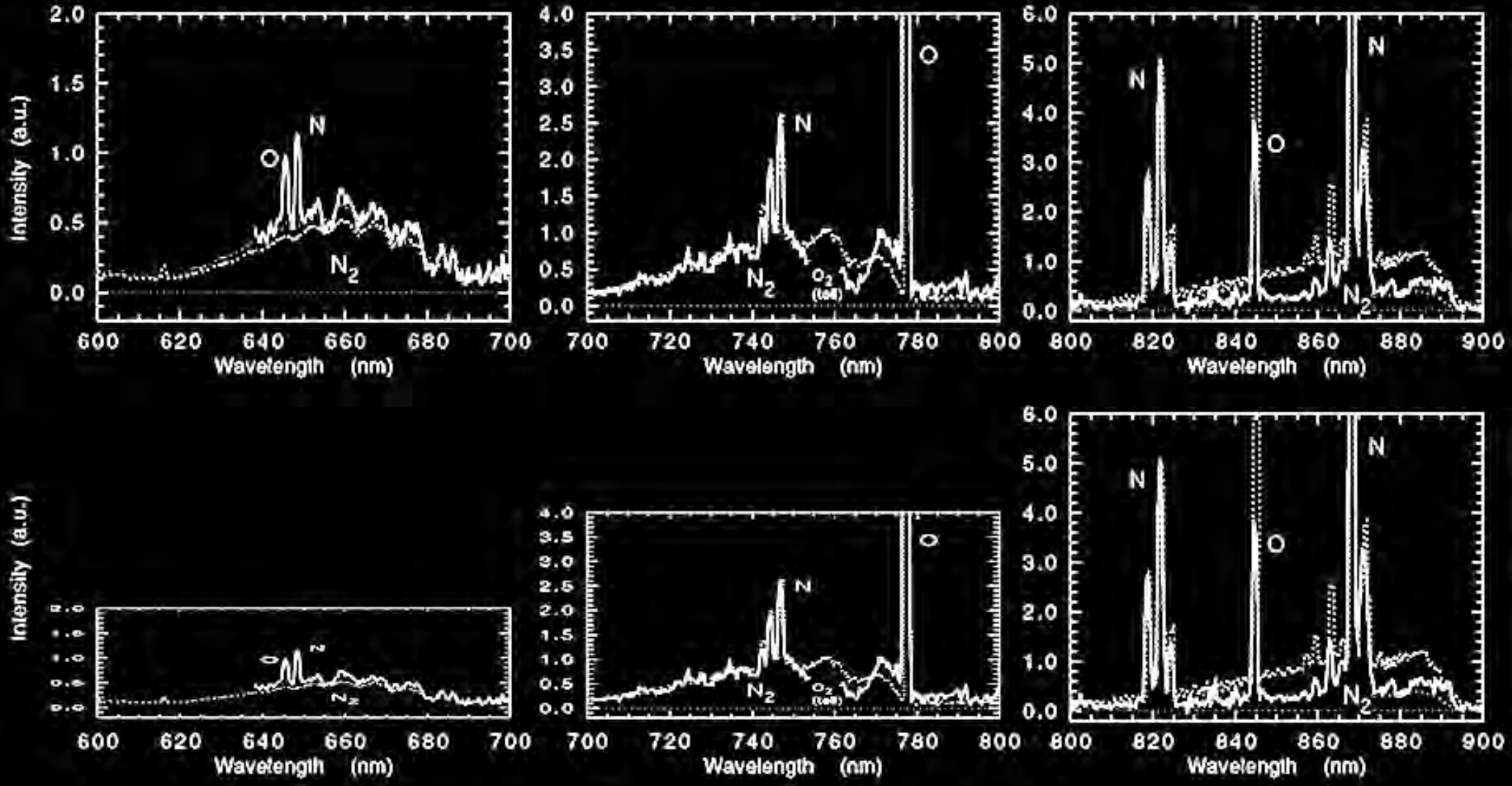
Meteor Spectra: video



- meteors radiating in NIR
- atmospheric lines (O, N)

Borovicka, 1998

Meteor Spectra: ESO, FORS1/VLT May 12-13, 2002



- very precise measurements
- high intensity in NIR

eso0424, 2004

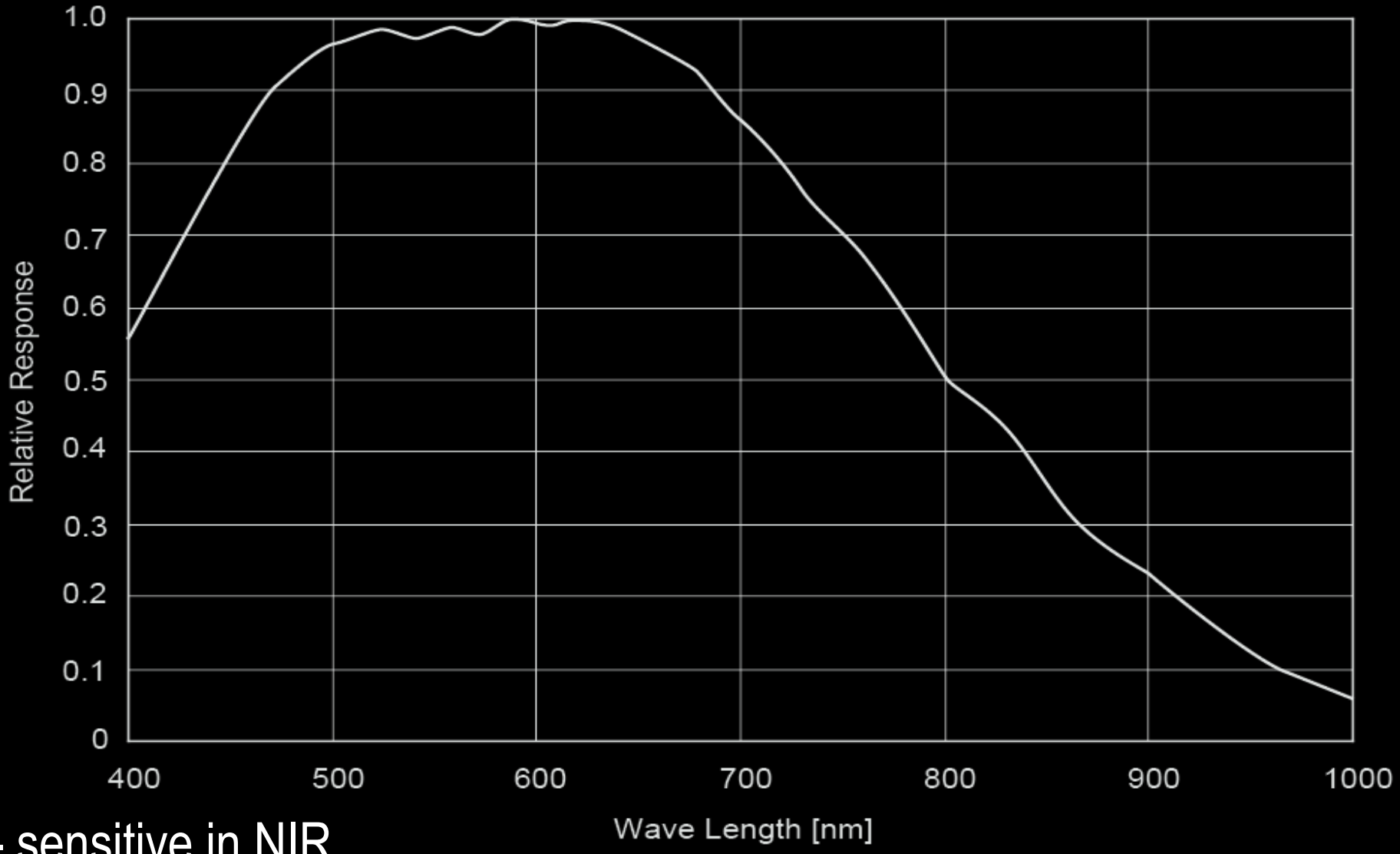
Basic Setup

w/o filter UV-IR cut IR pass optional

Quad Processor

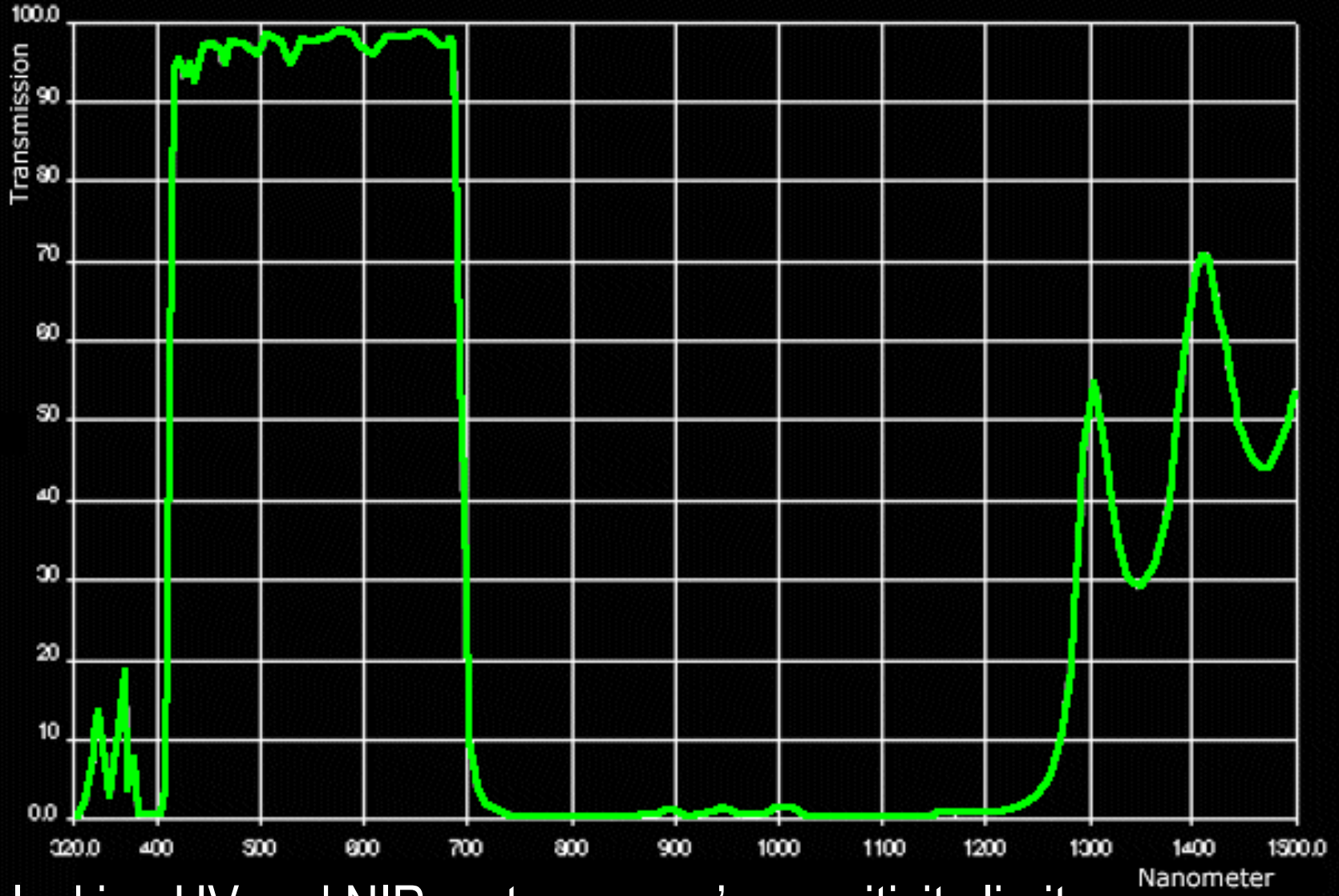
PC capture,
SkyPatrol

1004X Spectral Sensitivity



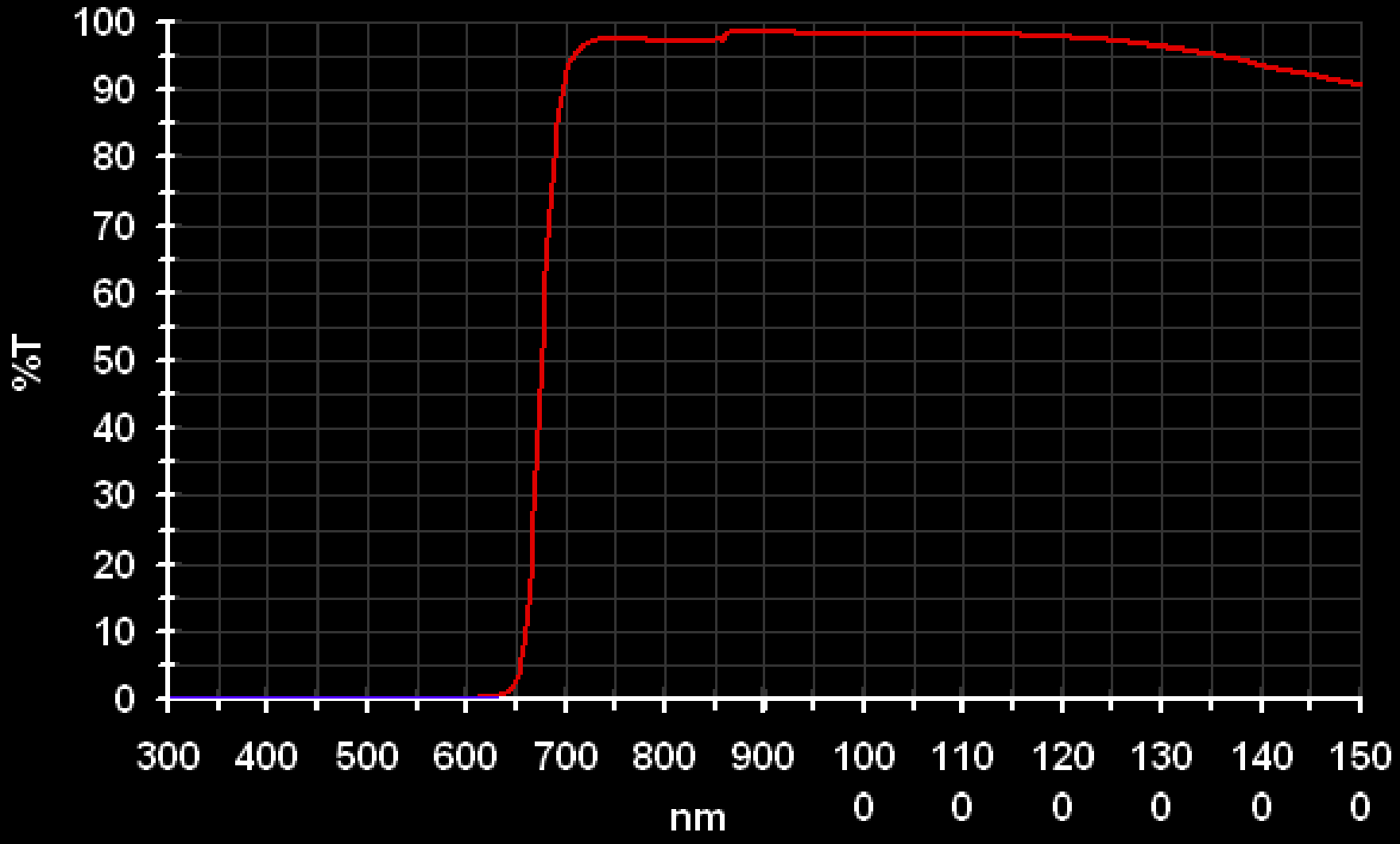
- sensitive in NIR
- about 65% at 780nm

Filter's Characteristics: UV-IR cut

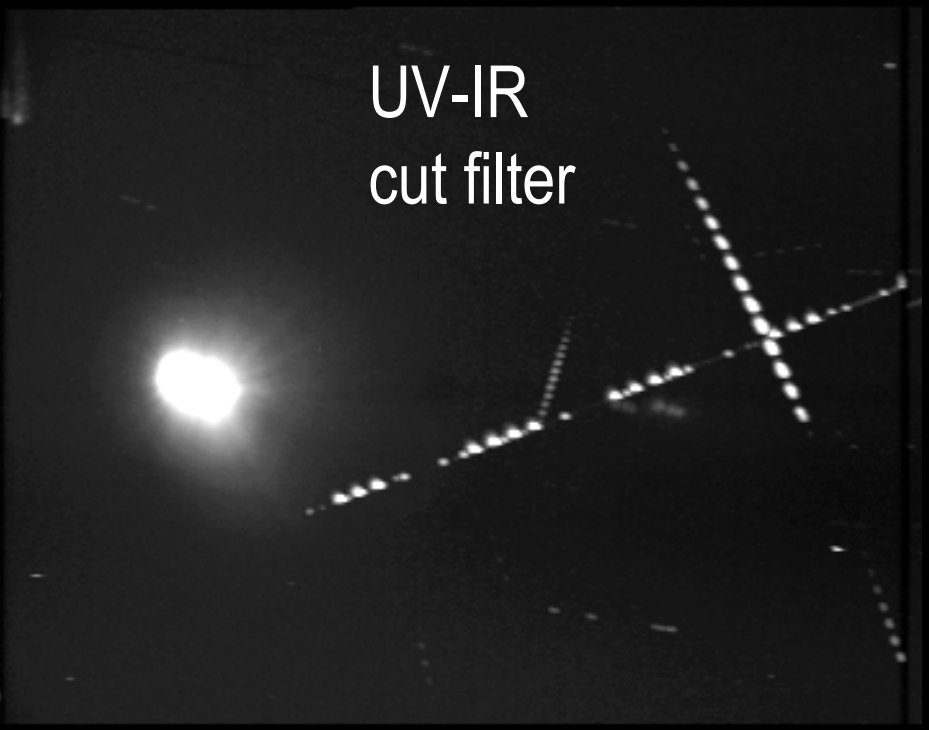


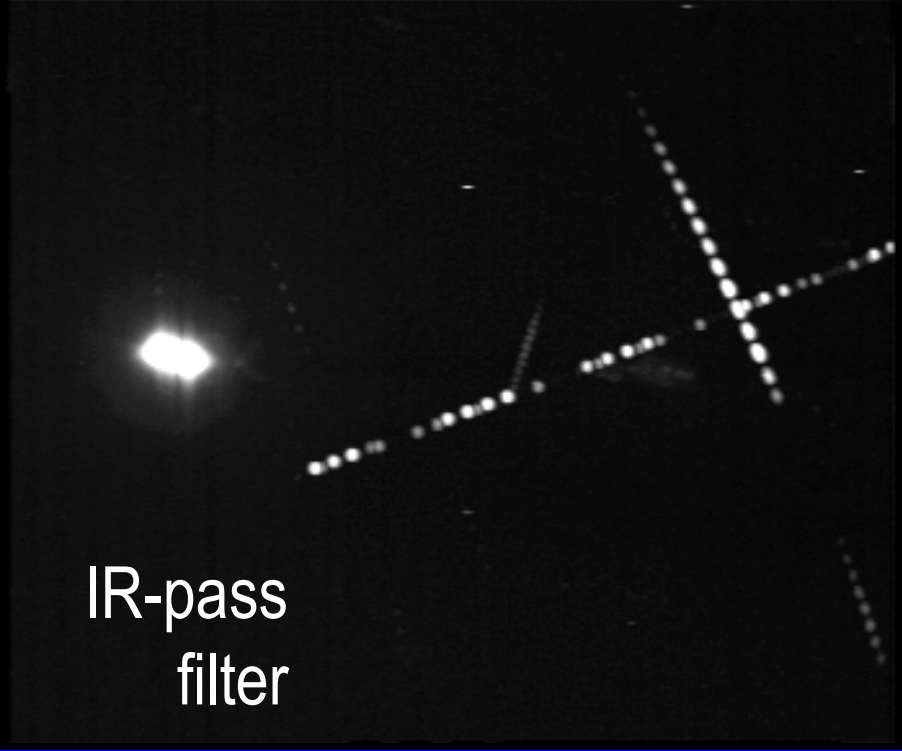
- blocking UV and NIR up to camera's sensitivity limit
- high transmission

Filter's Characteristics: IR pass



- blocking allmost complete visible part of the spectra
- high transparency





2009. Observations – Sum Image

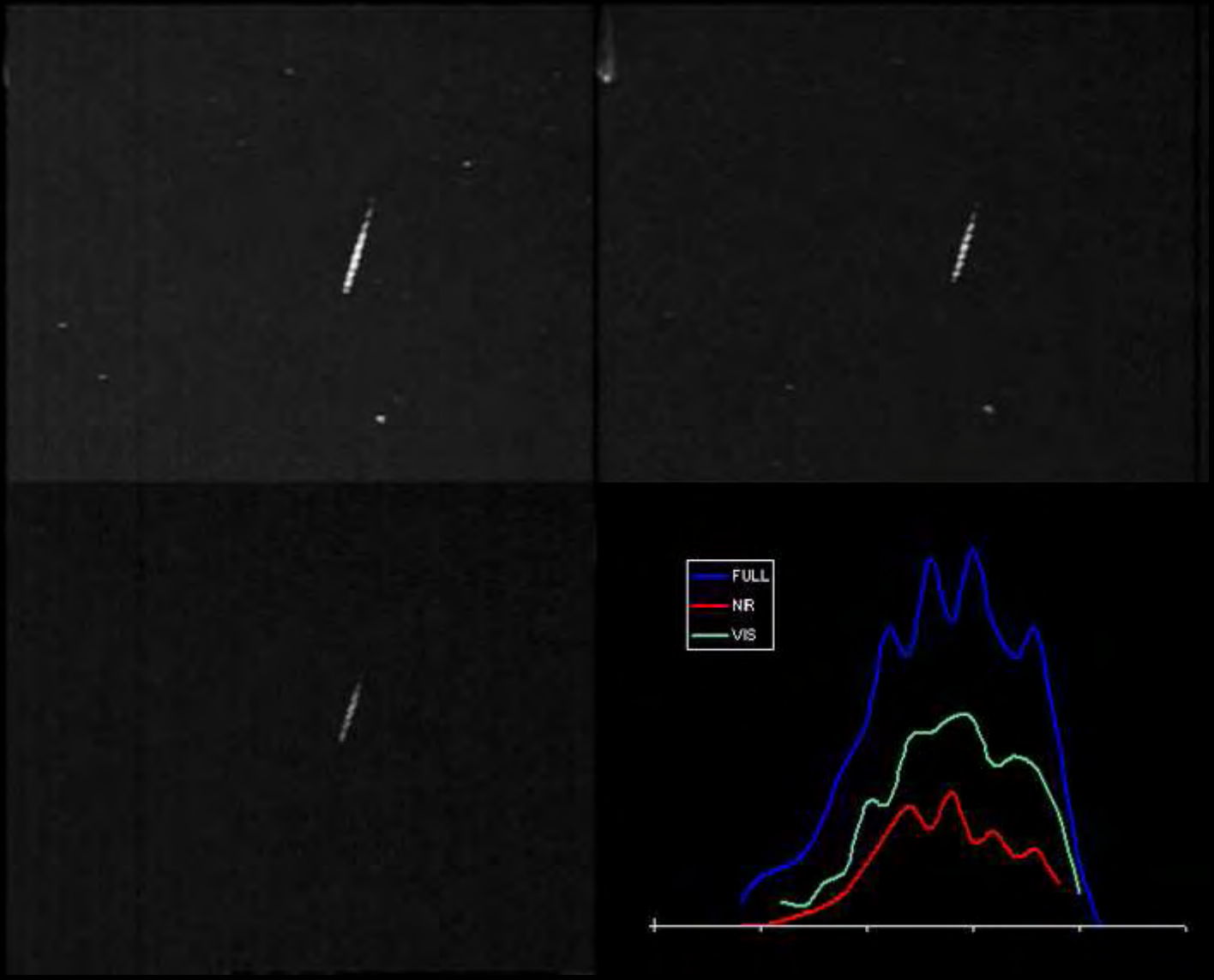
- 12 meteors captured in all channels
- capture card issues
- fair weather conditions
- MTP_Detector data processing
- data not calibrated

Detected meteors – first example, A

w/o filter

UV-IR cut filter

IR-pass filter



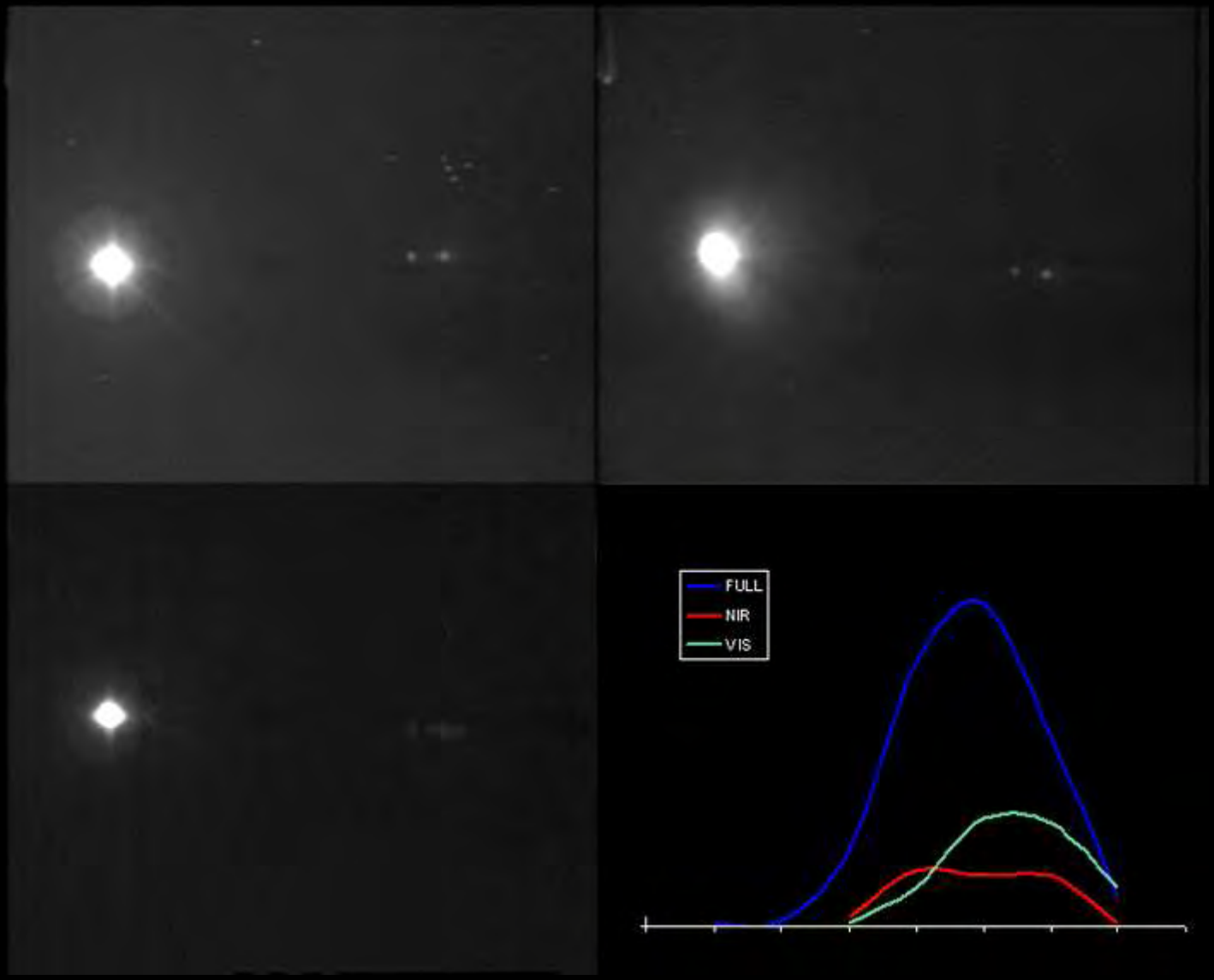
- light curves moreless consistent

Detected meteors – first example, B

w/o filter

UV-IR cut filter

IR-pass filter



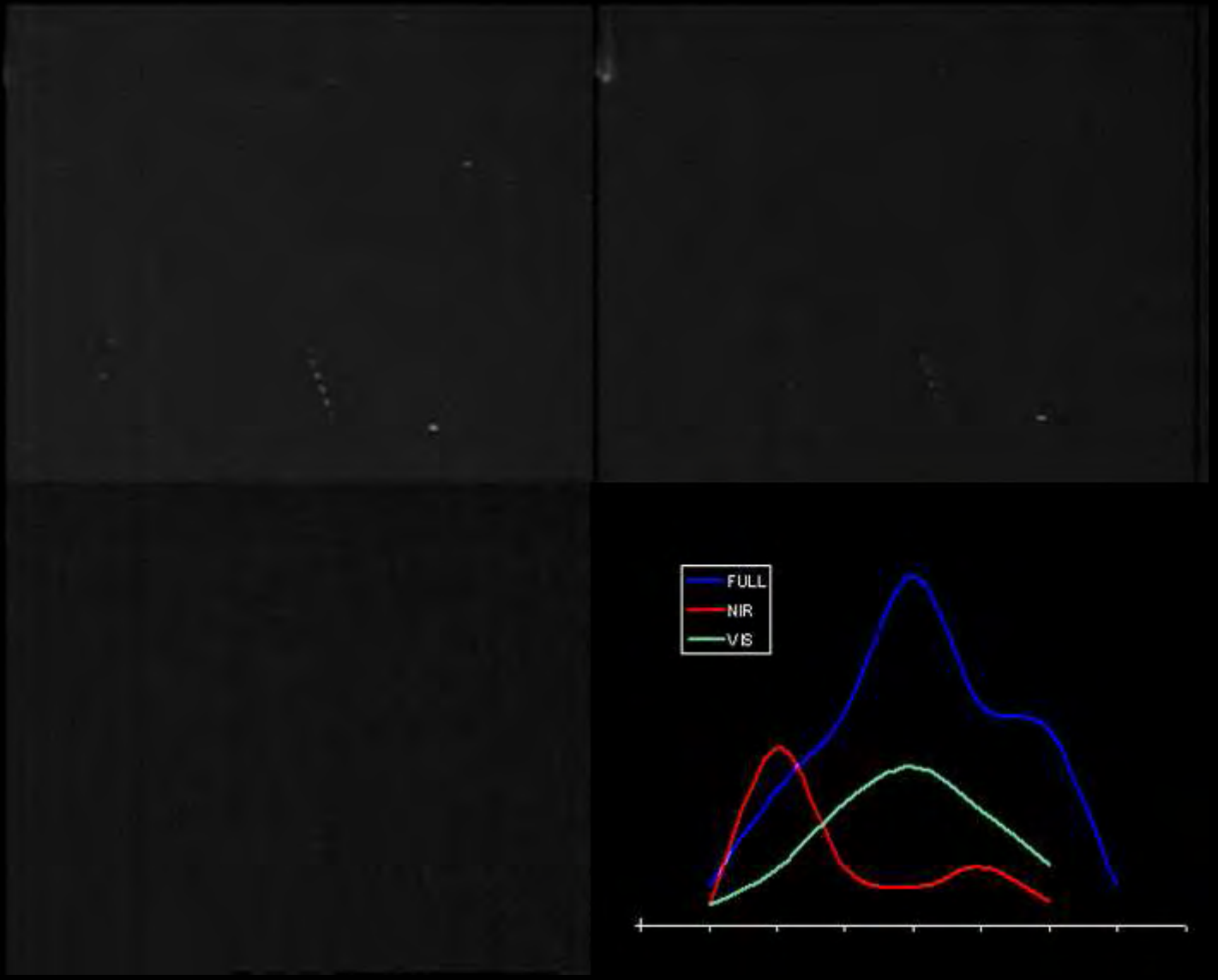
- light curves moreless consistent

Detected meteors – second example

w/o filter

UV-IR cut filter

IR-pass filter



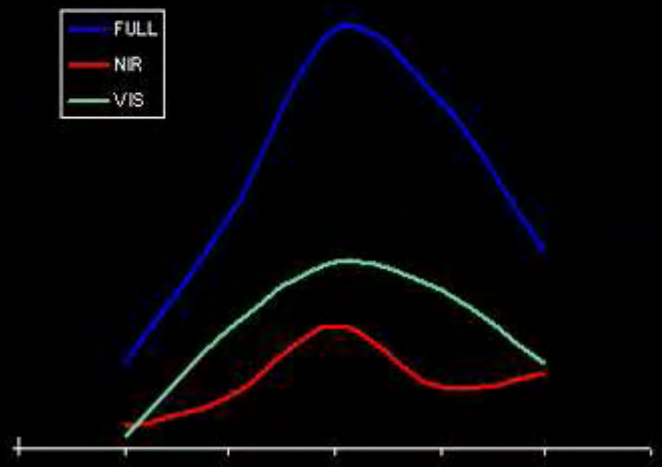
- obvious difference in light curve shape

Detected meteors – third example, A

w/o filter

UV-IR cut filter

IR-pass filter



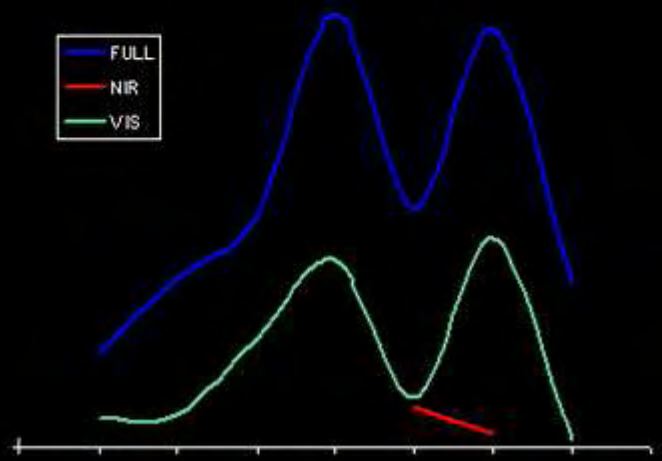
- lower meteor detected in NIR

Detected meteors – third example, B

w/o filter

UV-IR cut filter

IR-pass filter



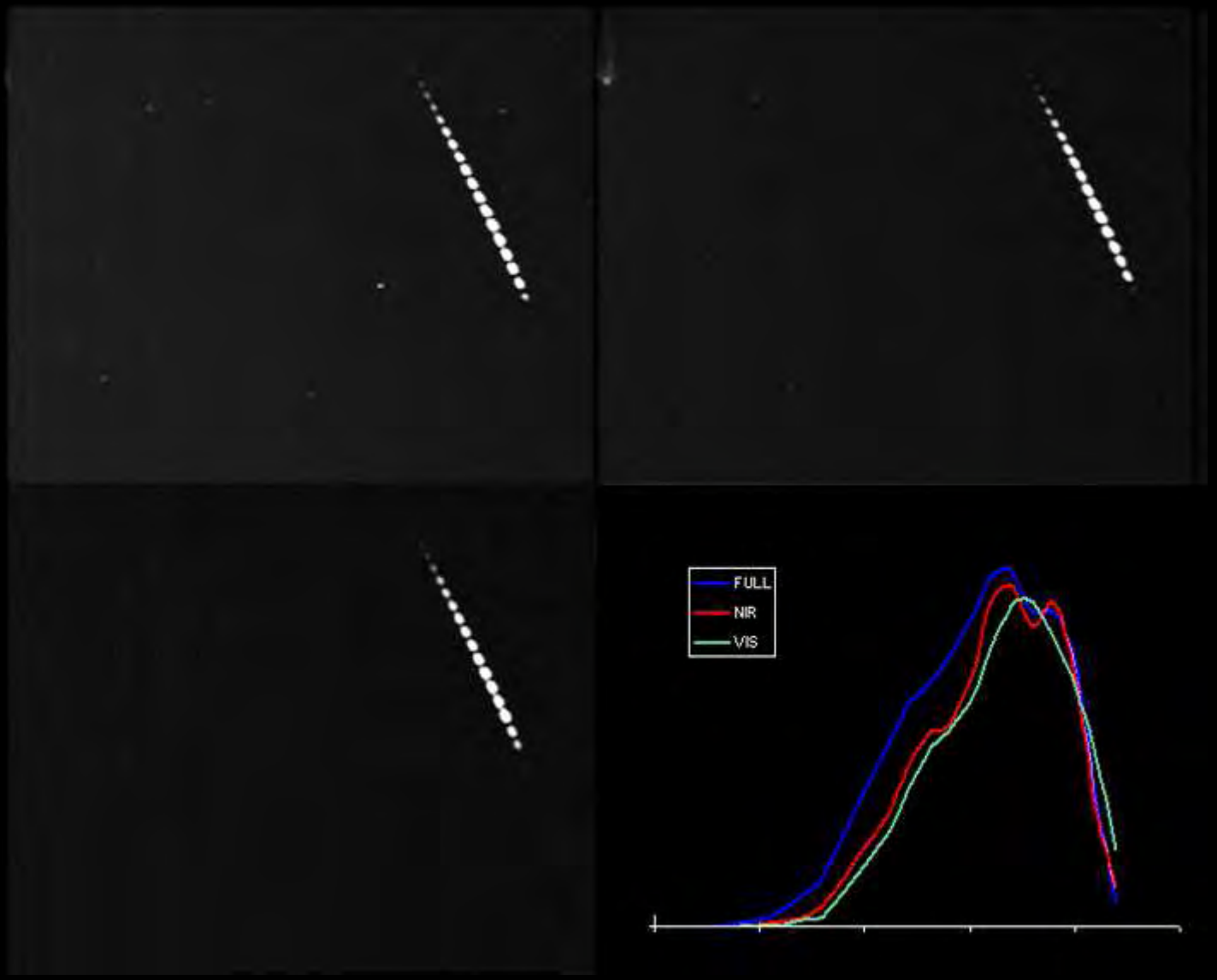
- allmost no trace of meteor at top right in NIR

Detected meteors – bright meteor

w/o filter

UV-IR cut filter

IR-pass filter



- light curves very similar in visual and NIR

Intermezzo

- significant part of meteor's radiation detected over 680nm

- comparable to visual part, inconsistent ratios

- obviously affecting magnitude estimation

- light curve shapes sometimes very different

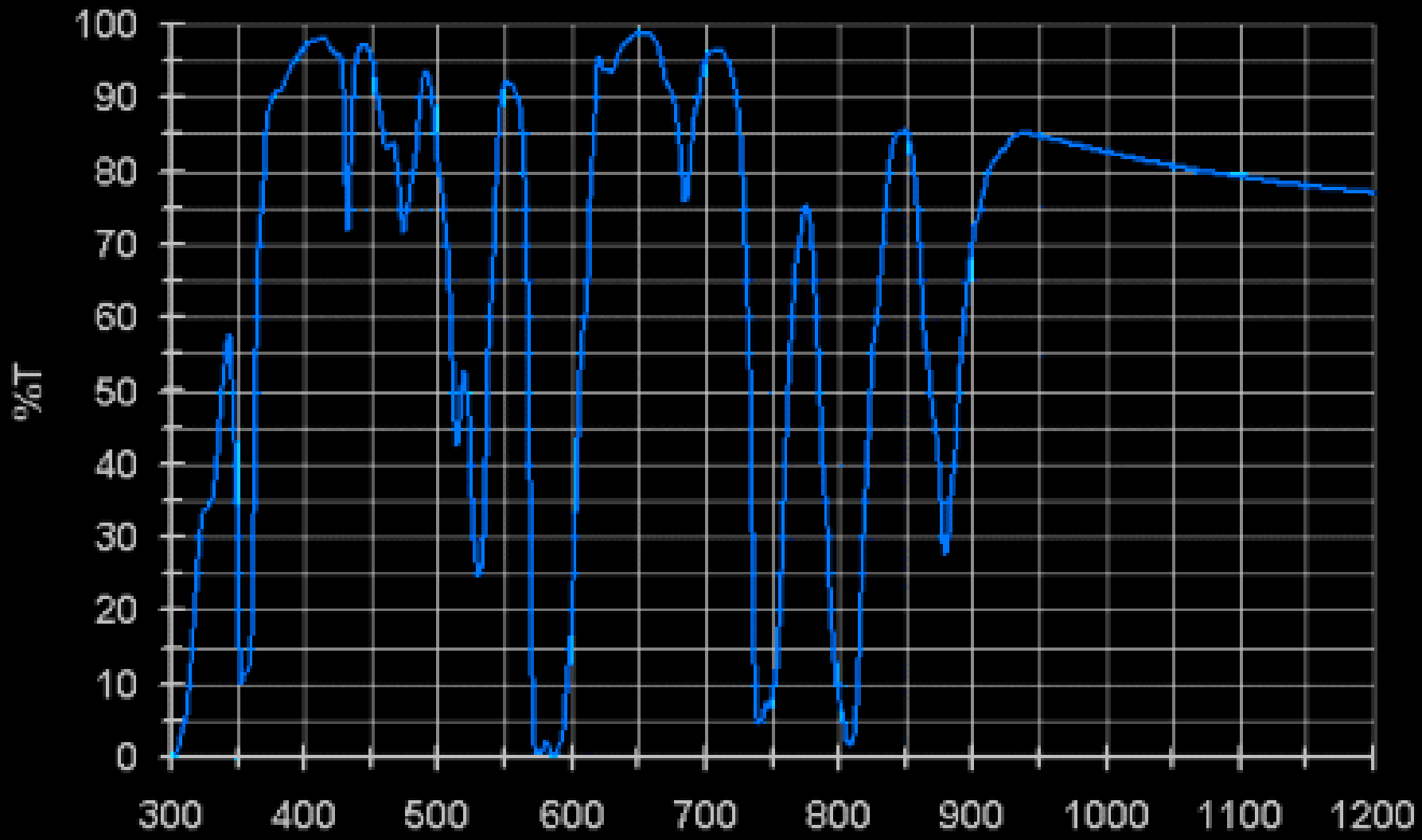
Basic Setup – 2012.

w/o filter UV-IR cut IR pass Neodymium

Quad Processor

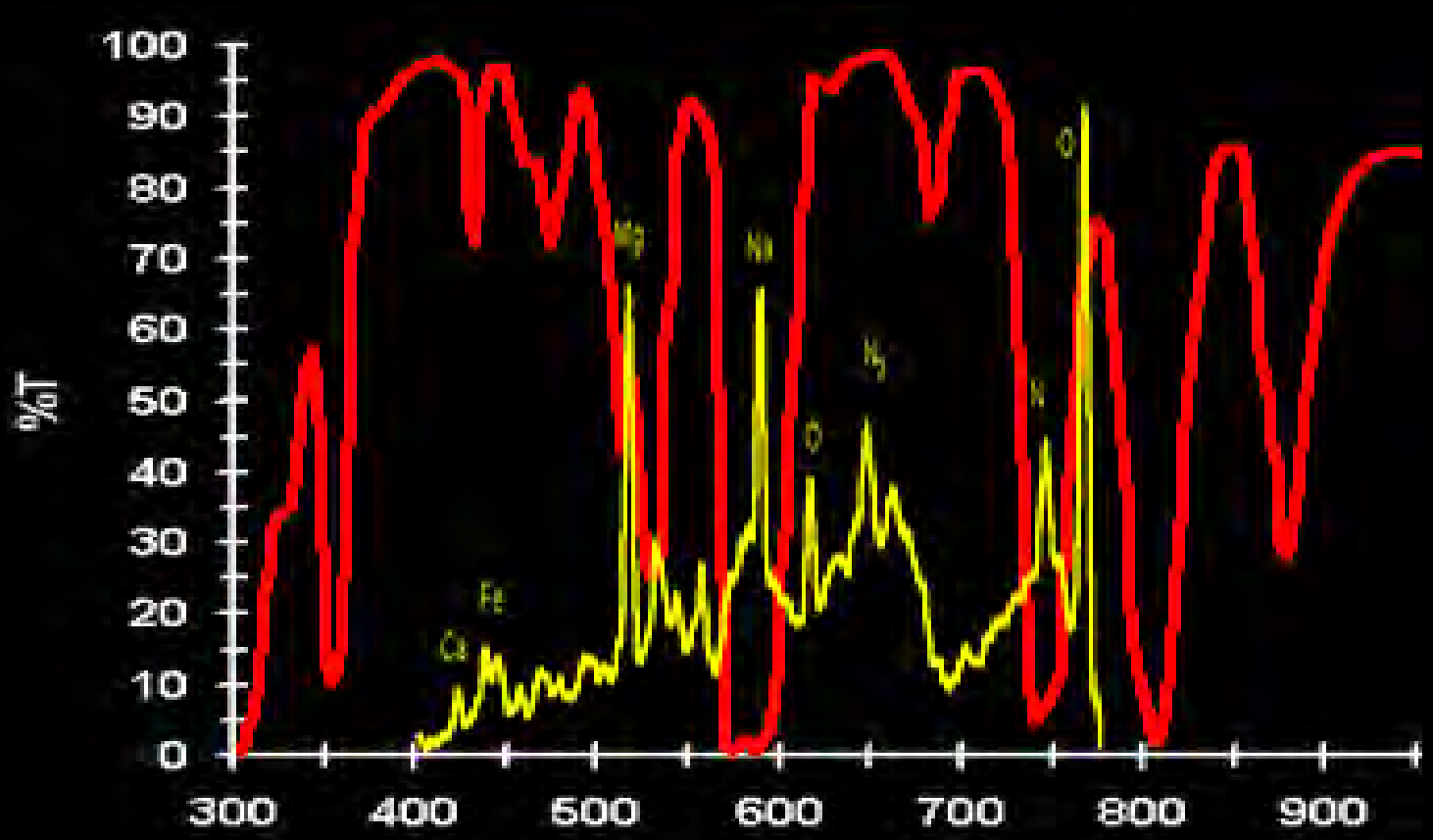
PC capture,
SkyPatrol

Neodymium filter transmission curve



- used as light pollution filter in urban astrophotography
- cutting off part of light coming from Na streetlights

Typical meteor spectra vs Neodymium transmission curve



- blocking strong Na line, about 45% transparency at Mg line
- 75% transparency at 780nm (O line), only 5% at 740nm (N line)

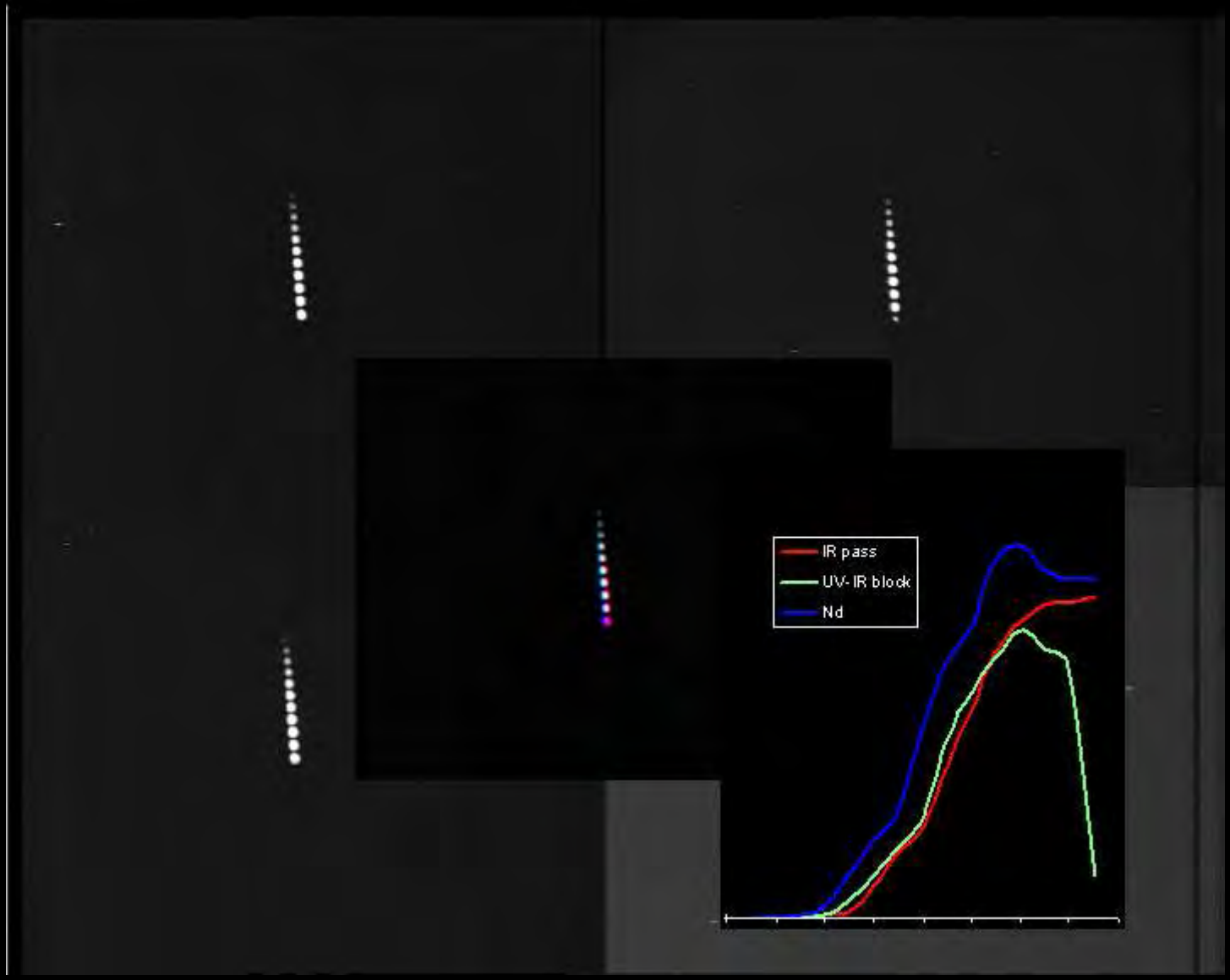
2012. results

- first false RGB color images

IR-pass filter

UV-IR cut filter

Neodymium filter



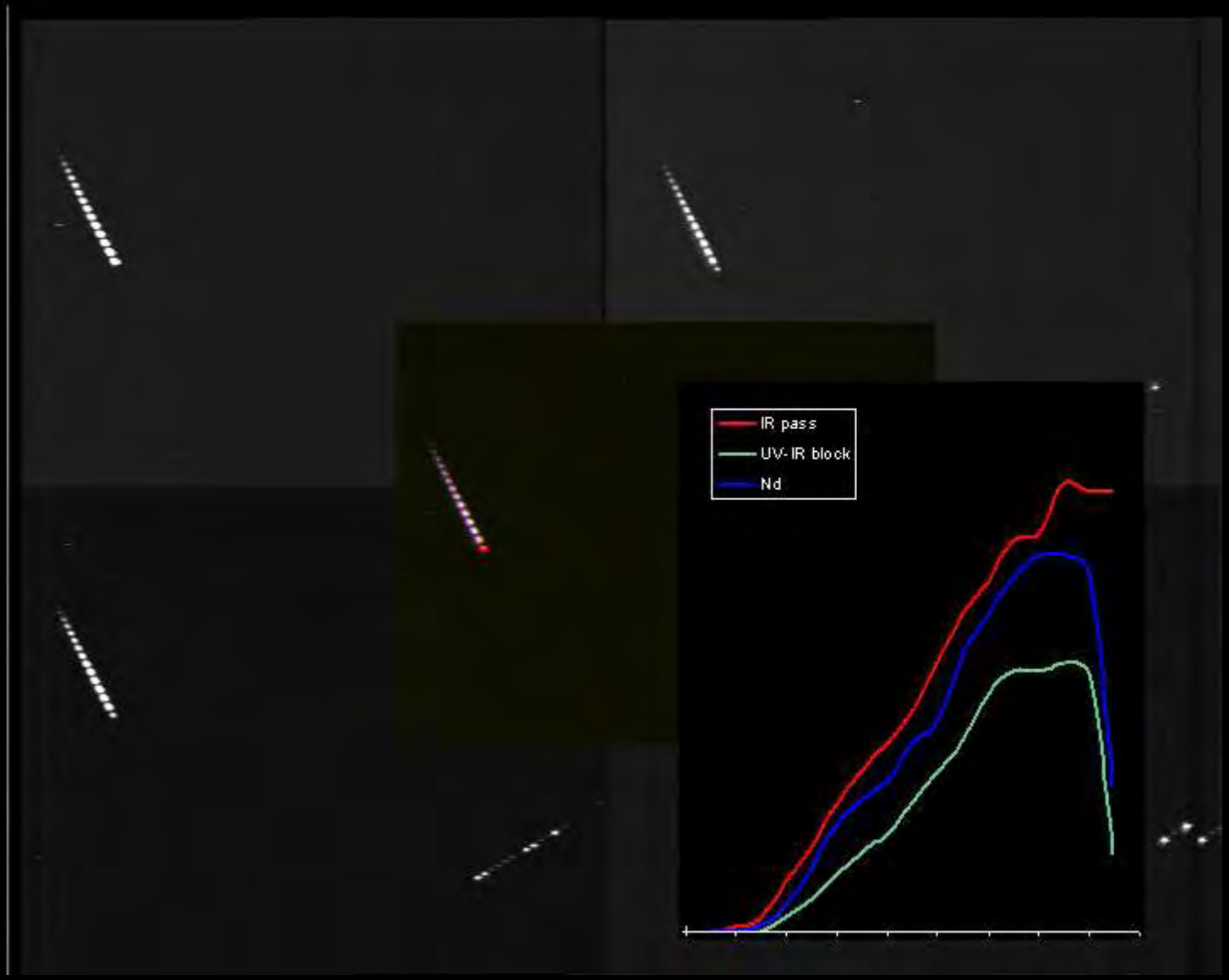
- light curves moreless similar – execpt the very end

2012. results

IR-pass filter

UV-IR cut filter

Neodymium filter



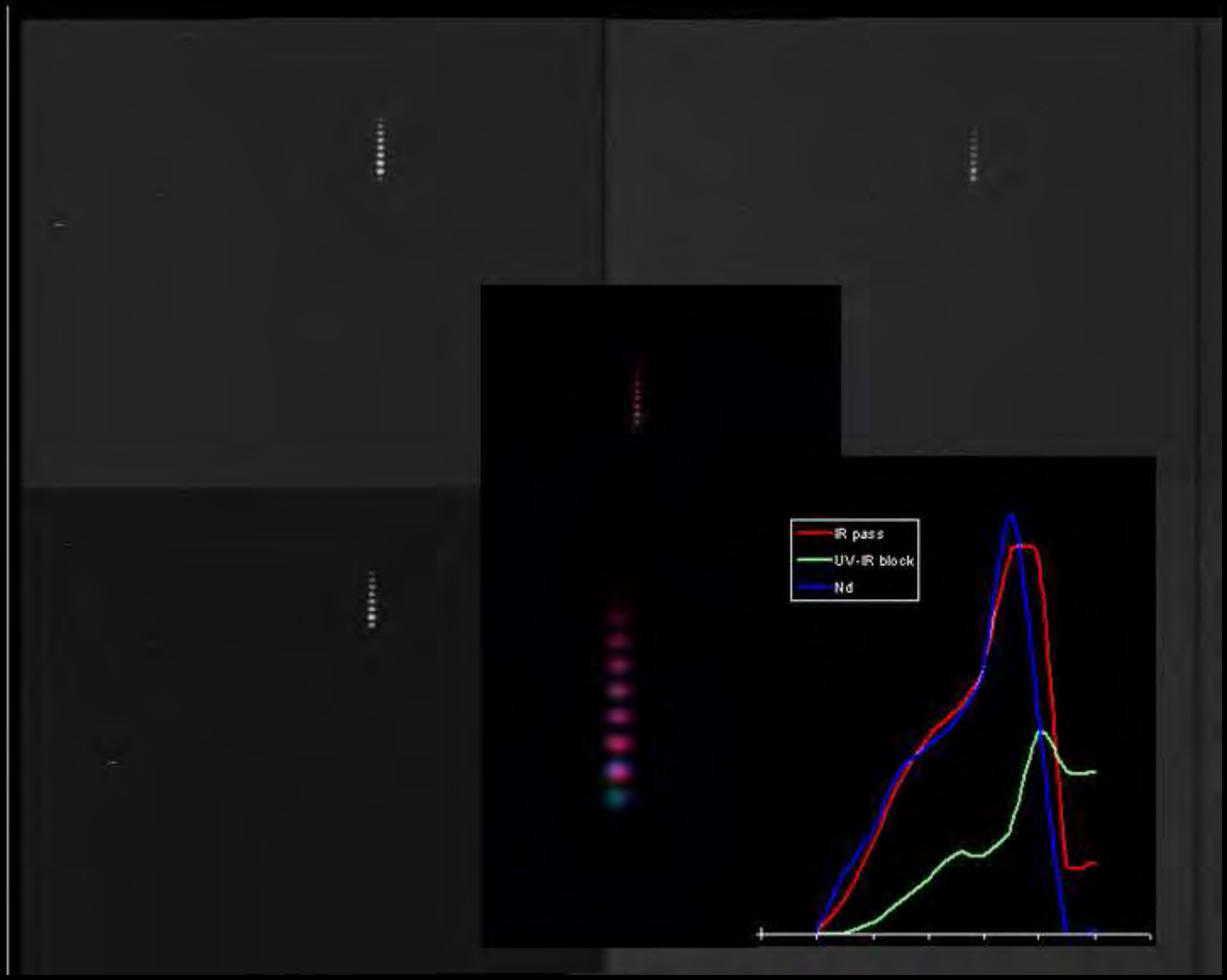
- light curves moreless similar – execpt the very end

2012. results

IR-pass filter

UV-IR cut filter

Neodymium filter



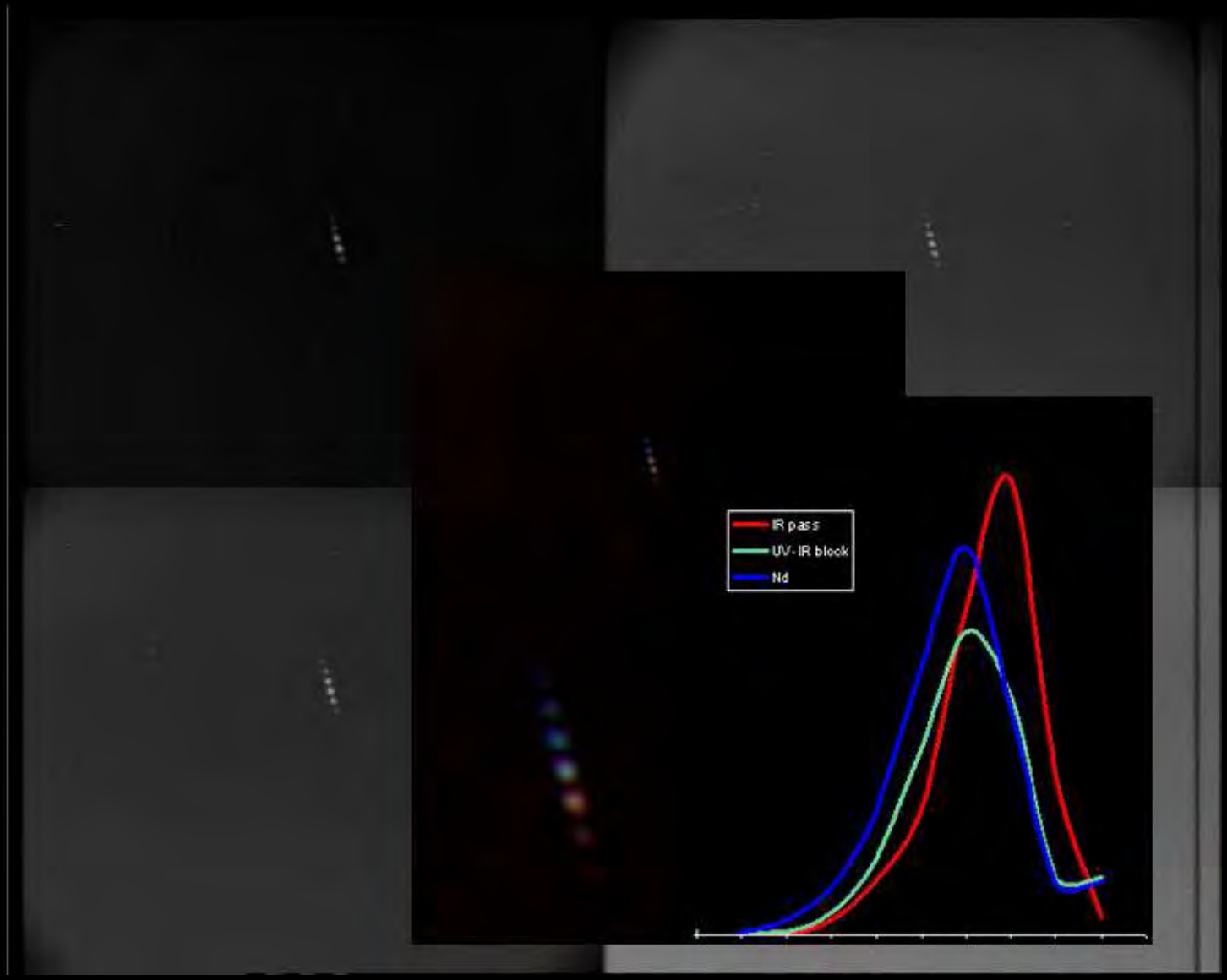
- light curves not so similar

2012. results

IR-pass filter

UV-IR cut filter

Neodymium filter



- light curves not so similar

Conclusion

- meteors can be observed in NIR part only

- cause of discrepancy between visual and video magnitudes

- differences in lightcurves?

- shower classification?

- more reliable devices needed

- more observations to be done

Acknowledgements

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Thank you for your attention!

Questions?