

Optical Meteor Systems Used by the NASA Meteoroid Environment Office

Aaron Kingery

ERC Inc. / Jacobs ESSSA Group

NASA Meteoroid Environment Office

Rhiannon Blaauw

All Points Logistics / Jacobs ESSSA Group

NASA Meteoroid Environment Office

Danielle Moser

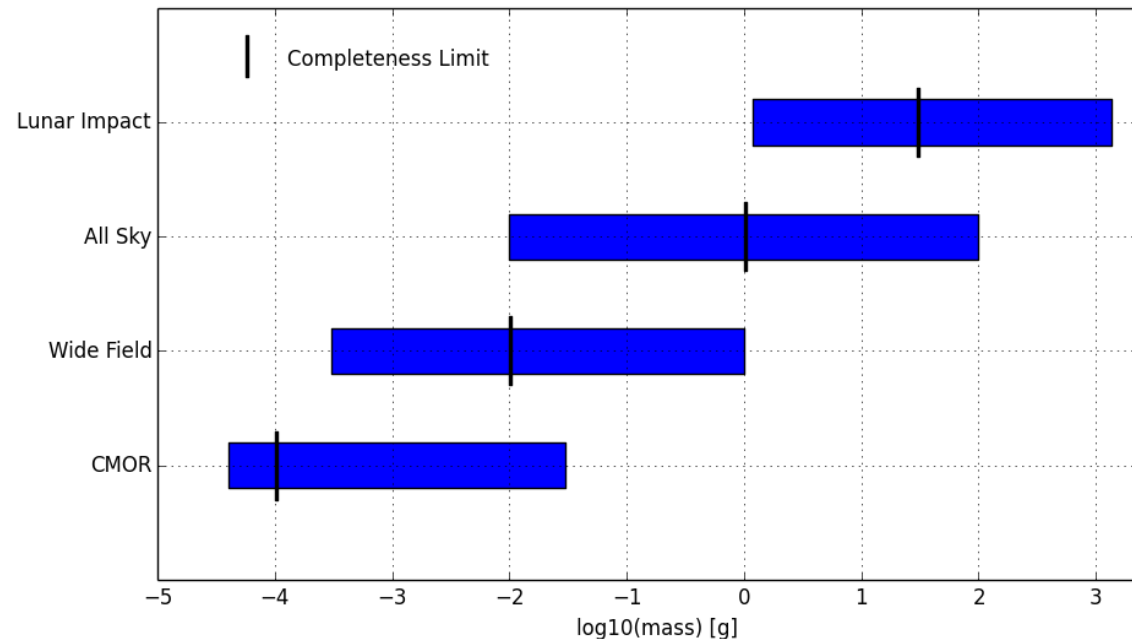
Jacobs / Jacobs ESSSA Group

NASA Meteoroid Environment Office



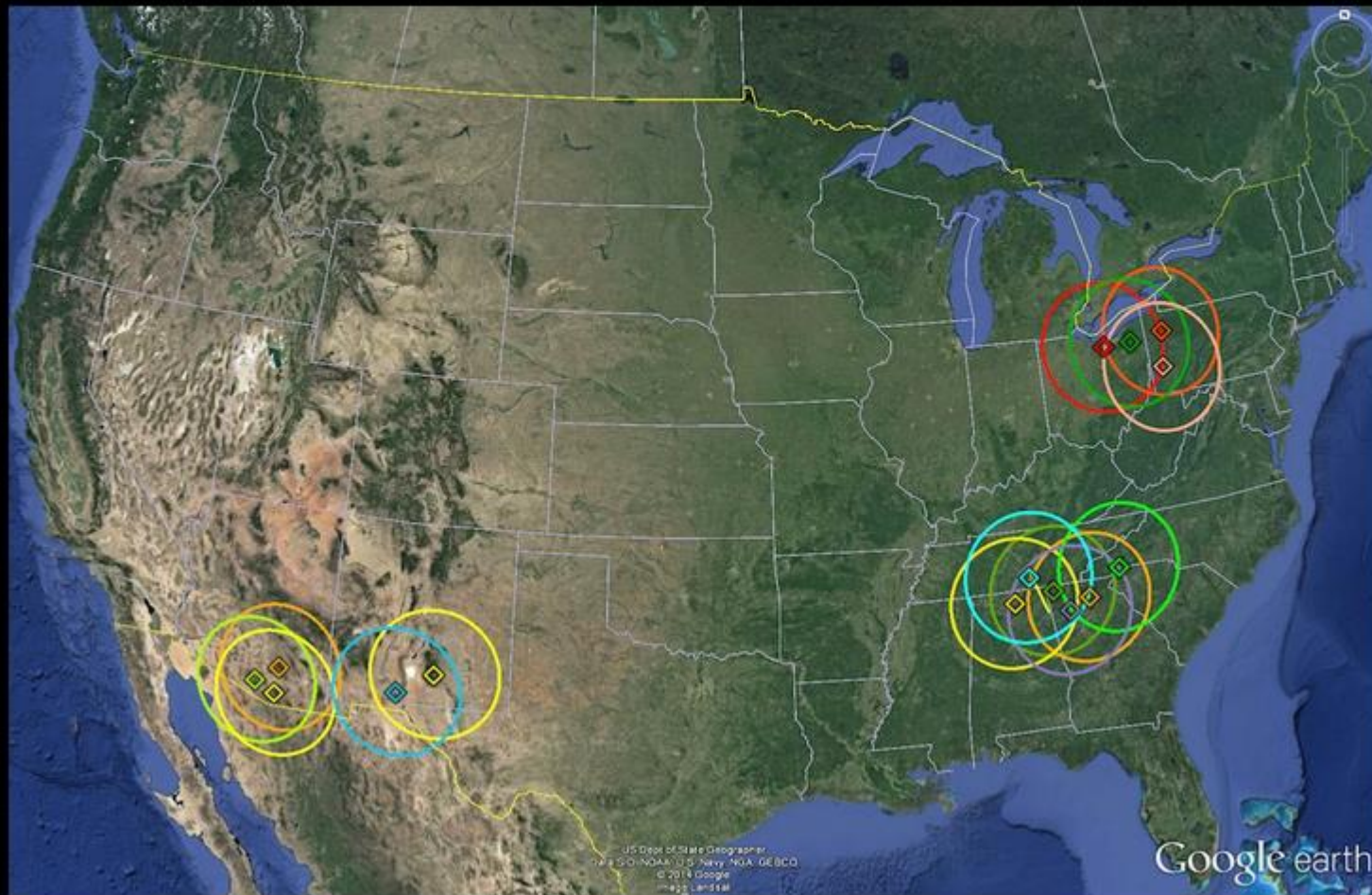
Purpose

- Calibrate NASA's engineering meteoroid engineering models
- Understand meteoroid environment
- Shower and sporadic fluxes
- Continuous observations for the MEO from 0.0001g to 1000g

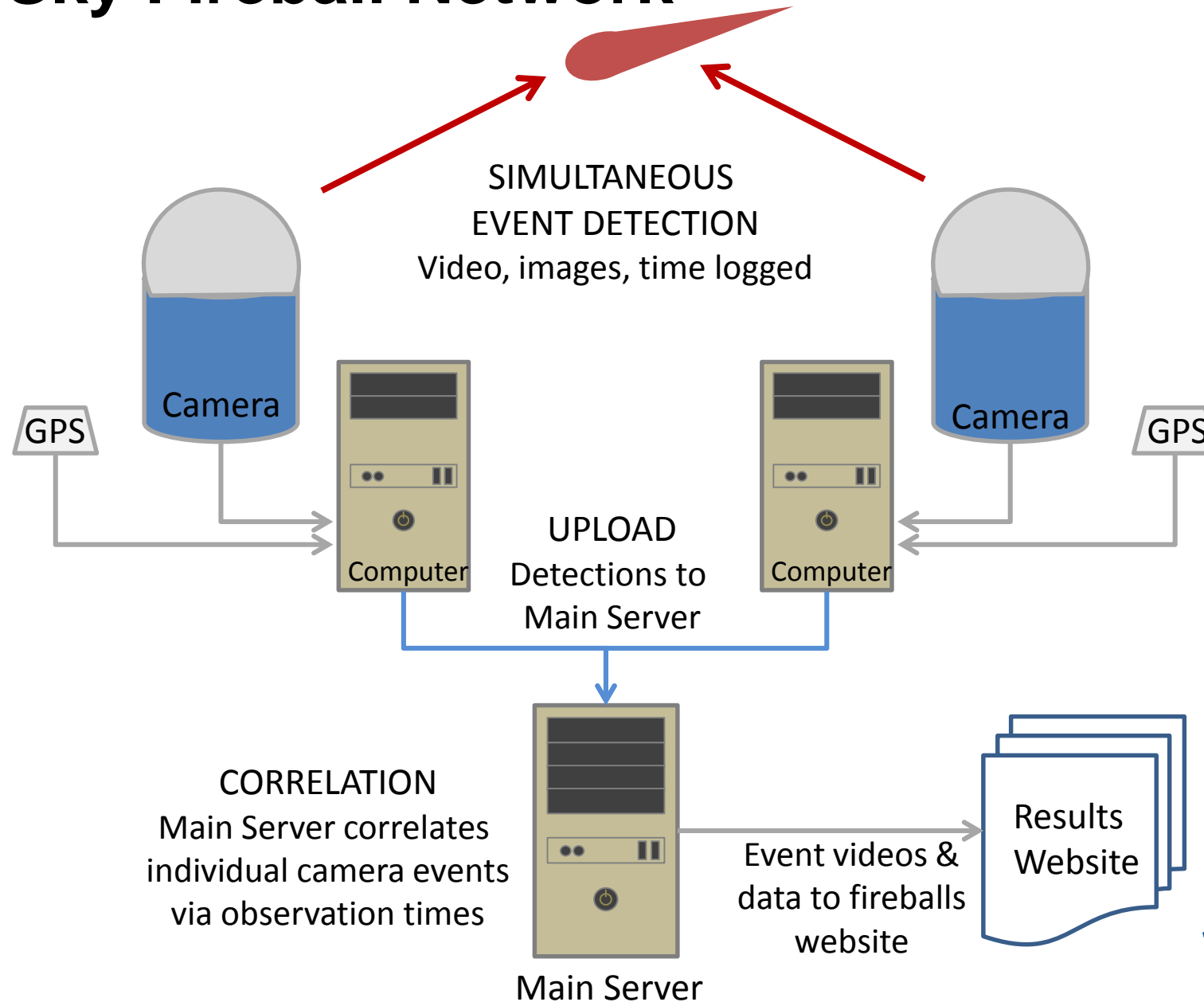




NASA's All Sky Fireball Network



NASA All Sky Fireball Network



All sky camera hardware

- Watec 902H Ultimate
- ~2mm f/1.4 lens
- Heater
- Daylight sensor
- PVC pipe housing
- Computer
 - ASGARD
 - All Sky and Guided Automatic
Rreal-time Ddetection
 - GPS



All sky camera hardware

- Watec 902H Ultimate
- ~2mm f/1.4 lens
- Heater
- Daylight sensor
- PVC pipe housing
- Computer
 - ASGARD
 - All Sky and Guided Automatic Real-time Detection
 - GPS



All sky camera hardware

- Watec 902H Ultimate
- ~2mm f/1.4 lens
- Heater
- Daylight sensor
- PVC pipe housing
- Computer
 - ASGARD
 - All Sky and Guided Automatic
Real-time Detection
 - GPS



All sky camera hardware

- Watec 902H Ultimate
- ~2mm f/1.4 lens
- Heater
- Daylight sensor
- PVC pipe housing
- Computer
 - ASGARD
 - All Sky and Guided Automatic Rreal-time Detection
 - GPS



All sky camera hardware

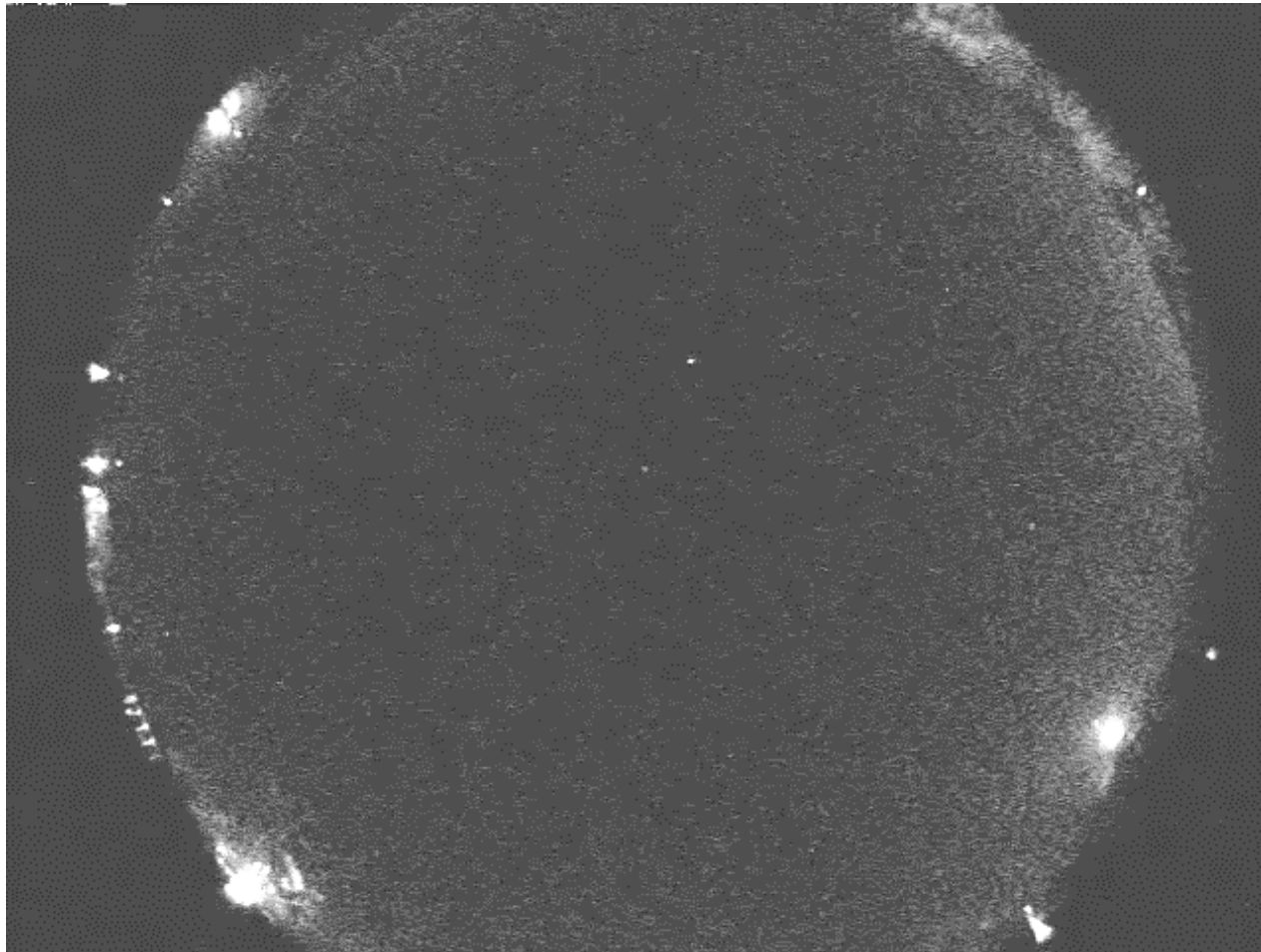
- Watec 902H Ultimate
- ~2mm f/1.4 lens
- Heater
- Daylight sensor
- PVC pipe housing
- Computer
 - ASGARD
 - All Sky and Guided Automatic
Rreal-time Ddetection
 - GPS



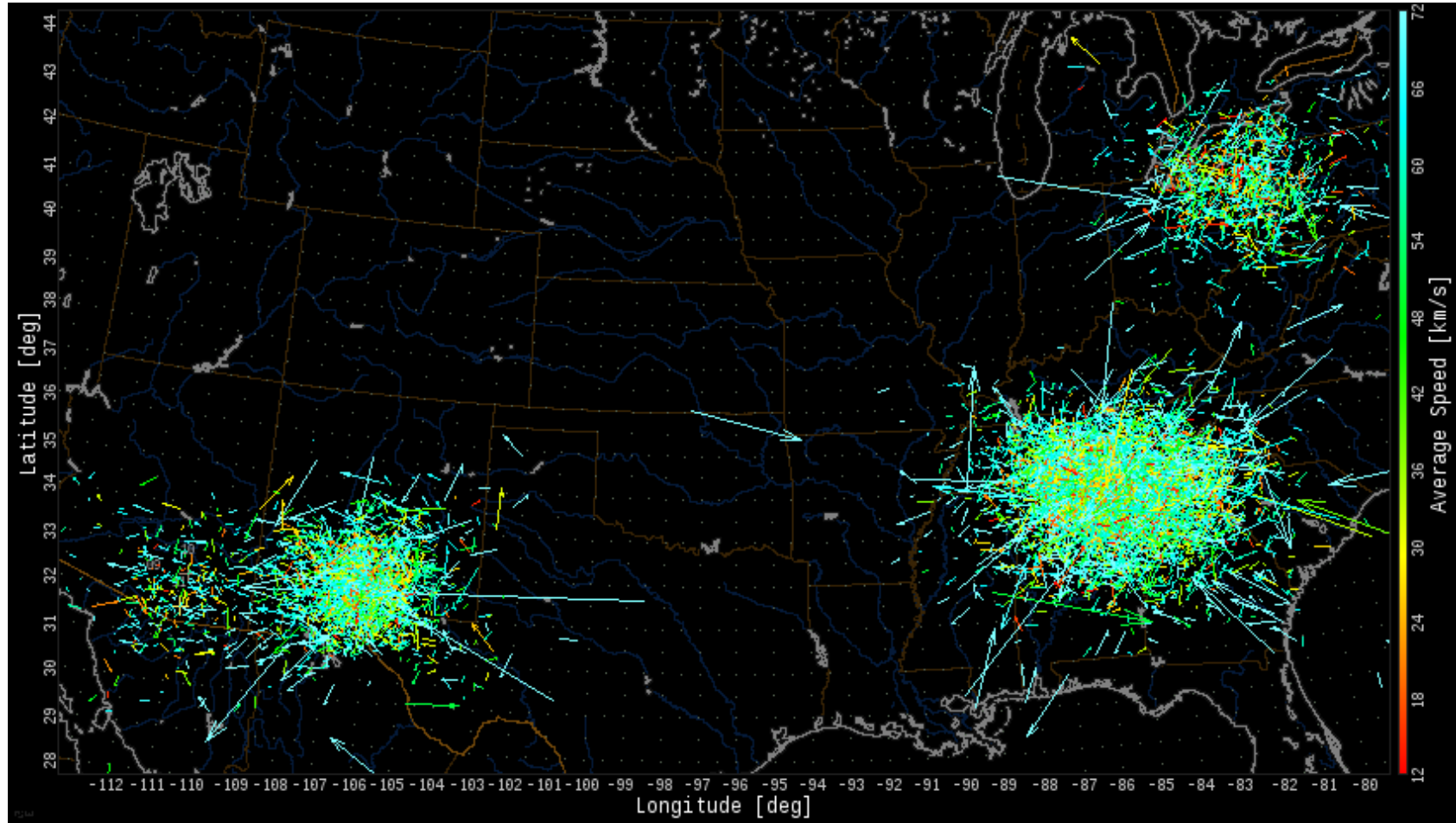
Dim Meteors



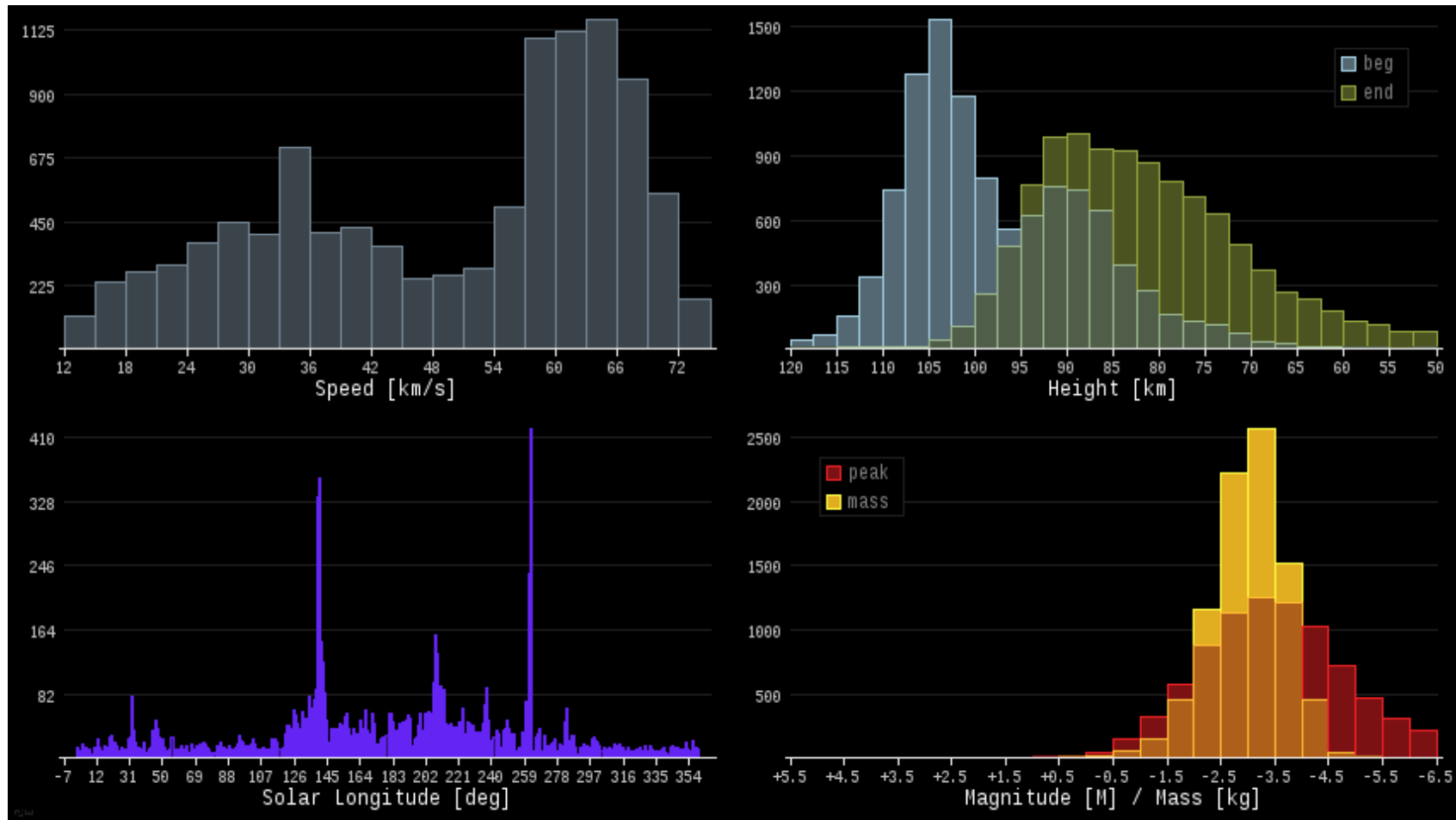
Bright Meteor



14,000+ meteors



Results



Wide field camera hardware

- Watec 902H Ultimate
- 17mm f/0.95 lens
- Heater
- Timer
- Pelco small enclosure
- Computer



Wide field camera hardware

- Watec 902H Ultimate
- 17mm f/0.95 lens
- Heater
- Timer
- Pelco small enclosure
- Computer



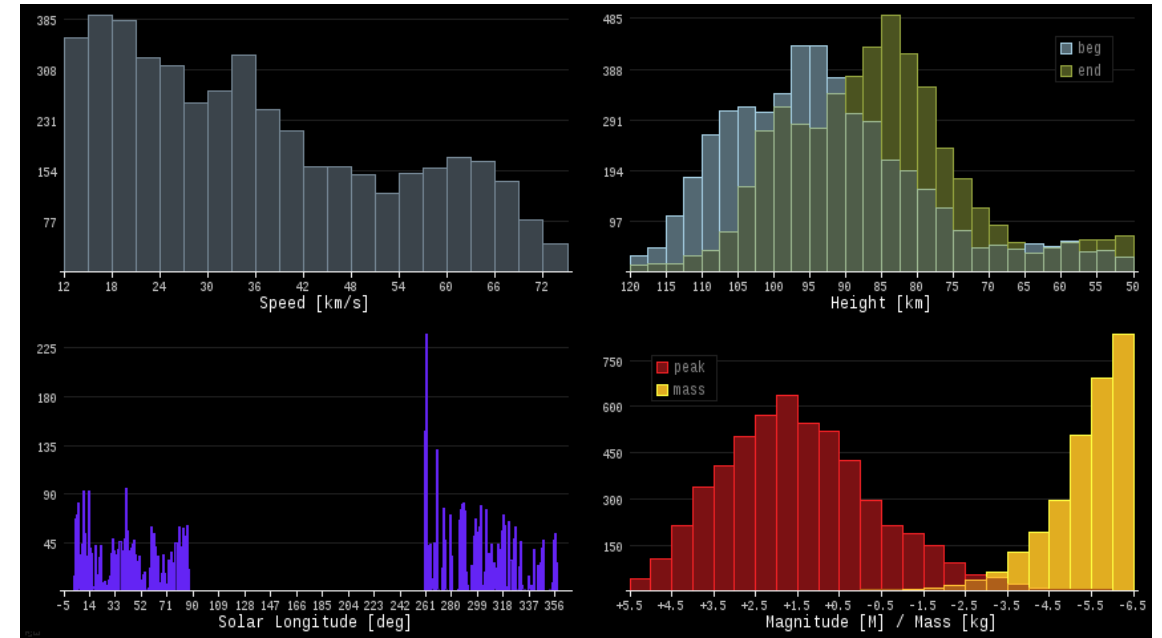
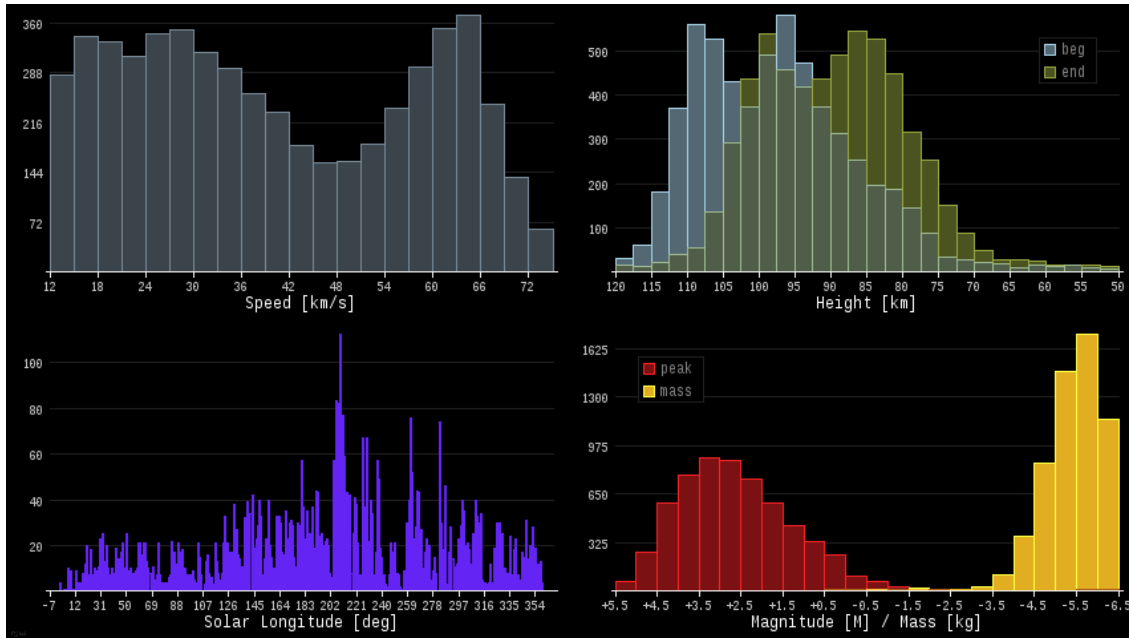
Wide field meteor



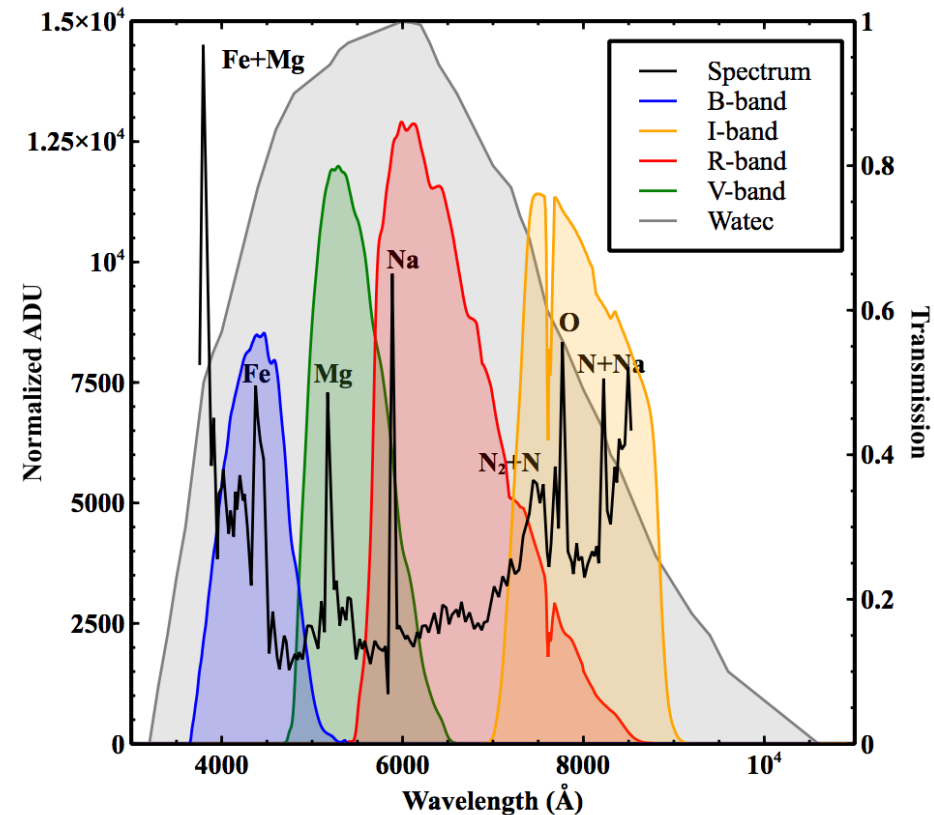
Results

2 Cameras: 5470 Meteors in 2 years

8 Cameras: 3423 in 5 Months



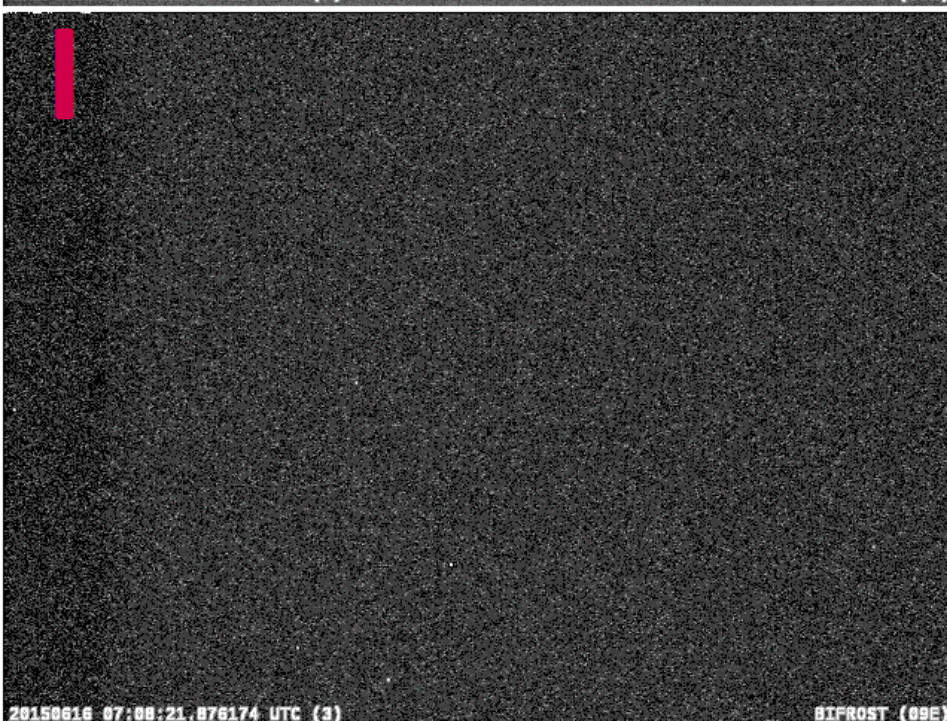
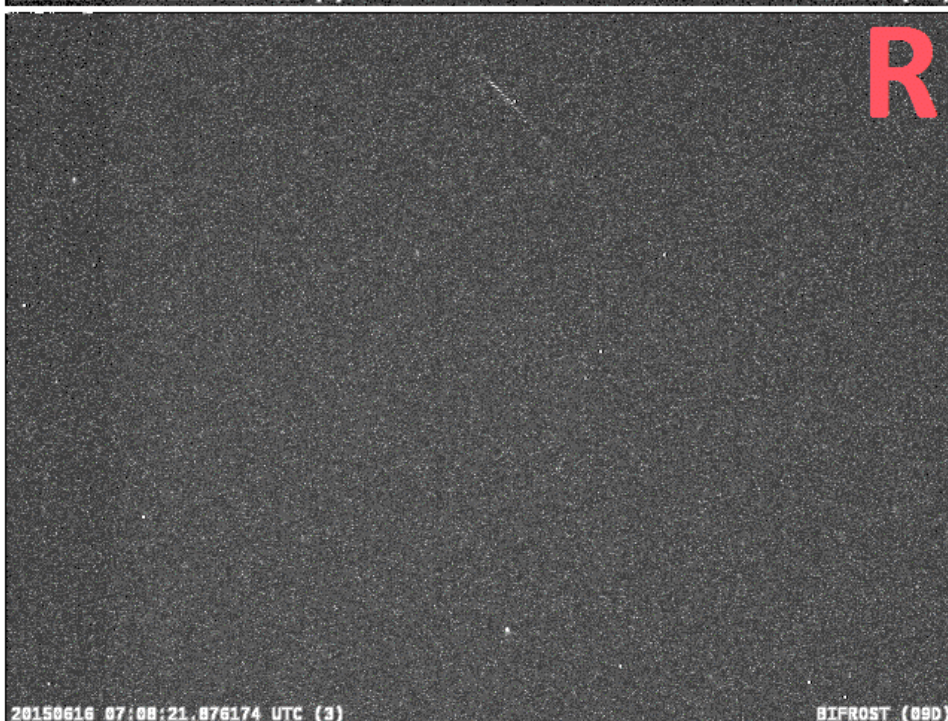
Future work - Broadband Colors



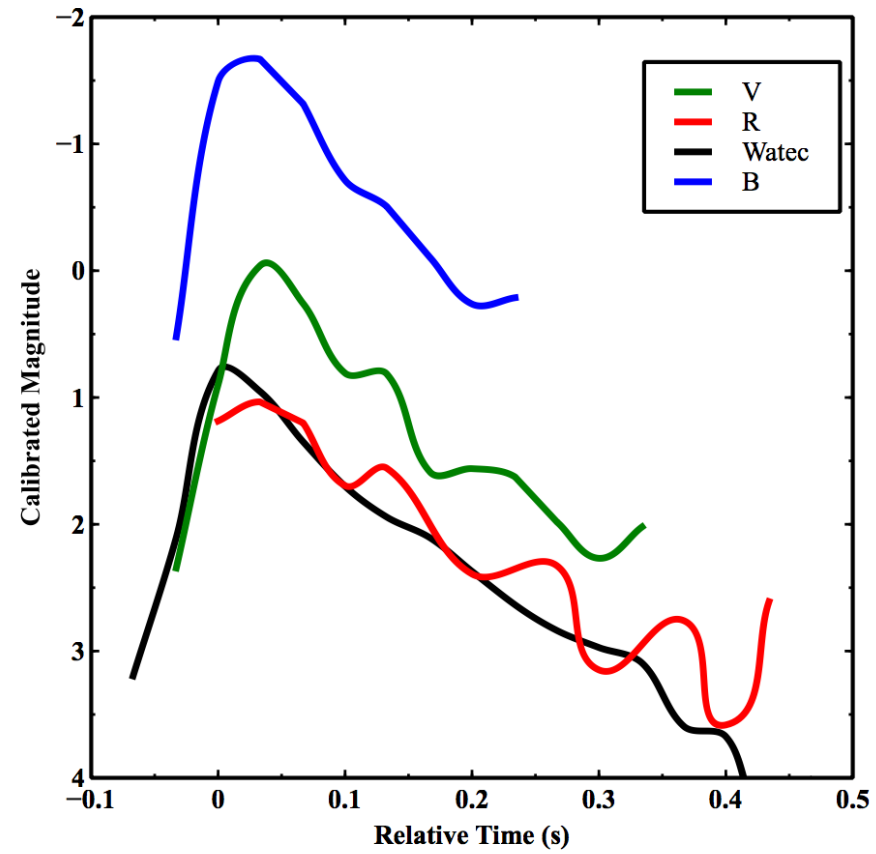
Draconid spectra from Borovička 2014

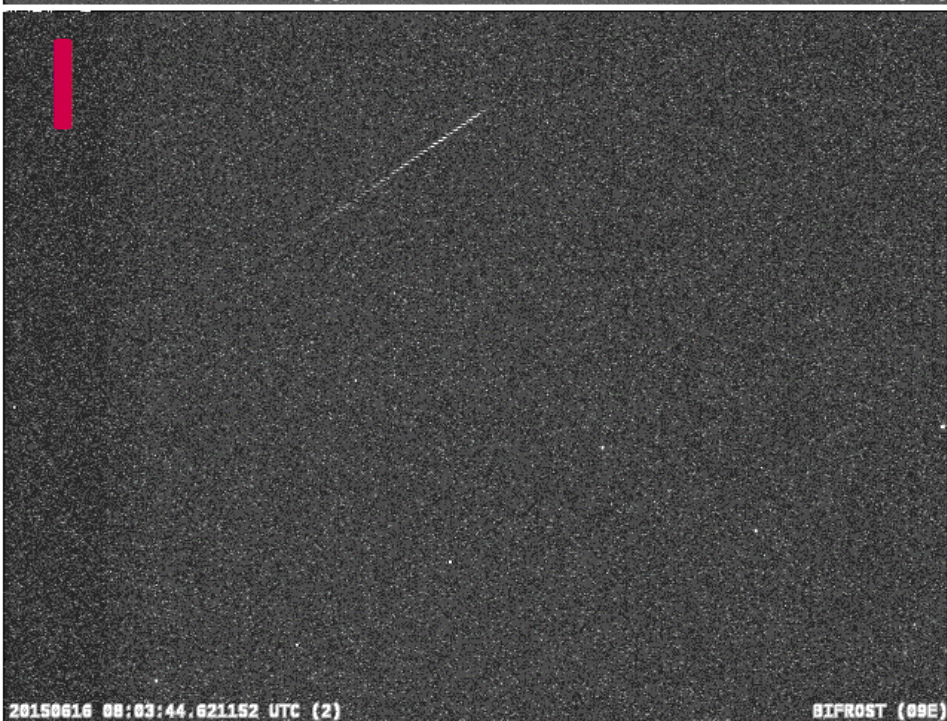
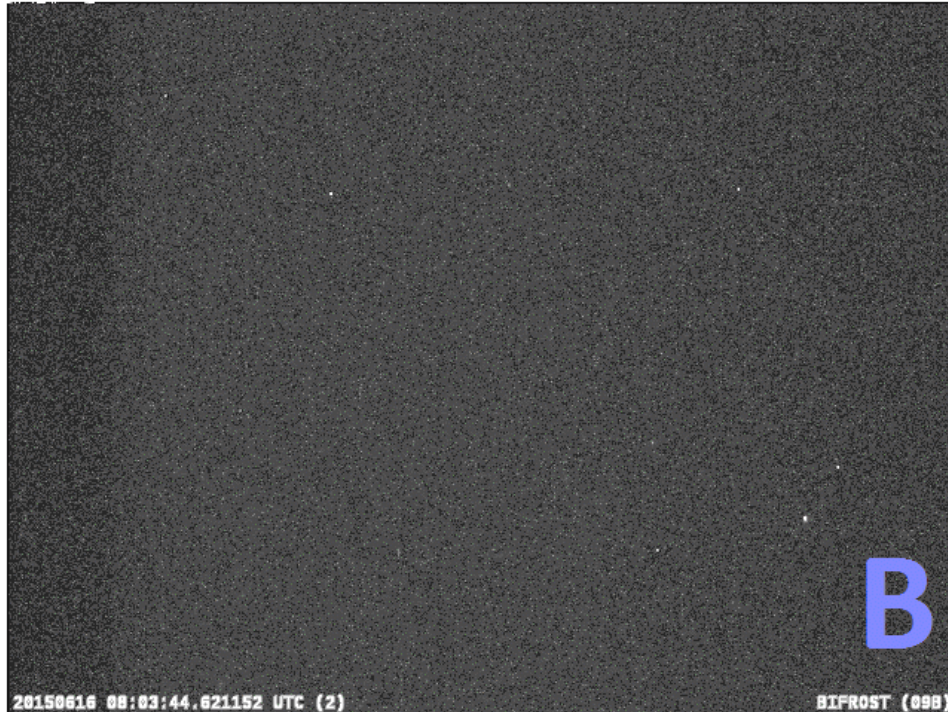
Future work - Broadband Colors



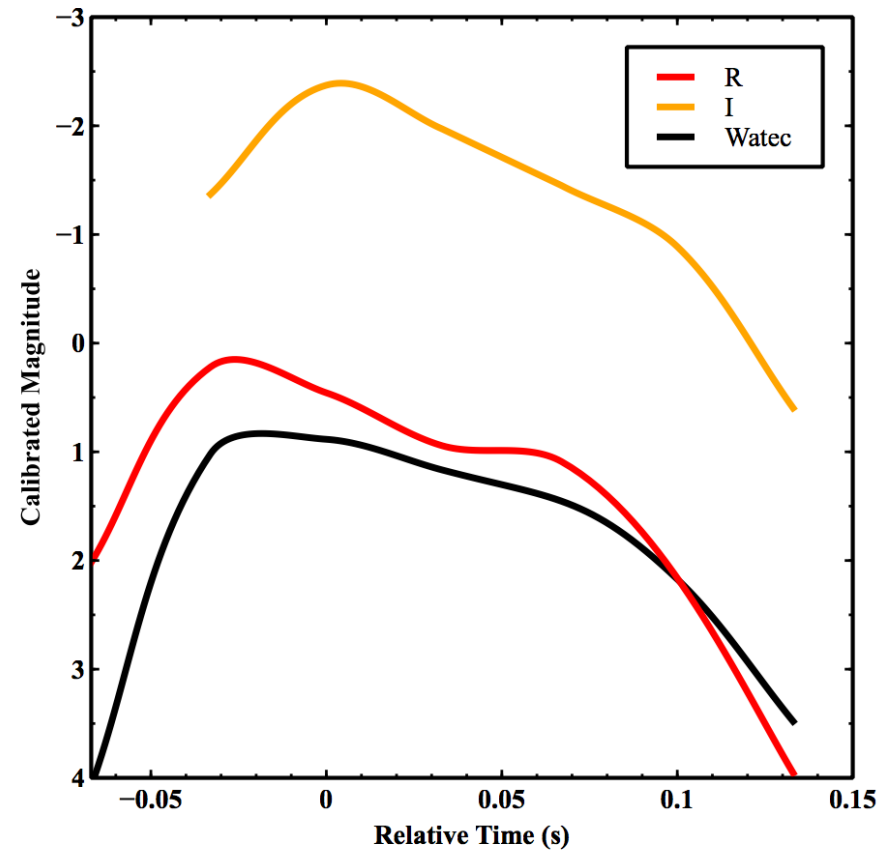


Light curve





Light curve



Future work - Photometry

Problems with video rate photometry with Watec 902H Ultimate

- Low bit depth
 - 8 bit
 - Gamma corrections
- Video rate readout noise
- Interlaced video
- Uncooled
- Small CCD chip
 - Small focal length



Future work - Photometry

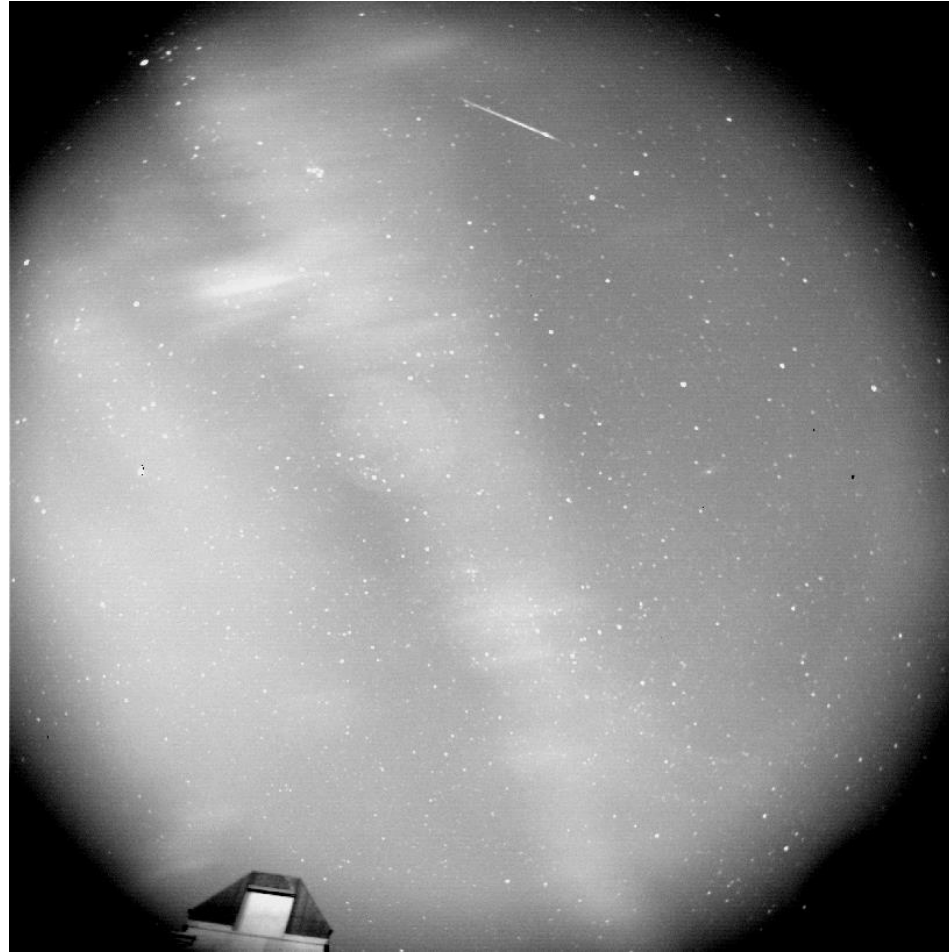
- Andor iKon-L 936
- 30-60 second exposures
- 1 Second read out time
- 39mm 2Kx2K sensor
- 16 bit
- Powerful cooler
- Consumer DSLR lens



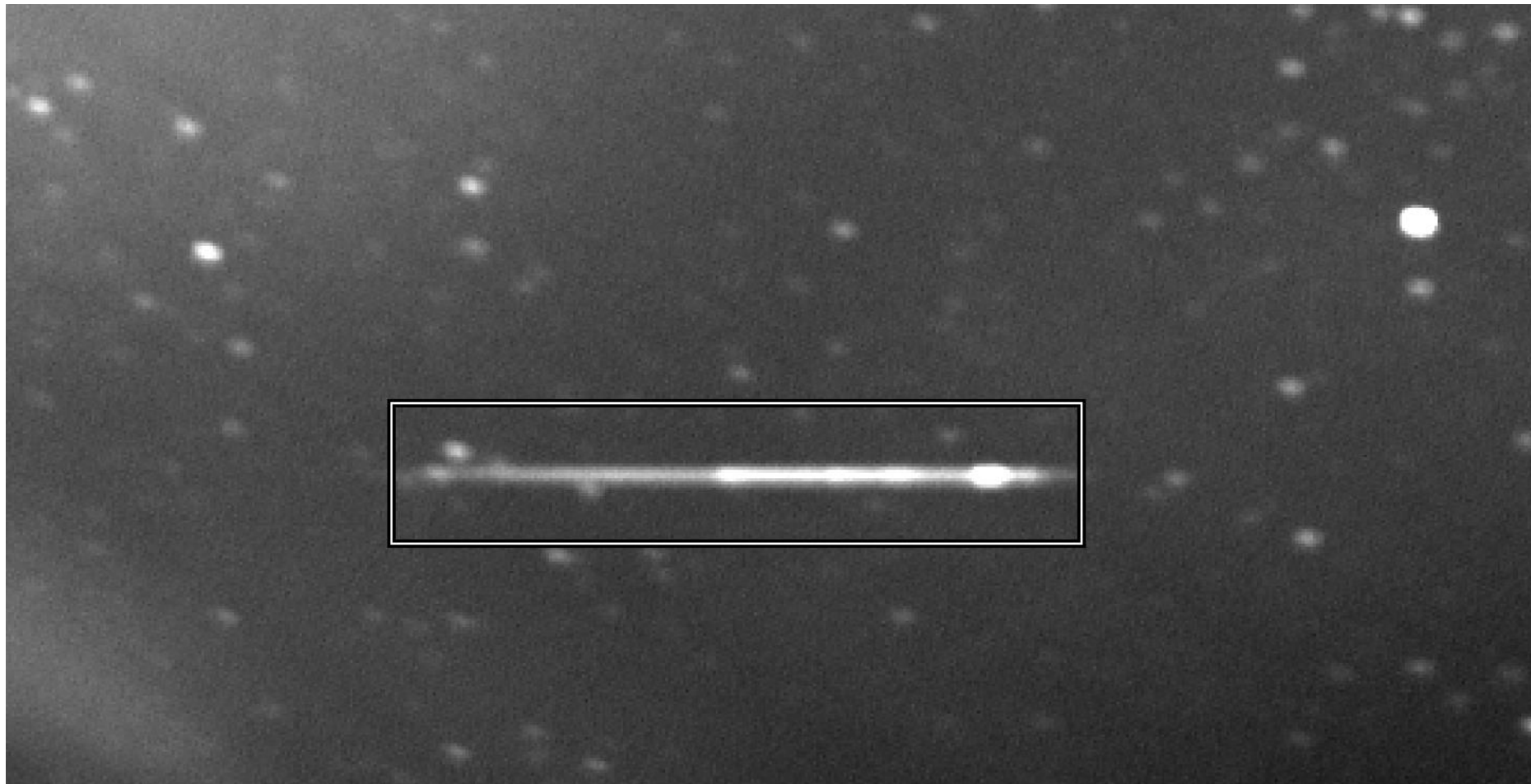
Future work - Photometry



Future work - Photometry



Future work - Photometry



Future work - Photometry

