


# Comparison of ASGARD and UFOCapture



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# Introduction

Set out to compare detection efficiencies between UFOCapture and ASGARD

## Outline

- 1) Overview of equipment
- 2) Overview of each software
- 3) Comparison of user-friendliness
- 4) Comparison of software output
- 5) Comparison of results

## Results Compared:

- Sensitivity of the two systems
- False alarm rates
- Astrometry
- Photometry

# Video Input

17 mm Schneider lens (25 degree field of view) on a Watec CCD camera was split and input into the two computer systems, running UFOCapture or ASGARD

Cost: Less than \$1,000 for Watec CCD + lens + encasing

Detects size range smaller (more faint) than All Sky Cameras. Therefore sees considerably more (up to 30 on a clear night).



# ASGARD Overview

- All Sky and Guided Automatic Real-time Detection
  - University of Western Ontario
  - Originally created to run on All-Sky cameras
  - Not publically available
- Runs on Debian GNU/Linux
- Compatible with several video sources (analog video camera interfaces, digital camera interfaces)
- Detects meteors in real-time, but can also run on pre-recorded video.
- Detection: Compares video frame-by-frame, pixel-by-pixel. Several plugins can be used for detection process. User can specify settings in the plugins, such as how many pixels above background for an event to be triggered.
  - A set of rejection algorithms throw out non-meteor events



# User-Labor Comparison - Setup

## Installation

- UFOCapture has an setup.exe file
- ASGARD requires Linux knowledge. Installation is non-trivial and non-intuitive.

## Plates

- ASGARD requires an extra program – METAL – or an IDL script
- Need to match up many stars (25+) all around FOV
  - User interface is good, but not intuitive
  - Less than 0.02 degree residuals
- UFOCapture has it built into program
  - User interface = very intuitive
  - Fairly automated
  - Less than 0.03 degree residuals



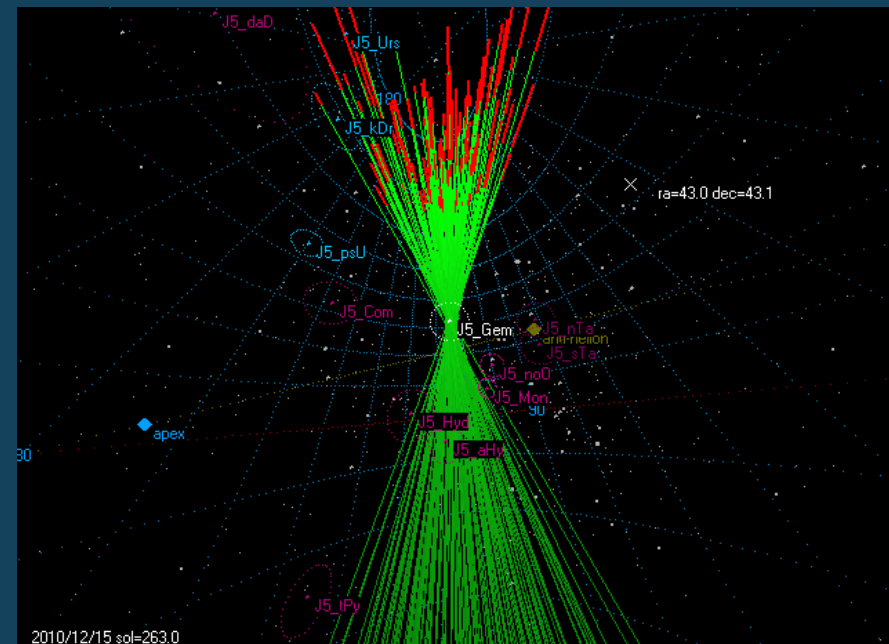
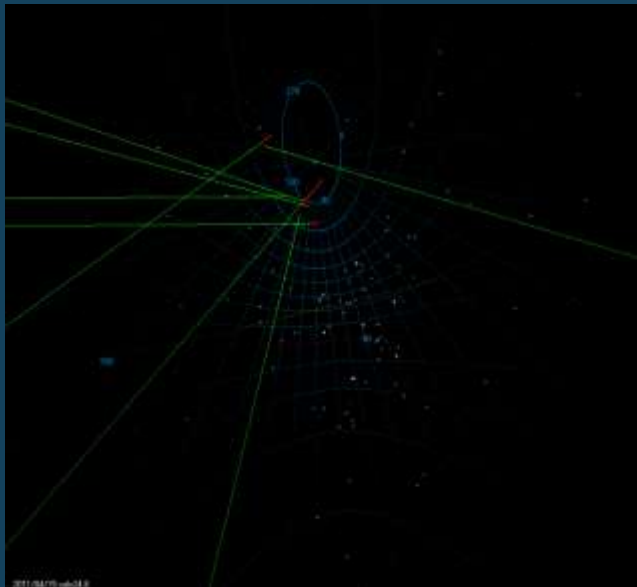
# User-Labor Comparison

- Daily data reduction
  - UFOCapture requires an additional program:
    - UFOAnalyzer takes all the events UFOCapture has detected, and identifies whether it is a meteor
      - Many events are misidentified – requires manual filtering through each event
      - Therefore more user-intervention for UFOCapture
  - ASGARD has real-time processing
    - Identifies whether the event is a meteor
    - Put in a reject folder if it is identified to be a non-meteor event
    - Still misidentification of events: requires manual filtering

# System Output Comparison

## UFOAnalyzer

- .csv (time, angular velocity, shower code, start/end RA/DEC, and more)
- .xml (azimuth, elevation, and more)
- Trail map (radiants)
- .avi
- .jpg





# System Output Comparison

## ASGARD

- tar (.png of each frame)
- txt (time, site, plate, the coordinates of the meteor in each frame and its magnitude at that point)
- avi
- png



# Initial Software Pros/Cons

## UFOCapture/Analyzer

### Pros

- Easy setup
- Available online
- nice interface
- Well documented

### Cons

- manually run Capture's output into Analyzer
  - during lightning storm it takes a while to process
- program occasionally crashes & system needs restarting (windows 7)
  - manual intervention

## ASGARD

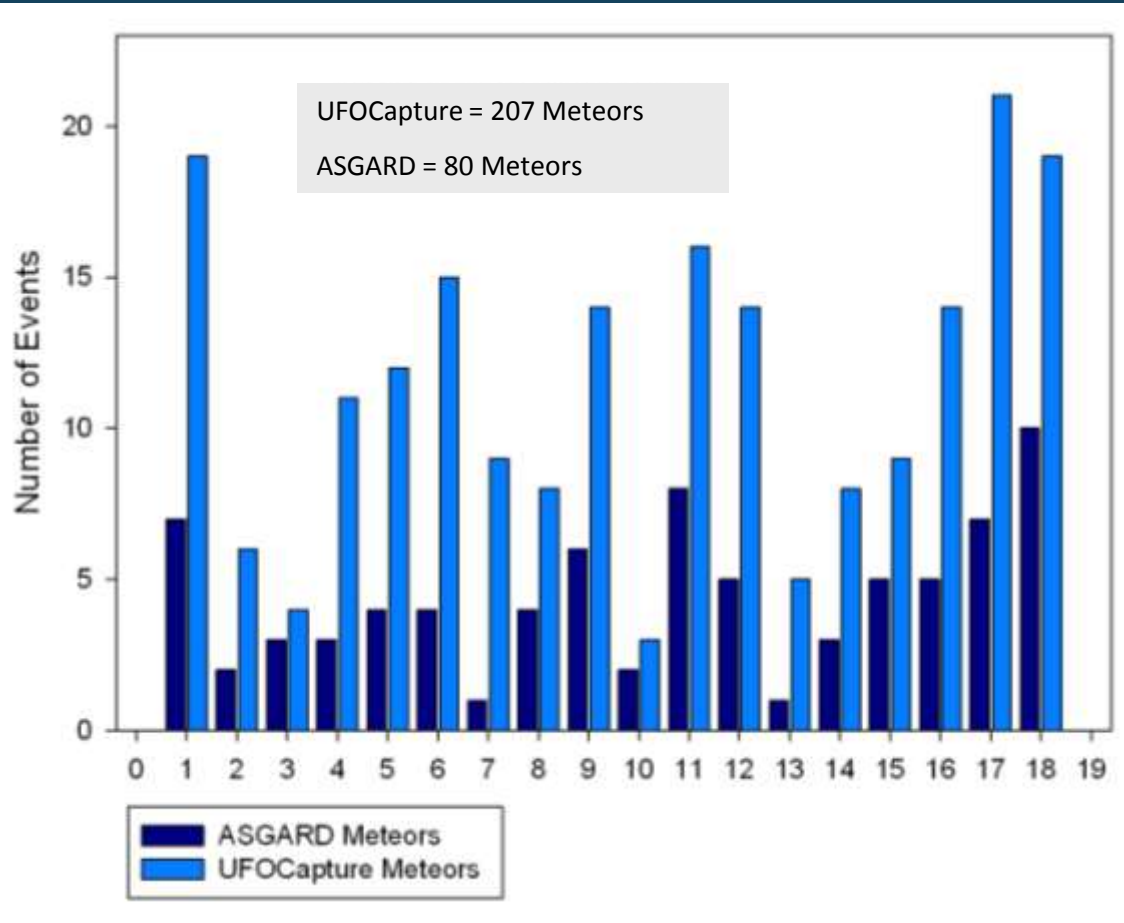
### Pros

- video buffer (to go back and look at raw videos later)
- Capture + Analyzing is together.
  - already identifies whether it is a meteor event or not

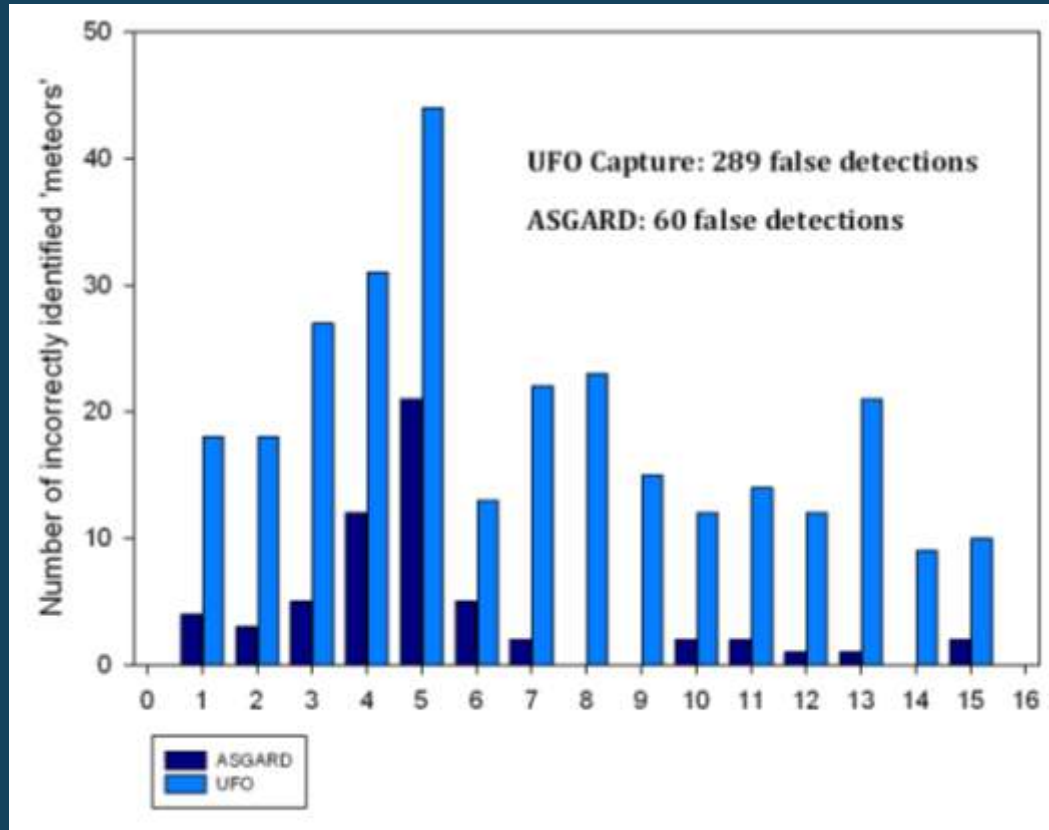
### Cons

- not well documented
- need METAL to make plates
- azimuth + elevations in slightly different format

# Initial Results



# Initial Results



- 3 nights of lightning storm – not included
- Hundreds of false alarms for UFOCapture

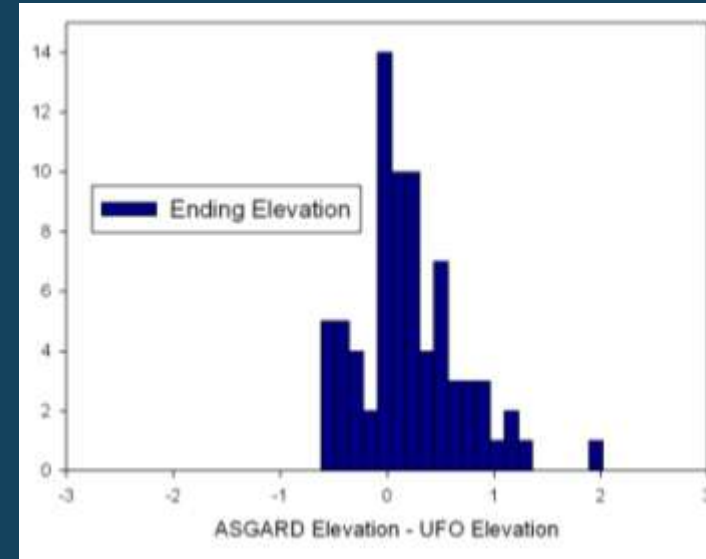
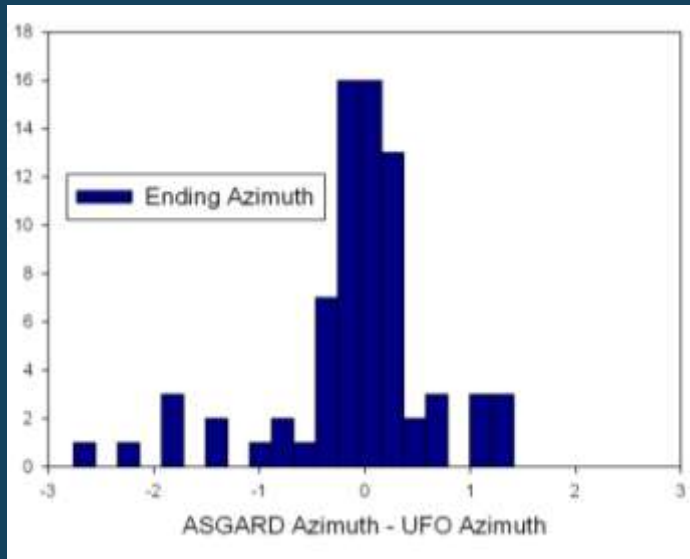
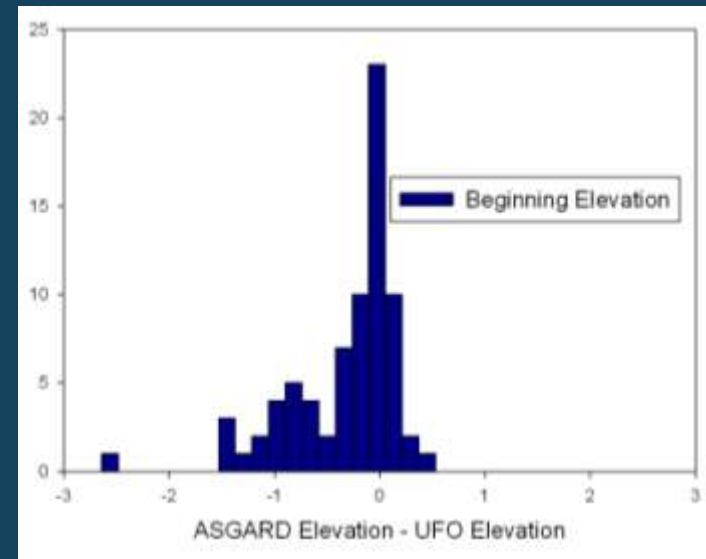
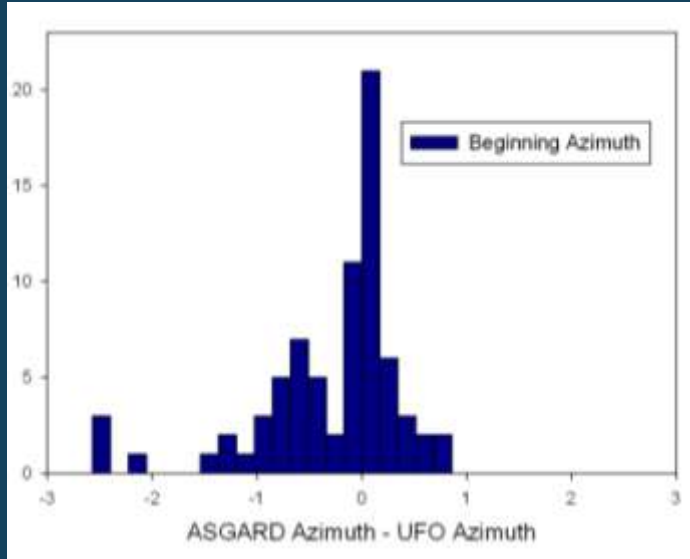
# False Alarms



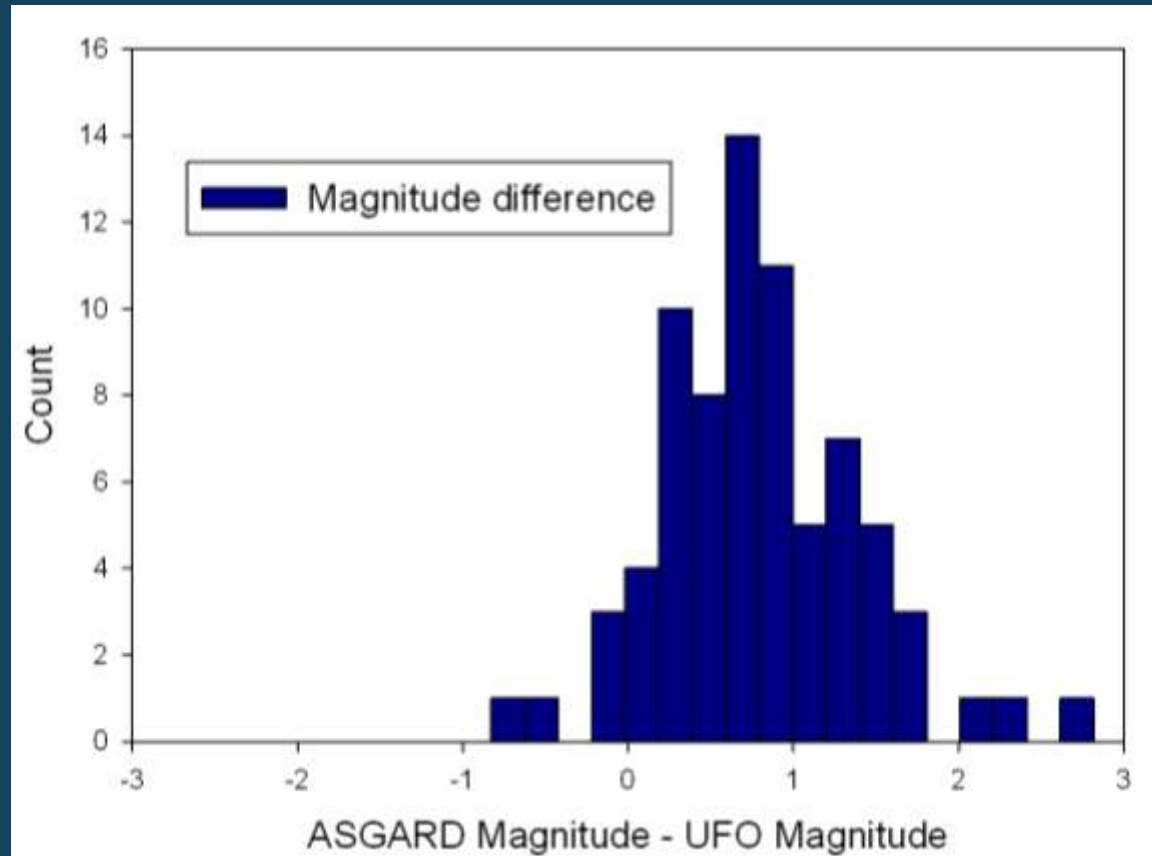
20110711 02:57:49.886526 UTC

HSV\_watec (50A)

# Initial Results – Astrometry



# Initial Results - Photometry



Magnitudes not as reliable.

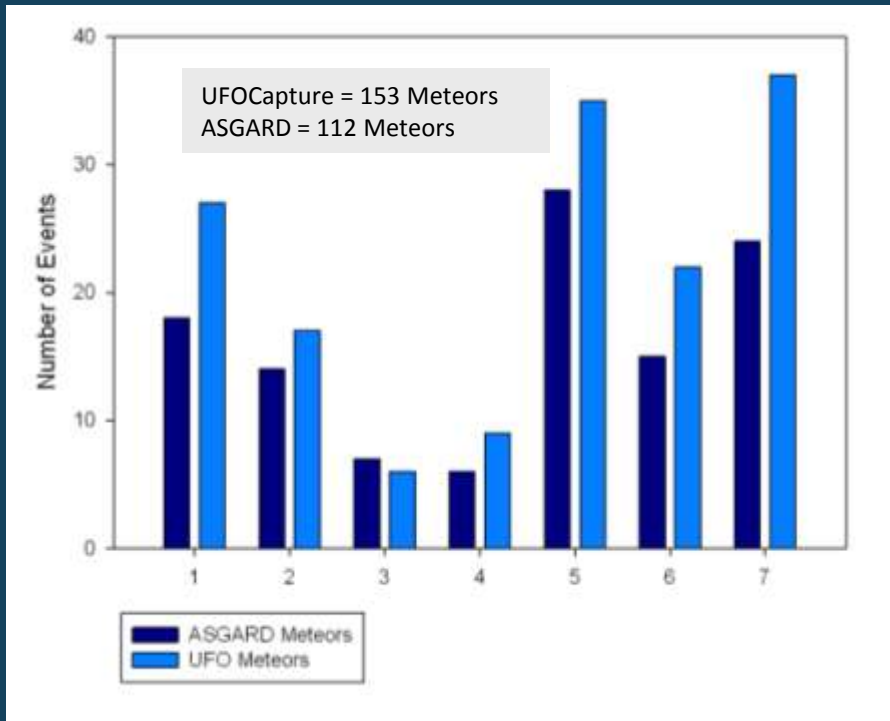
More work needs to be done in this area.

# Changes to ASGARD

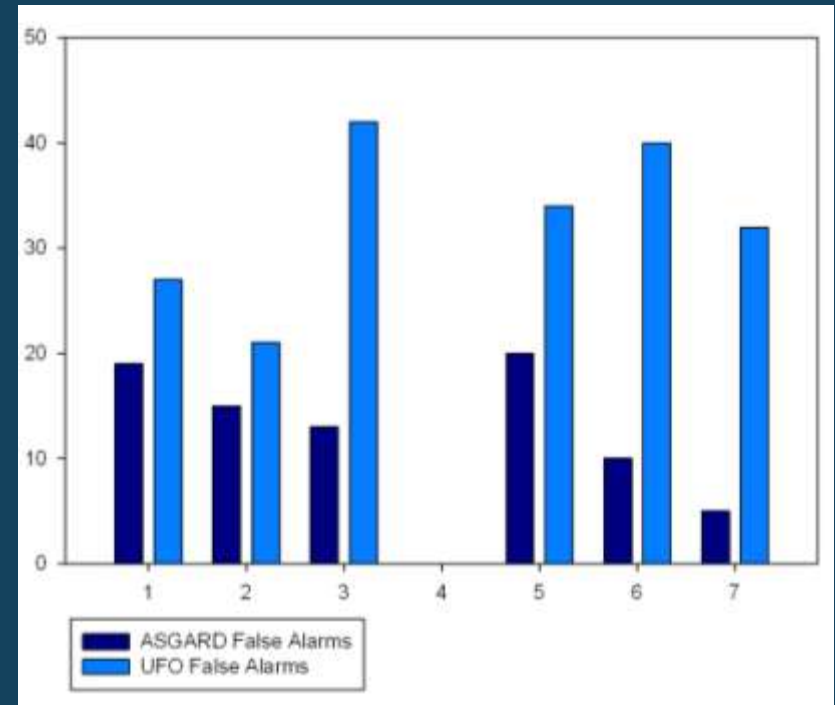
- Lowering the threshold at which ASGARD flags an event
- Changing detection plugin – affects how an event is triggered. Experimented with other versions.
- Taking out reject filters – inspected which reject filters were flagging real meteors.



# Preliminary Results



## False Alarms:



Lowered Threshold (from 75 to 50) and removed a rejection filter that flagged a bunch of single frame triggers (meant for blinking planes).

# Conclusions + Future Work

ASGARD Benefits: Very automated. Results easily accessed in the morning without doing additional work. A preferred software if it can become as sensitive as UFOcapture.

UFOCapture Benefits: Overall rates initially higher than ASGARD. Easy install. Windows compatible.

Additional Work:

- Experiment with a different plugin
- Meteor photometry

