

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

UFOCapture Overview

Multipurpose motion-capture software
(including security purposes)

\$225-\$250 depending on exchange rate

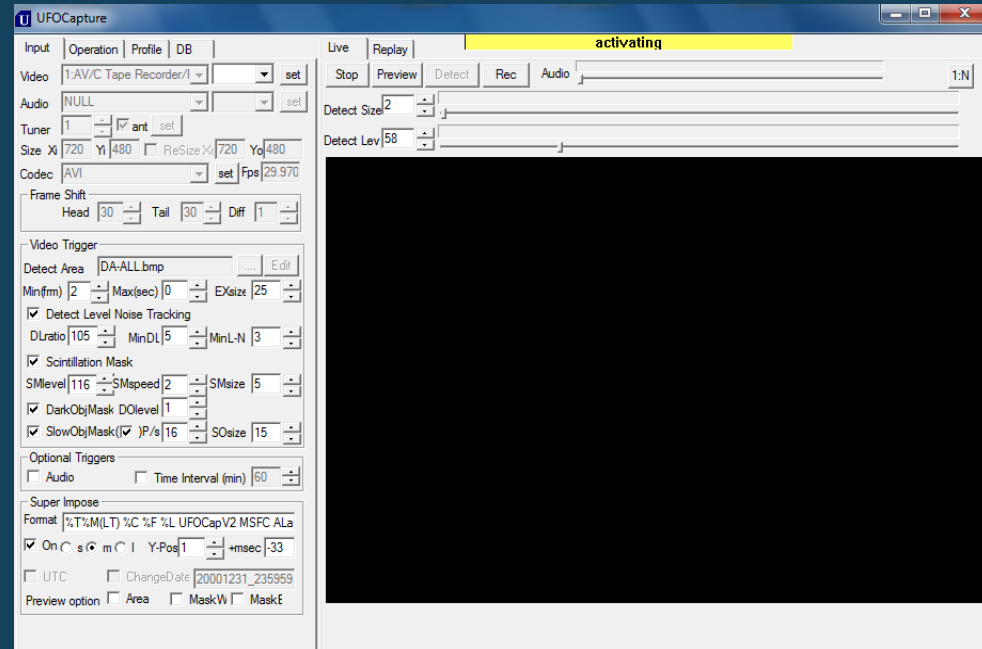
Compatible with many different video inputs

Need PC: Windows XP,
Windows 2000, or Windows 7

Fairly well documented on website

Preset files to initialize the settings

Good user-interface to tweak settings



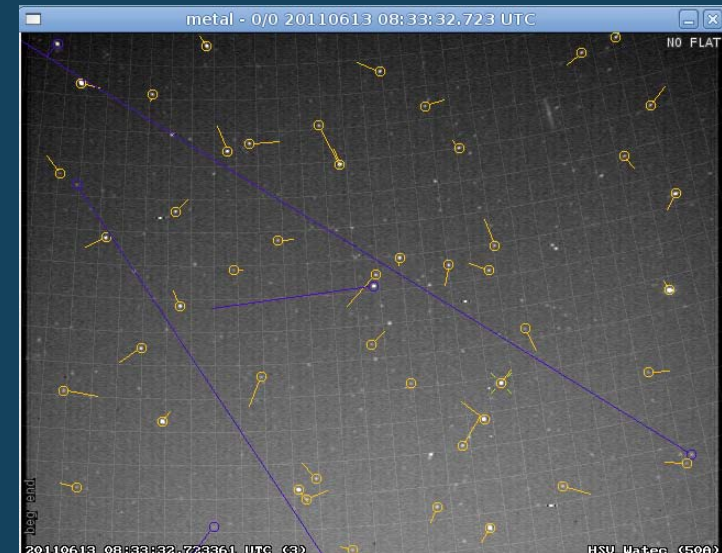
User-Labor Comparison - Setup

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



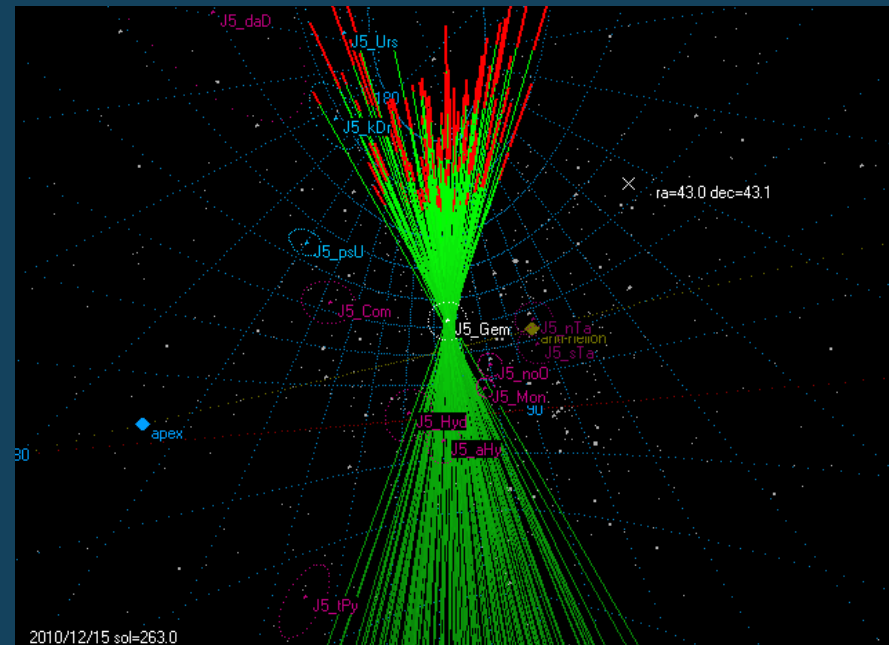
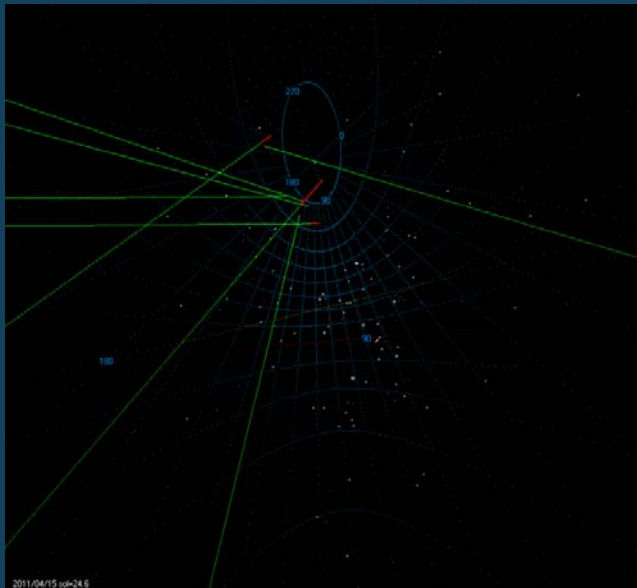
User-Labor Comparison

- 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

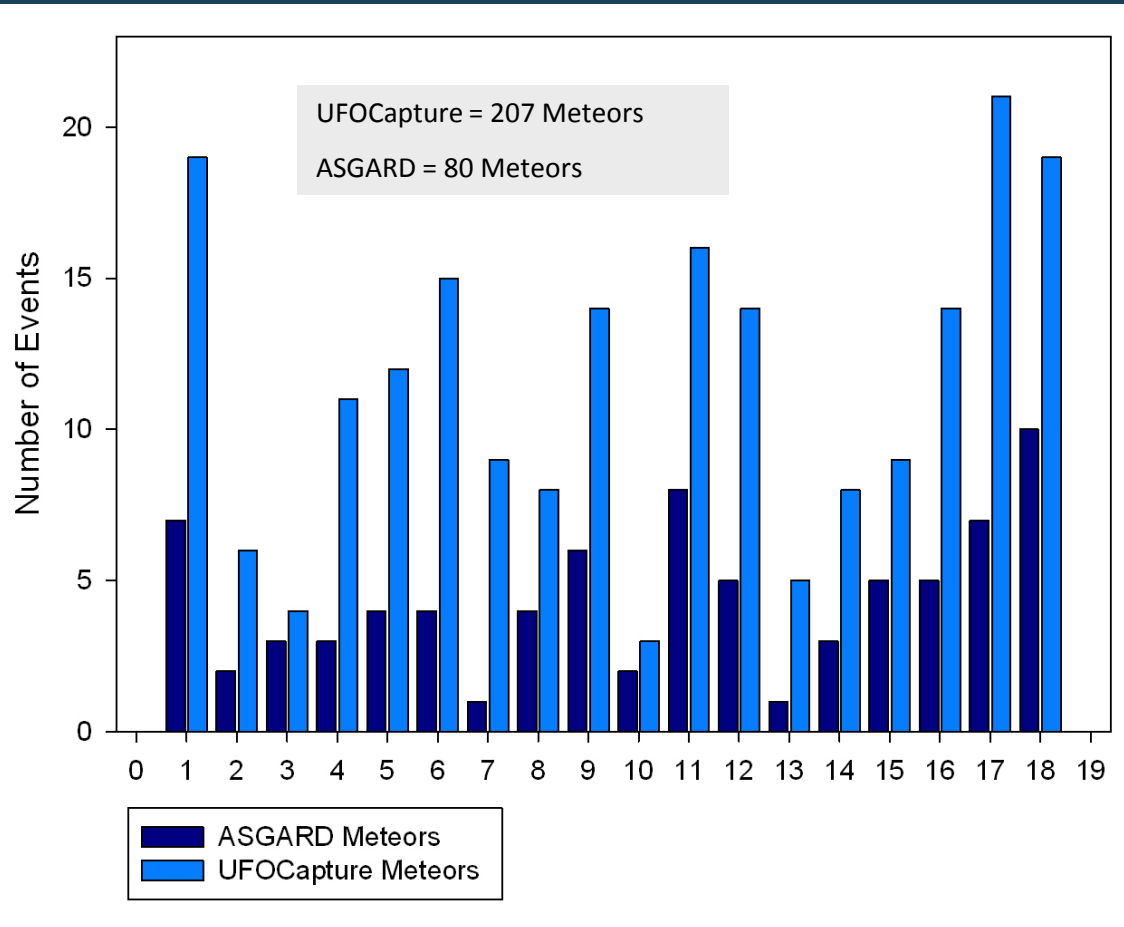
Pros

- 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

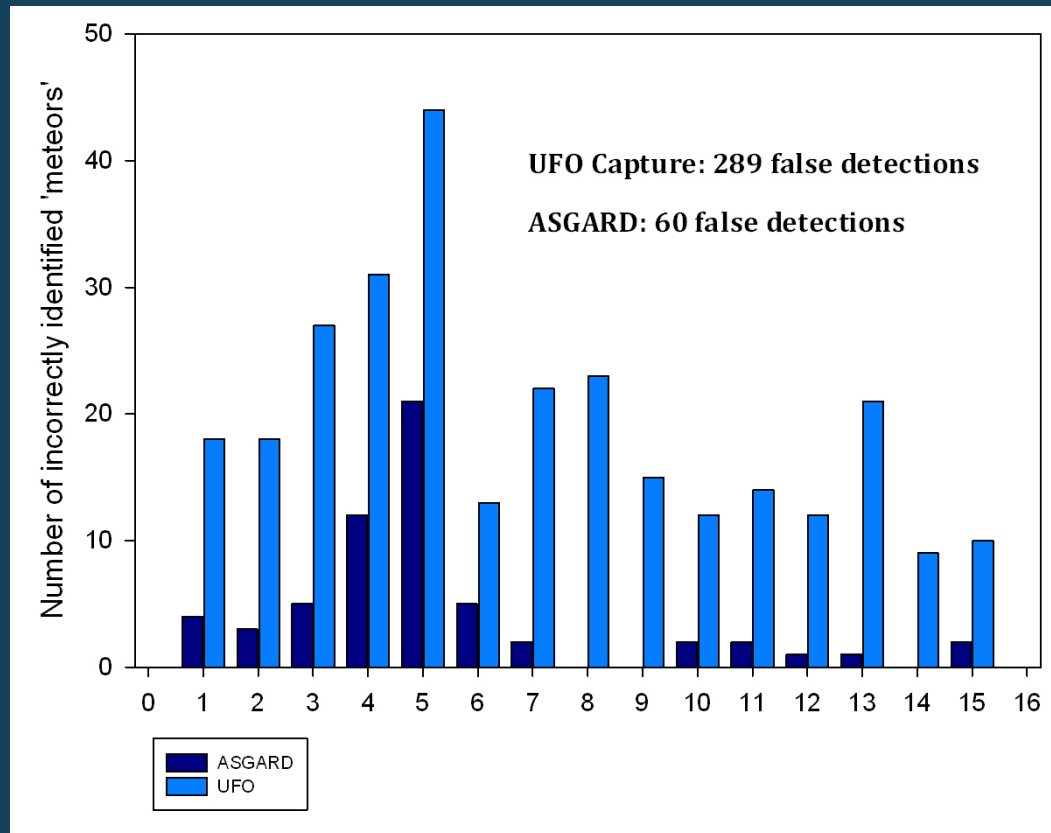
Cons

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

Initial Results



Initial Results

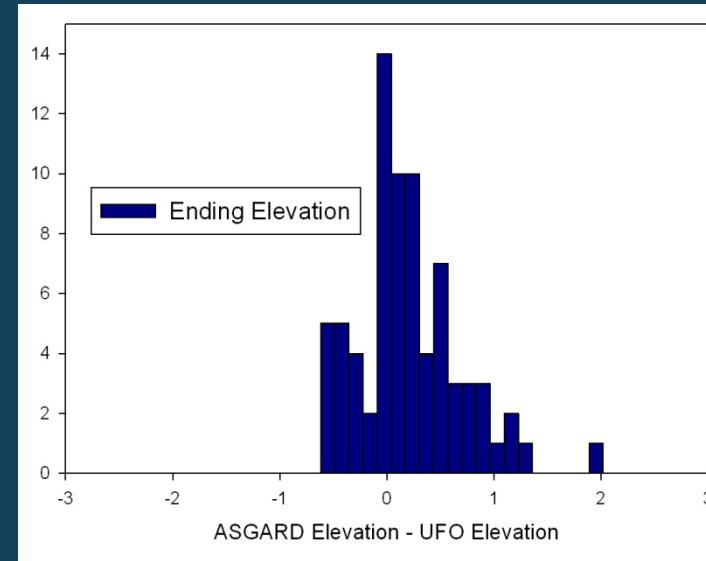
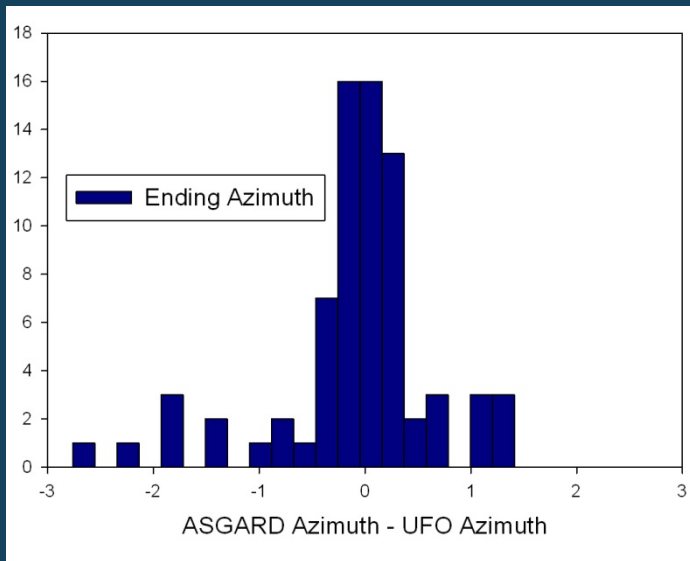
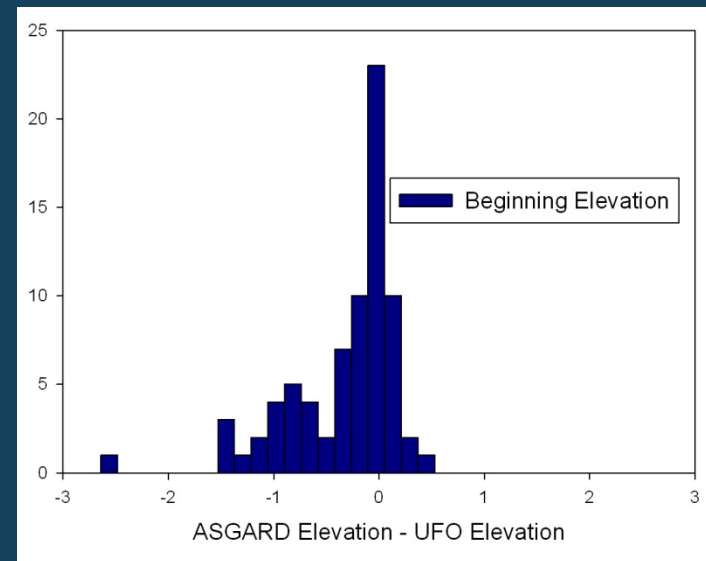
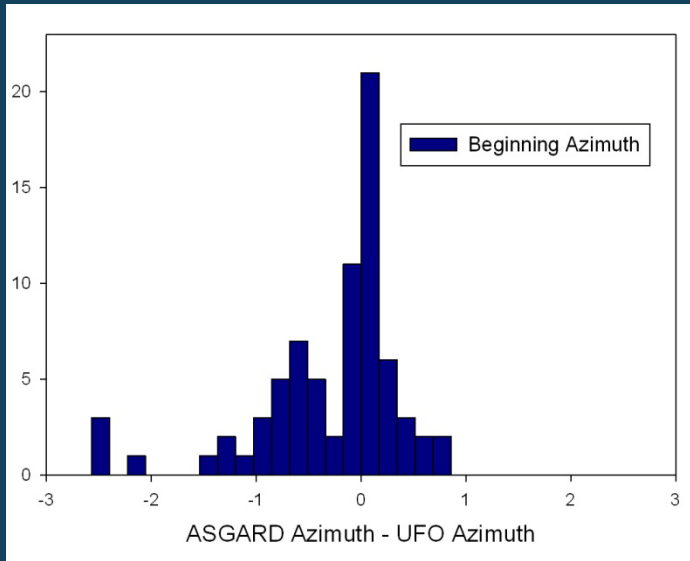


3 nights of lightning storm – not included
– Hundreds of false alarms for UFOCapture

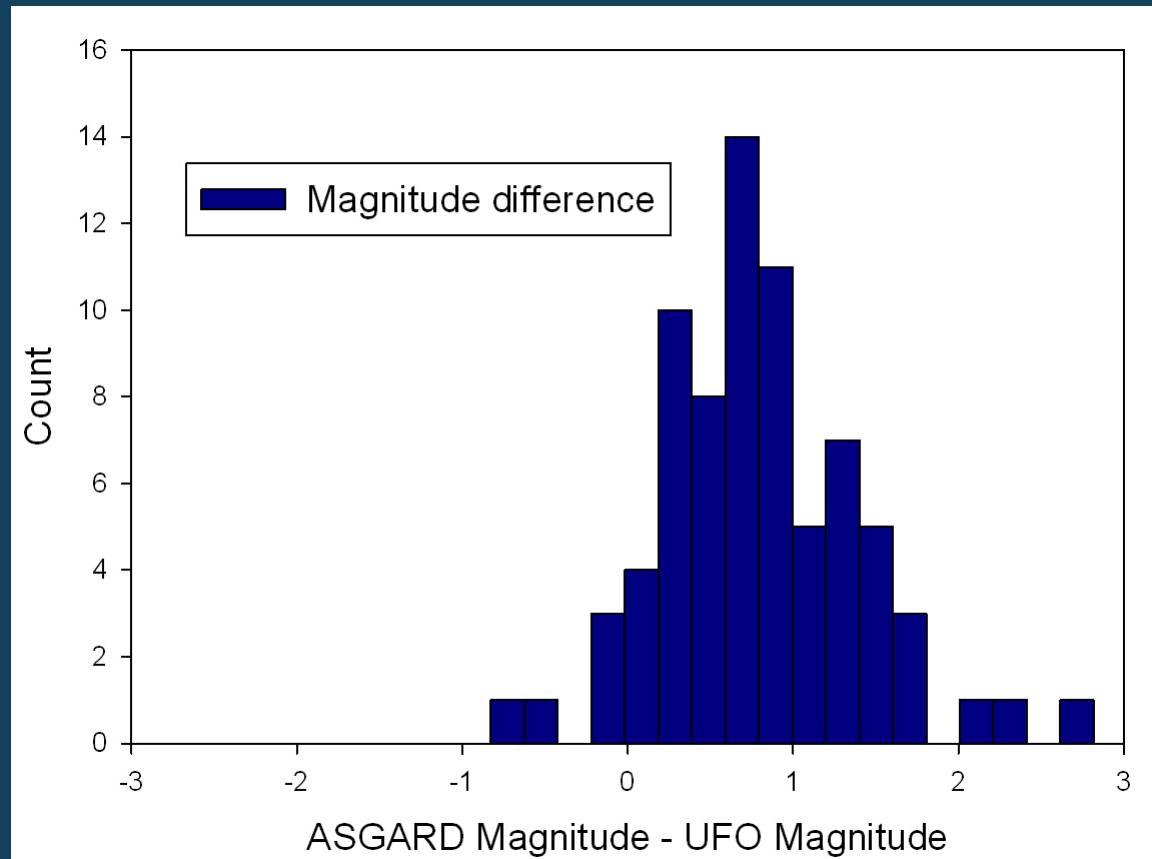
False Alarms



Initial Results – Astrometry



Initial Results - Photometry



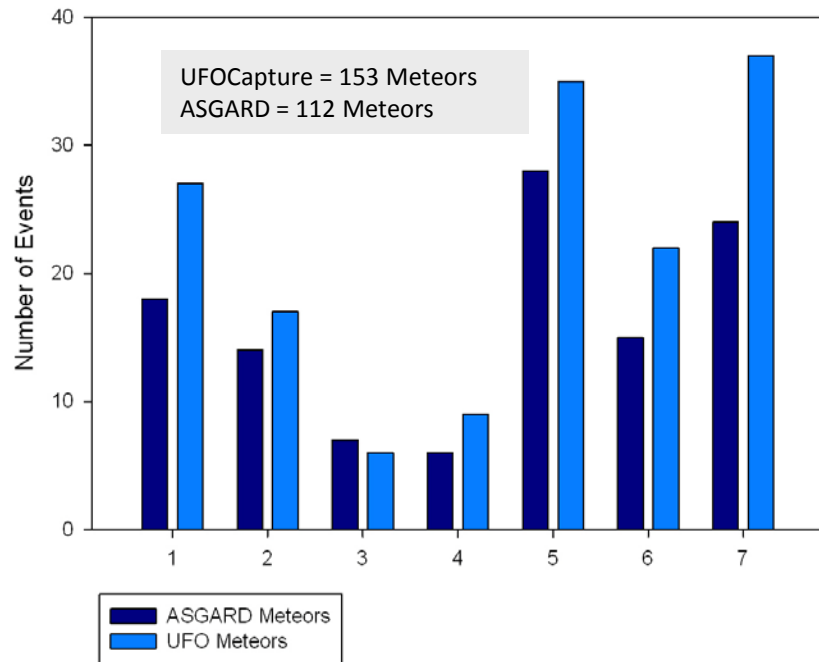
Magnitudes not as reliable.

More work needs to be done in this area.

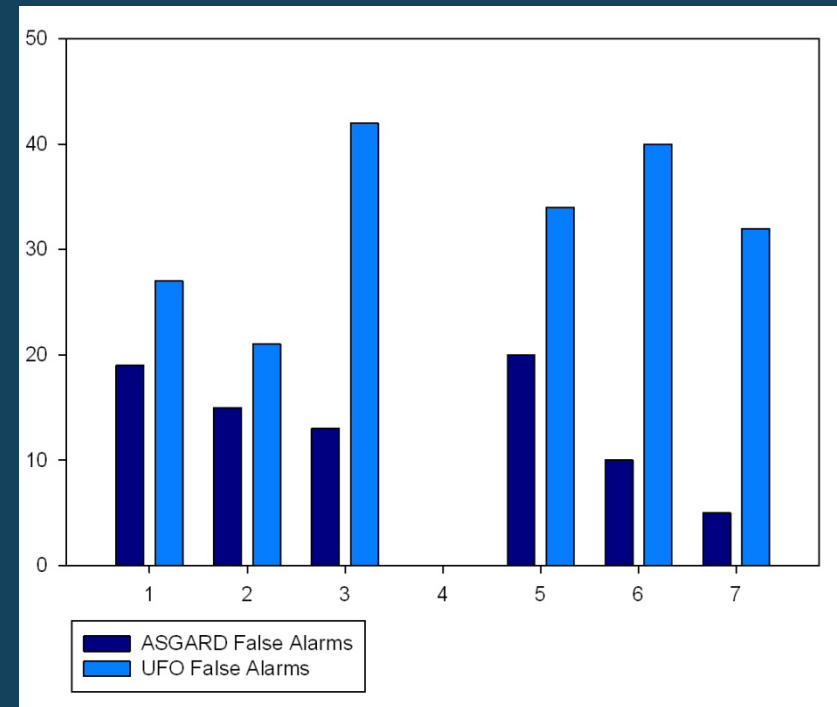
Changes to ASGARD

- 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).

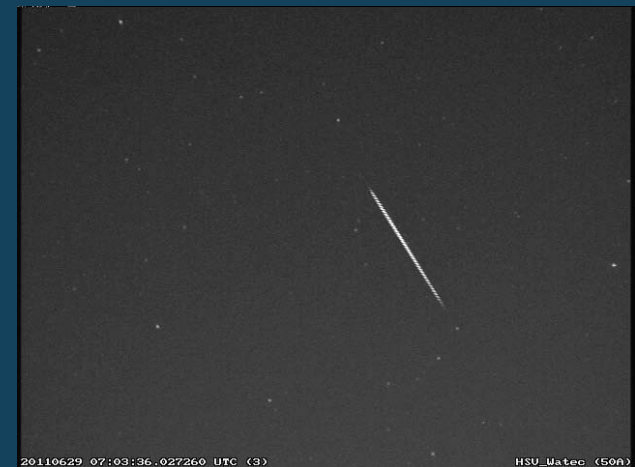
Conclusions + Future Work

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



- FINAL RESULTS STILL TO BE ADDED