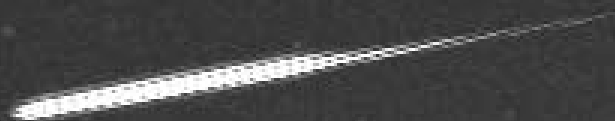# Comparison of ASGARD and UFOCapture

PARI, North Carolina, August 4-5, 2011

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EV44 NASA MSFC

20110624 02:23:21.385805 UTC (3)   HSV_Watec (50A)

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)

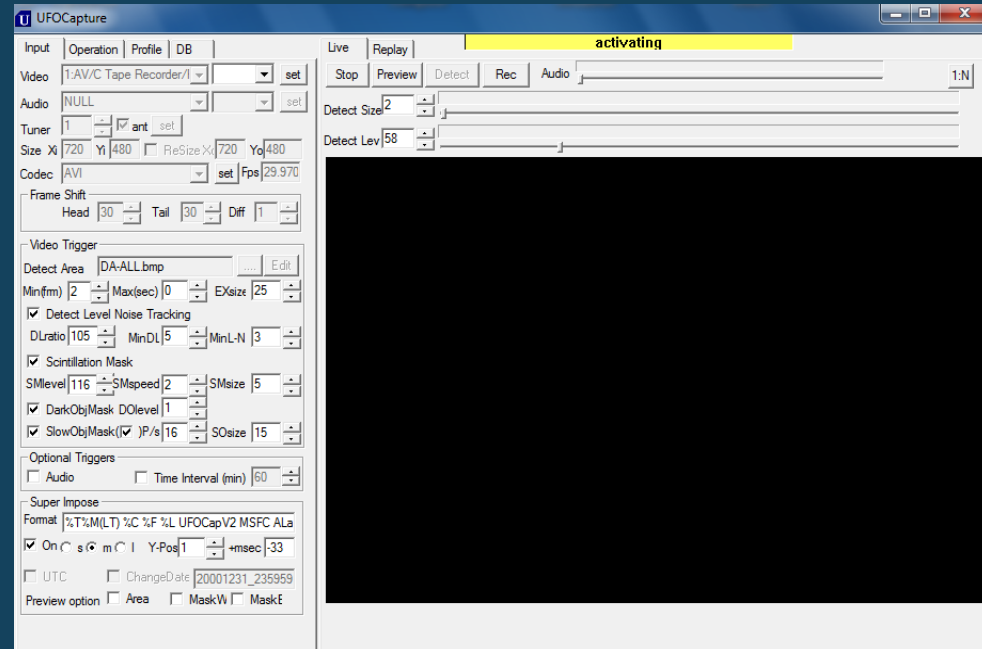$225-$250 depending on exchange rate

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
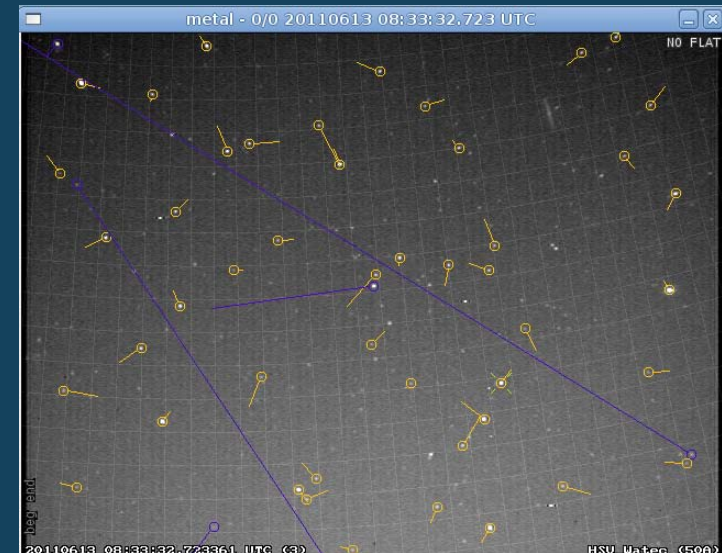
User-Labor Comparison

- 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
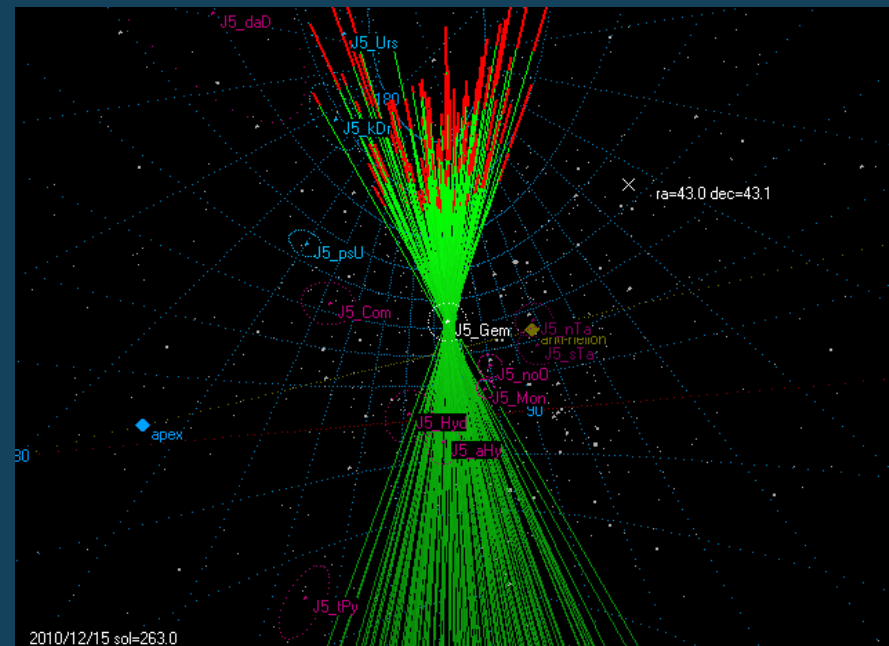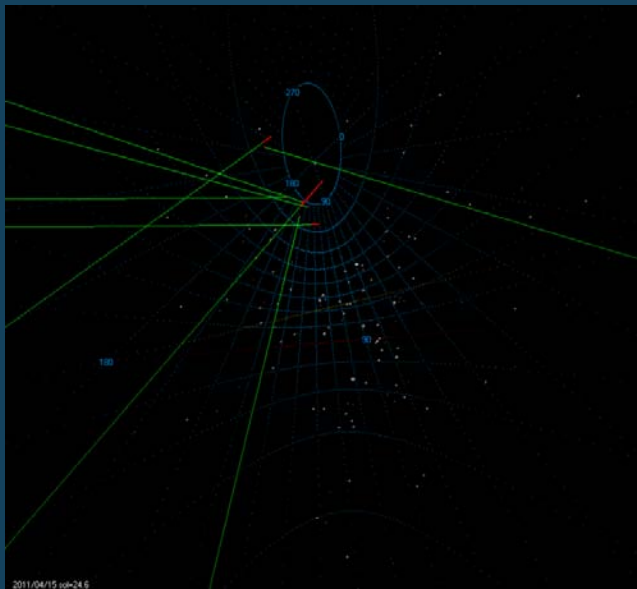
System Output Comparison

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

20110627 06:39:20.724949 UTC   HSU_Watec (50A)

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)
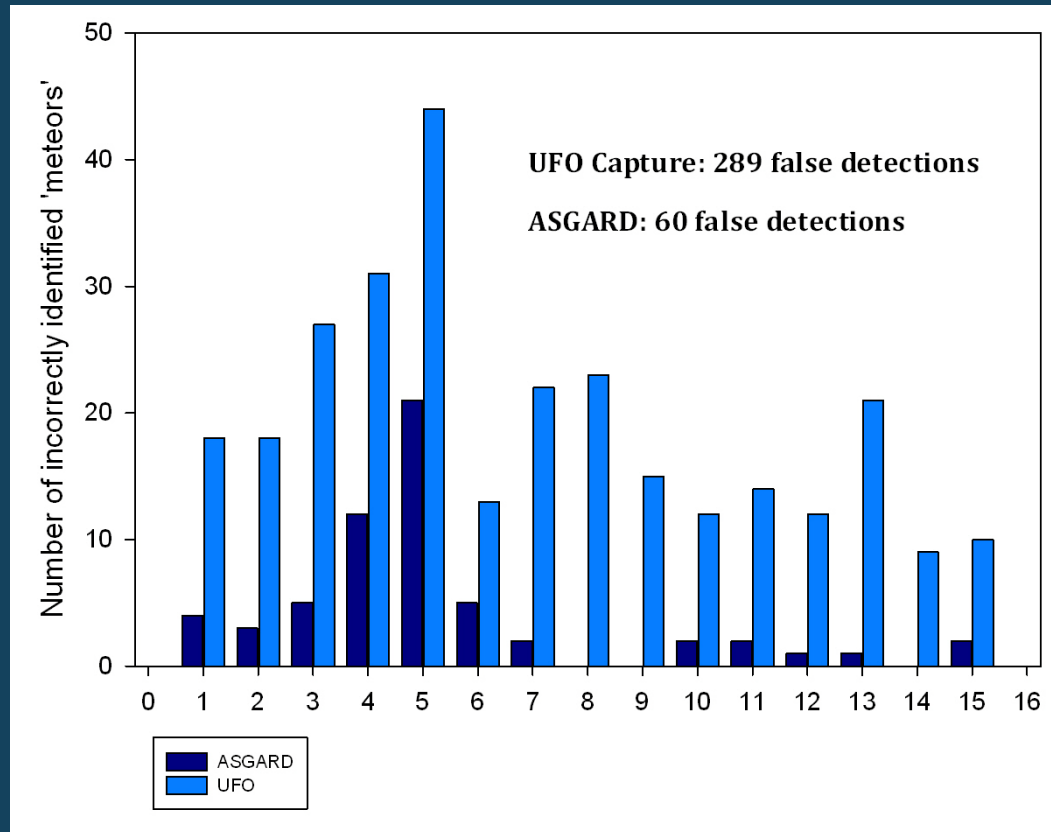- Capture +Analyzing is together.
  - already identifies whether it is a meteor event or not

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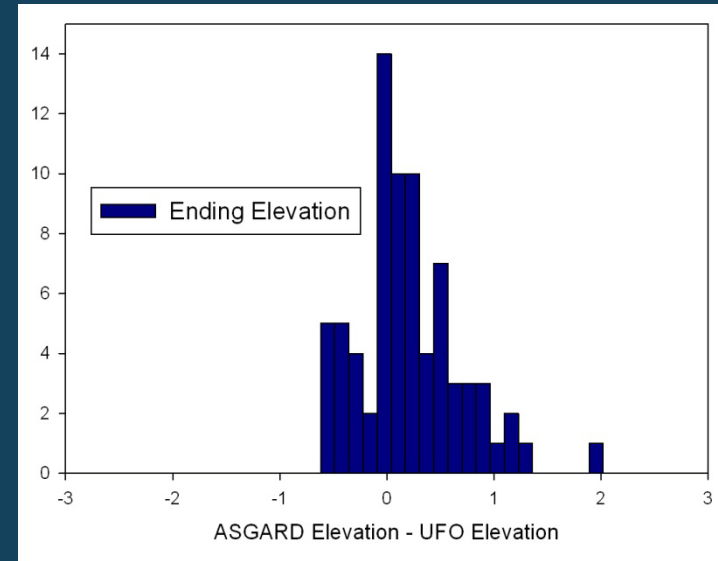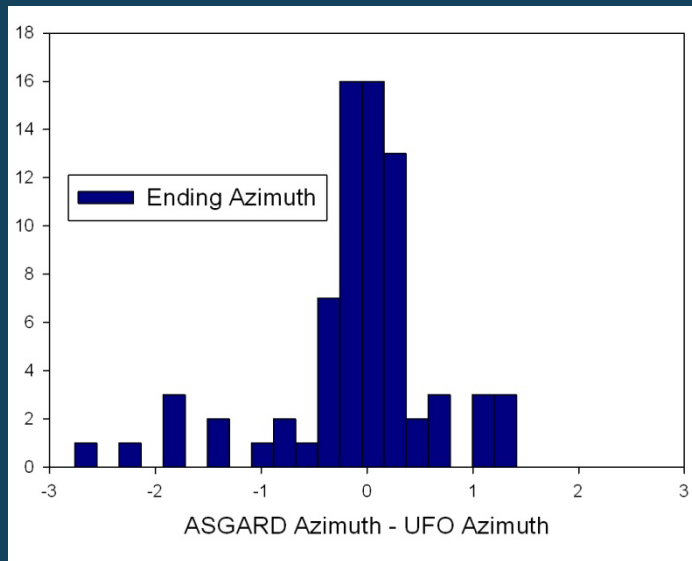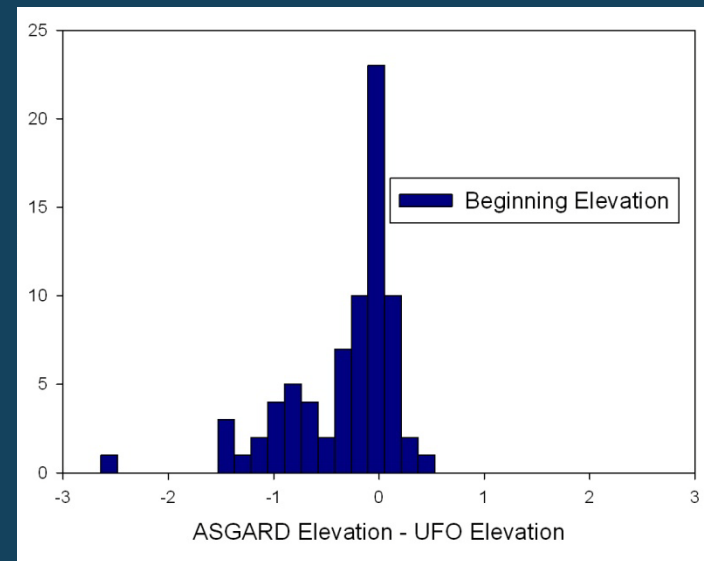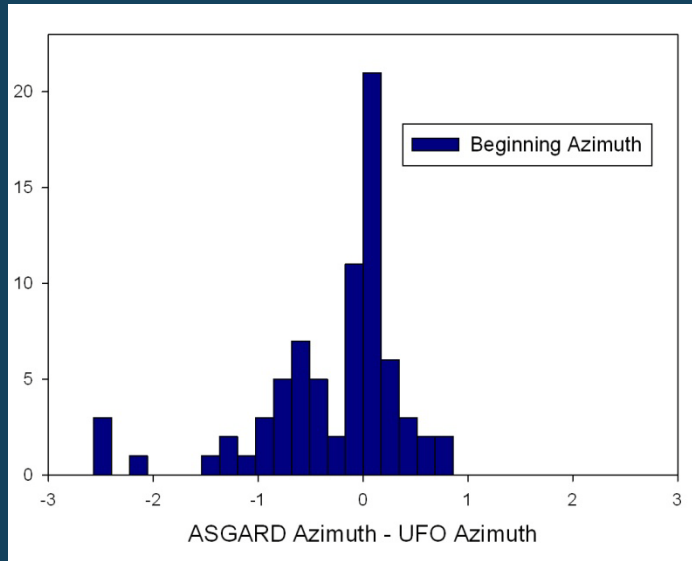
Initial Results
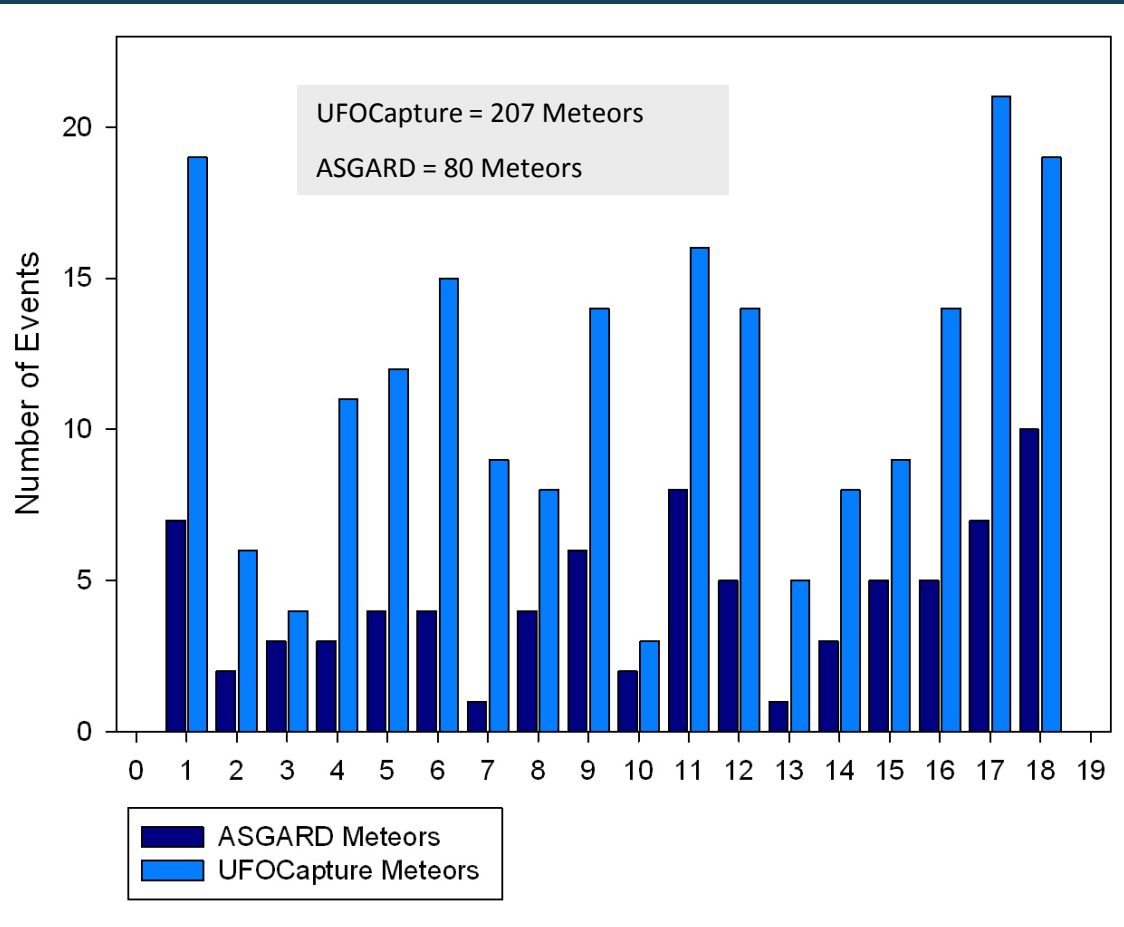
Initial Results

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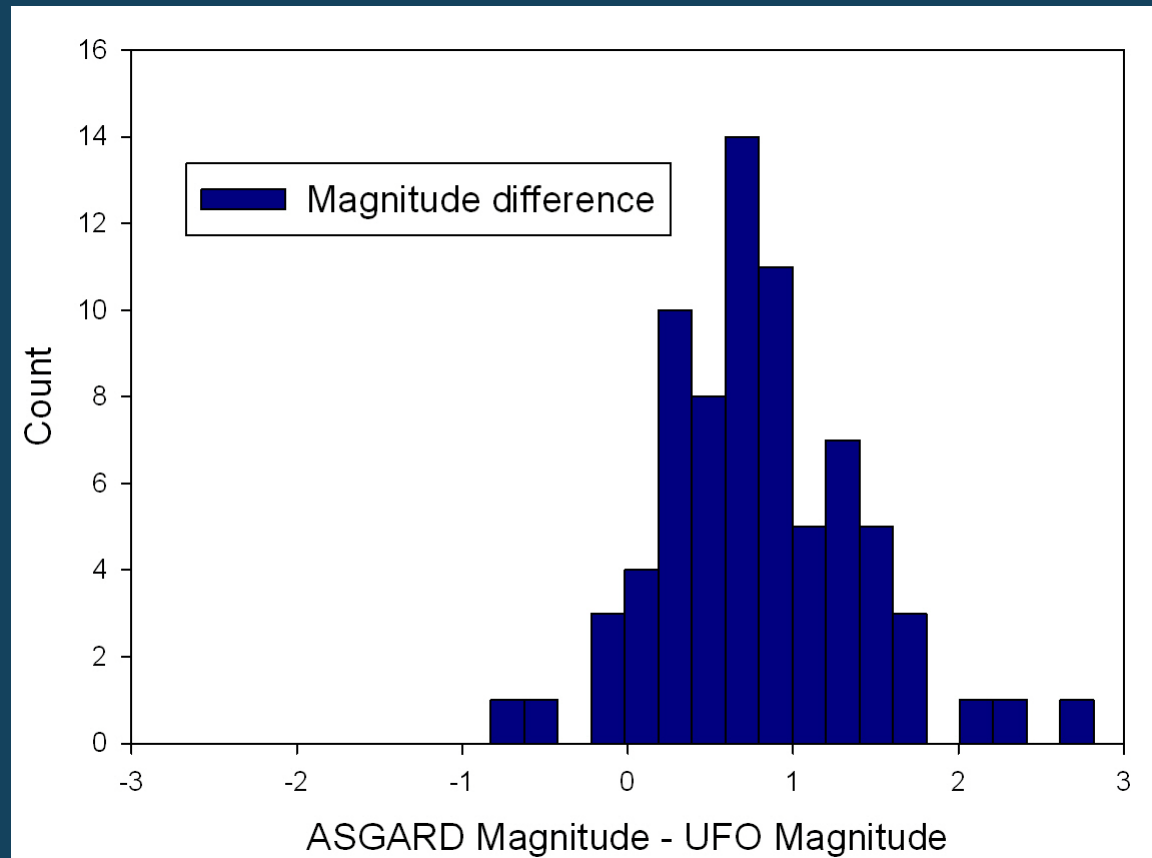 – Hundreds of false alarms for UFOCapture

False Alarms

20110711 02:57:49.886526 UTC — HSV_Watec (50A)

2011/06/09 02:33:49.044(LT) 0067   00001   00000 054 UFOCapV2 MSFC ALaMO

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

UFOCapture = 153 Meteors
ASGARD = 112 Meteors
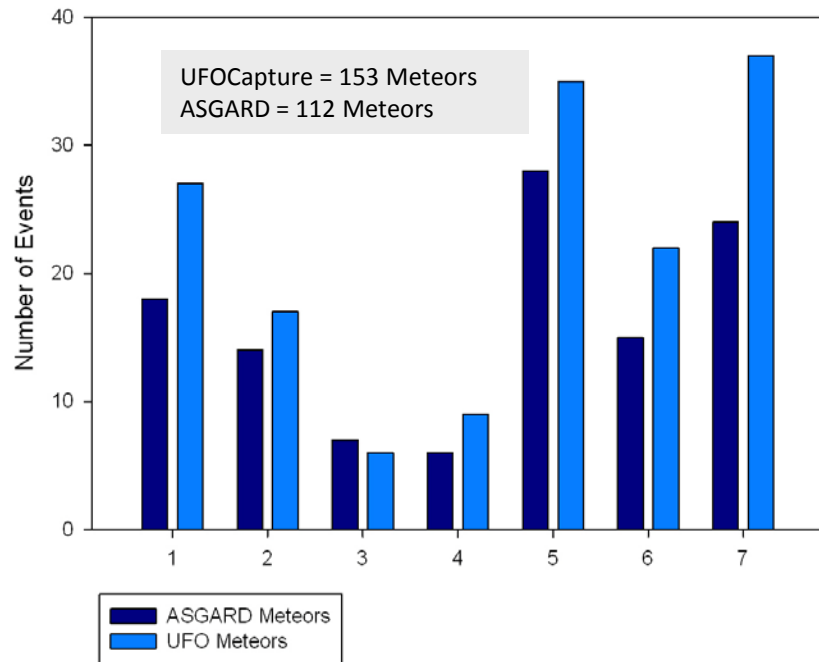
Lowered Threshold (from 75 to 50) and removed a rejection filter that flagged a bunch of single frame triggers (meant for blinking planes).
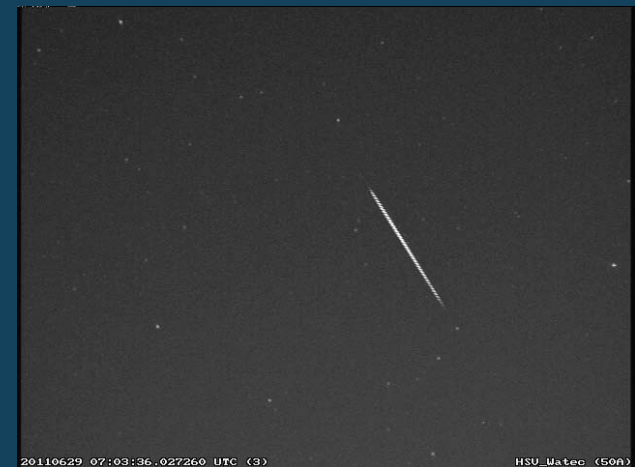
False Alarms:
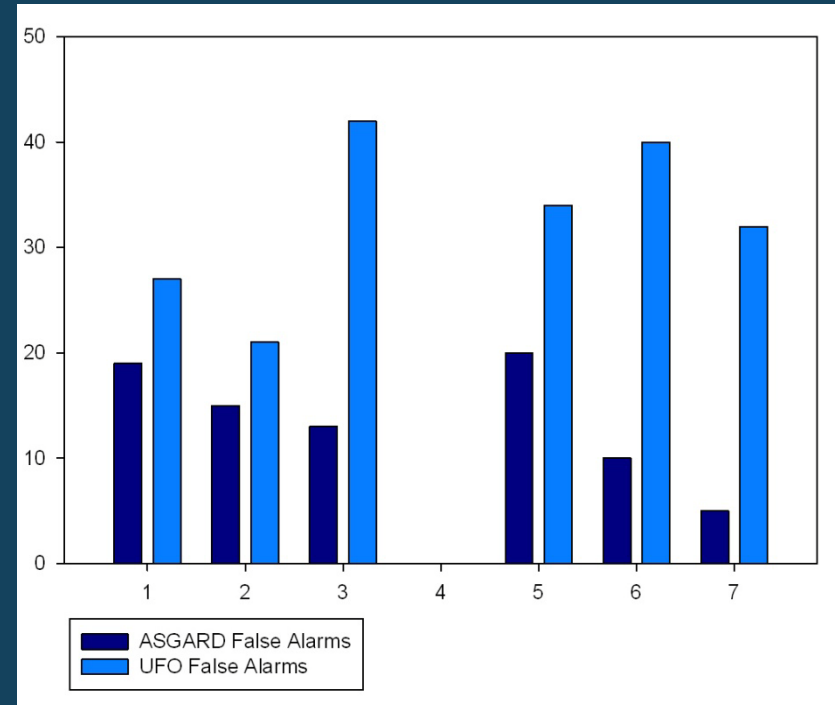
Conclusions + Future Work

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