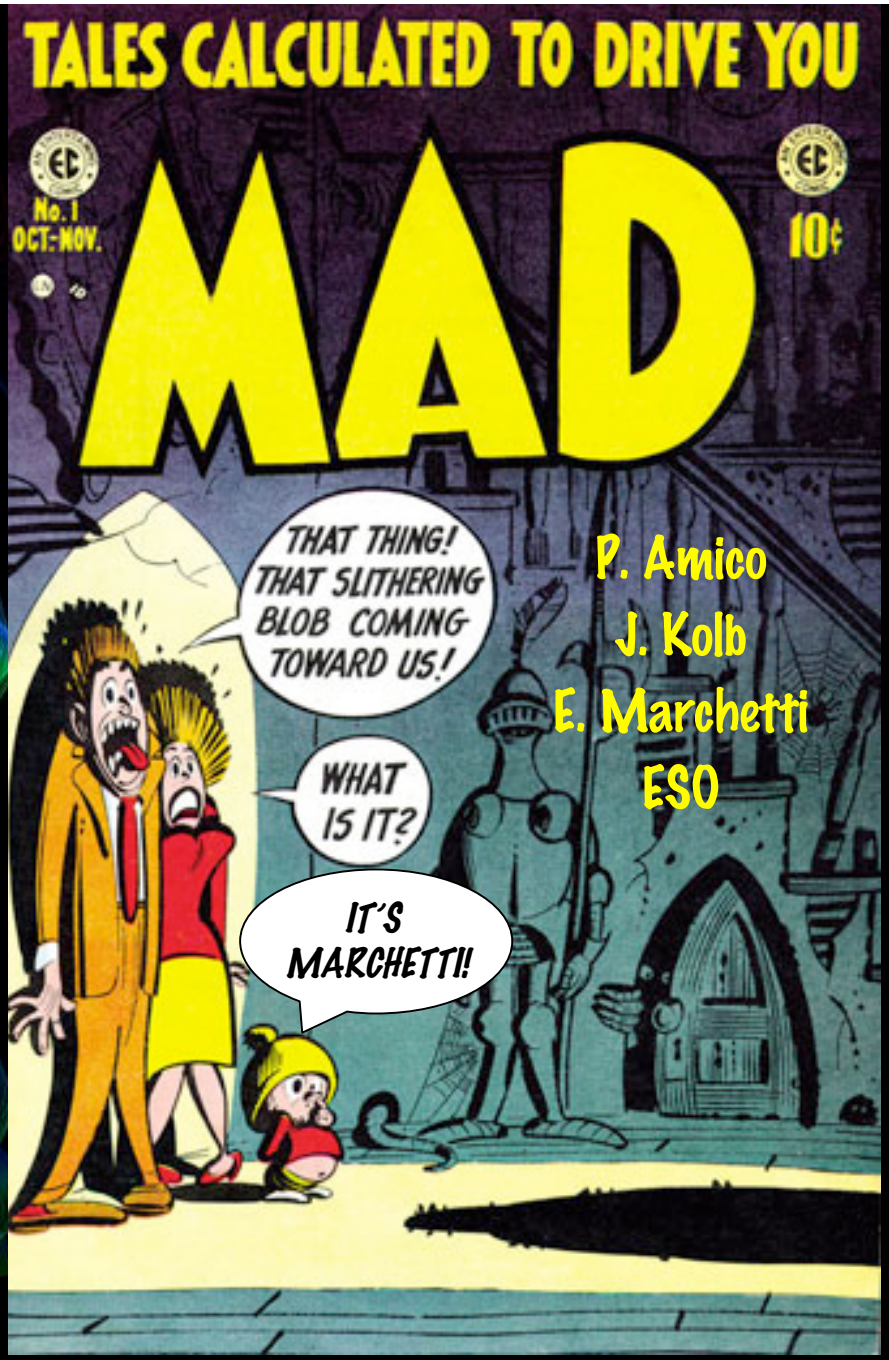



P. Amico
J. Kolb
E. Marchetti
ESO

# Lessons from MAD: from the LAB to the SKY

# Talk synopsis

- Statistics measured for the science demonstration runs:
  - Weather stats
  - Technical time losses
  - Science stats
- Analysis of targets acquisition which is a measure of the "operability" of MAD
- Asterism tutorial: what to do an what to avoid when choosing your NGSs asterims.

# MAD on sky

Three Commissioning runs (2007):

- CR1 (SH): Mar 26 - Apr 5, 8 nights
- CR2 (SH): May 30 - Jun 6, 4 (2) +4 (GTO) nights
- CR3 (LO) : Sep 21 -29, 3+6 (GTO) nights

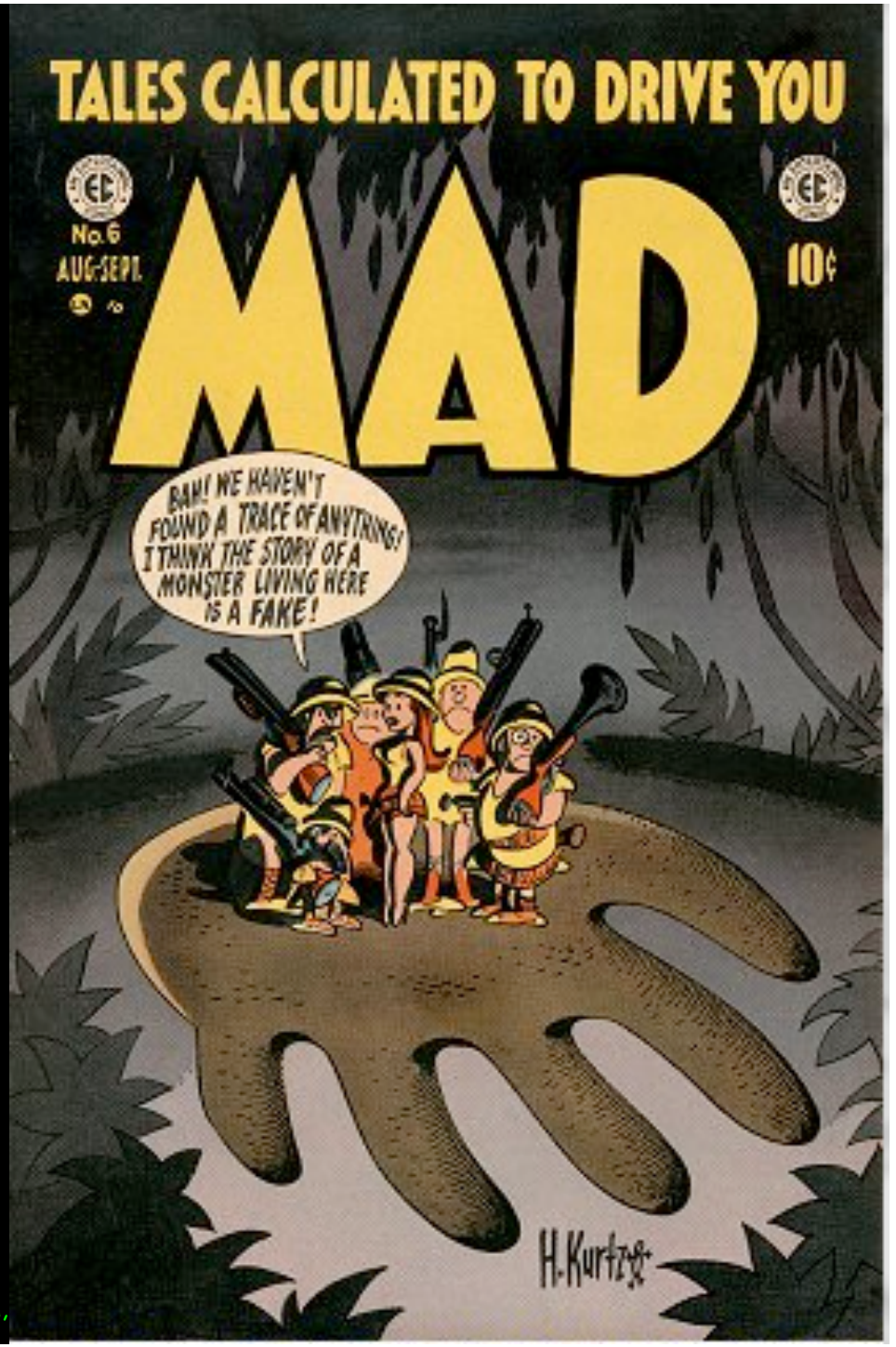
Three Science demonstration runs (Shack-Hartmann mode):

- SD1: Nov. 24 - 30, 2007, 7 nights
- SD2: Jan 7 - 13, 2008, 7 nights
- SD3: Aug 11 - 21, 2008, 9 nights + 1T

SD: 23 nights, 23 Proposals, 39 targets

# MAD SD team

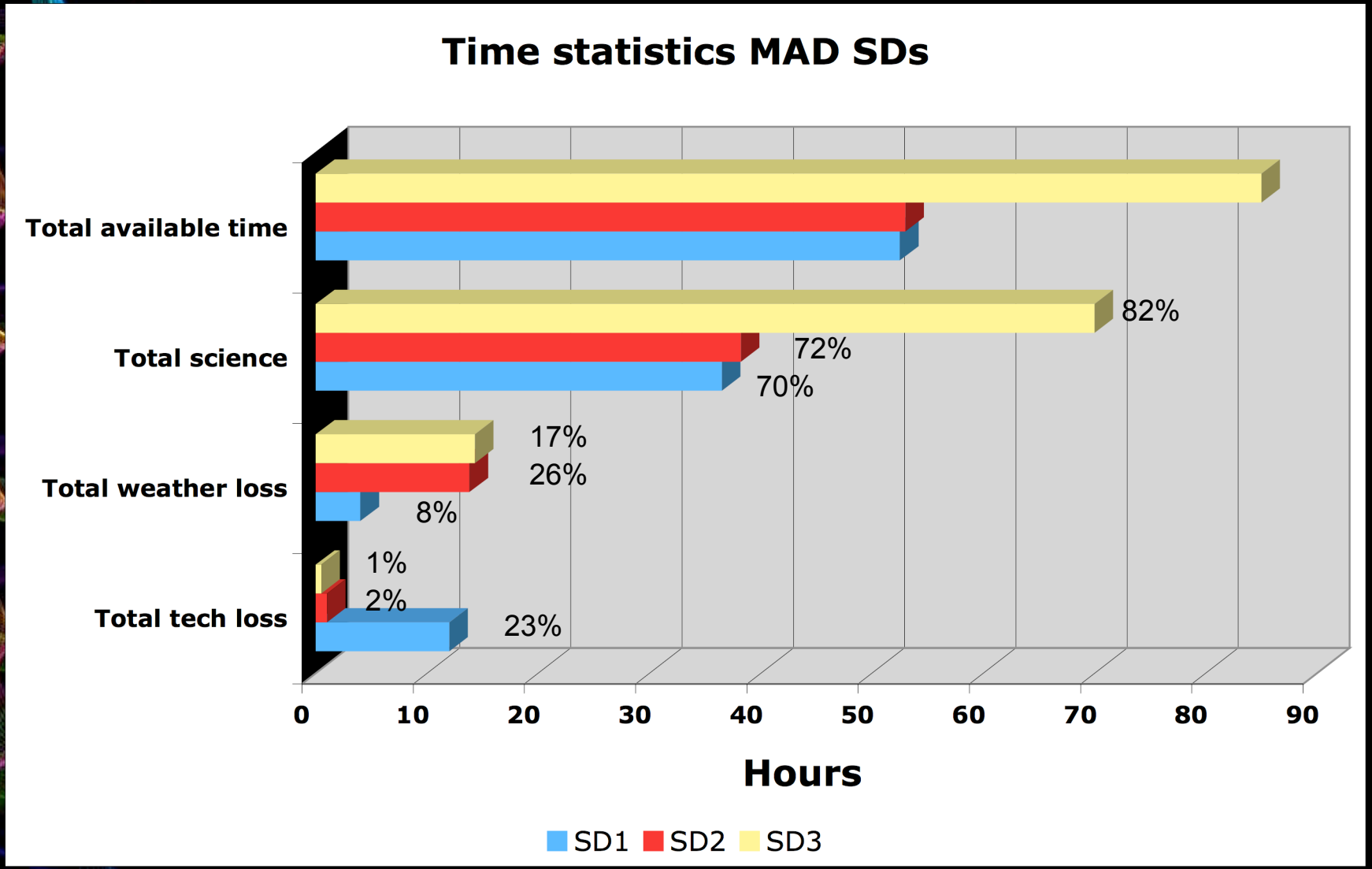
- Technical feasibility
- Phase II
- Pre and post observing support
- Observations and technical support!



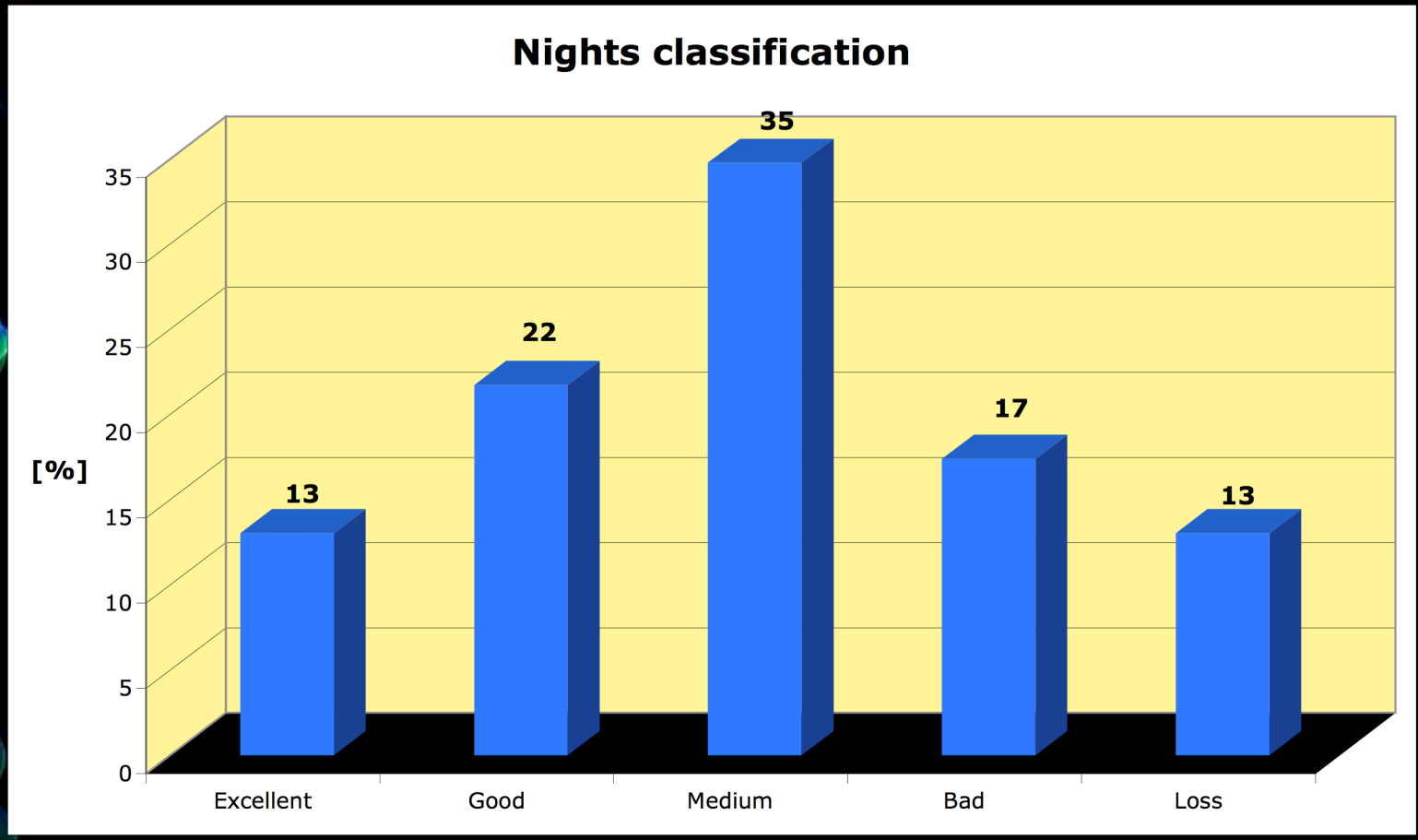
# MAD statistics

- Weather losses
  - 3 Full nights lost
  - 4 nights with marginal conditions
- Technical losses
  - Mostly during SD1
    - De-rotator problem
    - TF error of the HVA
    - "Beagle" contamination
- Science stats

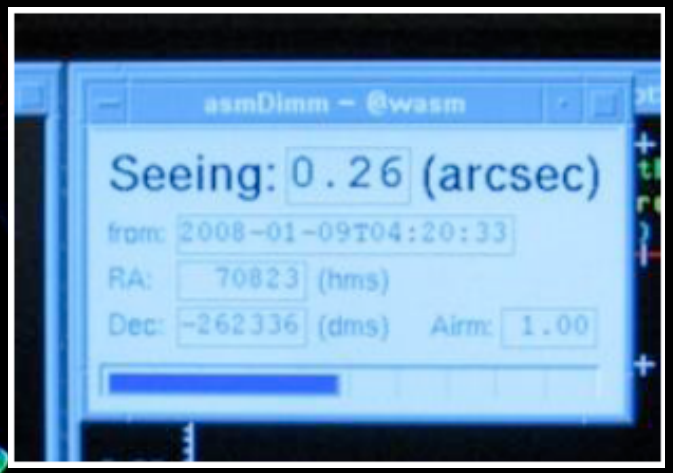
# MAD Time Statistics

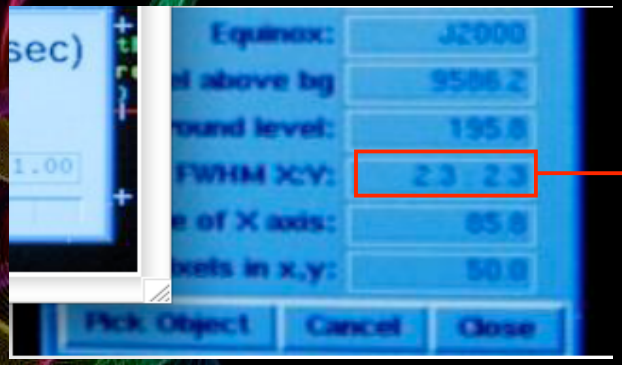


# MAD Weather

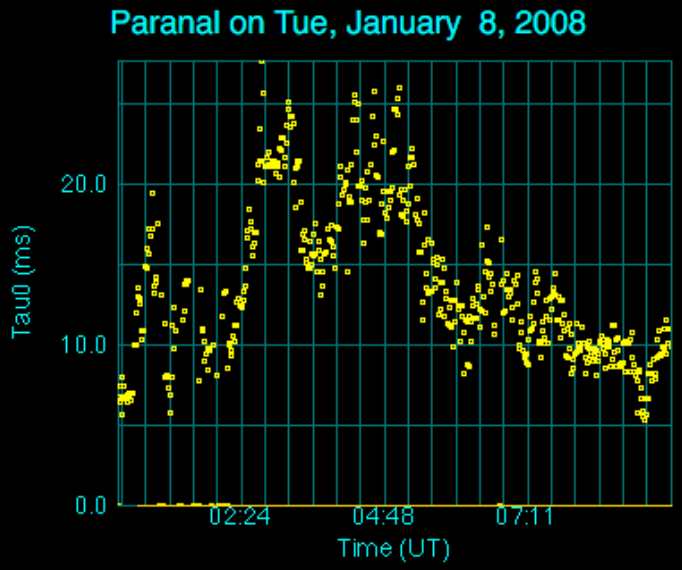

Nights classification
[%]
0
5
10
15
20
25
30
35
13
22
35
17
13
Excellent
Good
Medium
Bad
Loss

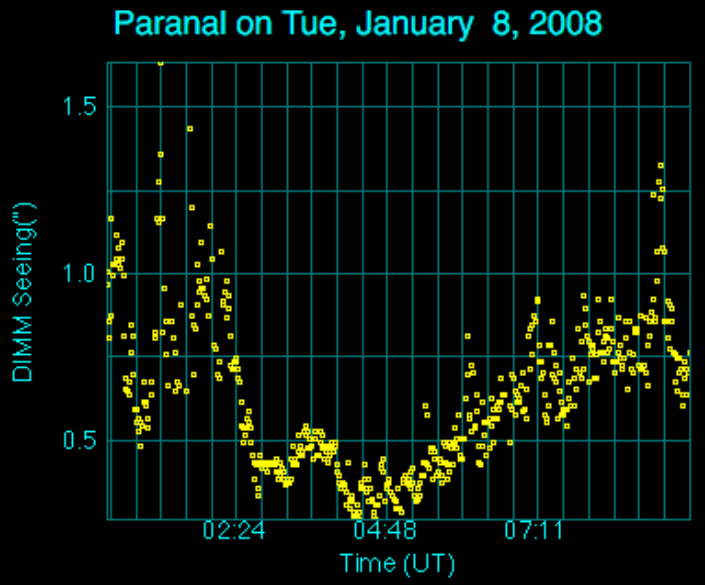
# Momentous moments




65 mas in K



# Time/efficiency loss: De-rotator problem

- Discovered during SD1 on long exposures for object close to zenith (faster rotation)
- Affected mostly DF and Davies field. Needed constant re-centering of NGSs on the WFS. Warped the field.
- Bug in the calculation of the counter rotator rates found and fixed "on-the-fly" by Garching night (!) support.
- Cost 1.5-2 (5) hours on sky

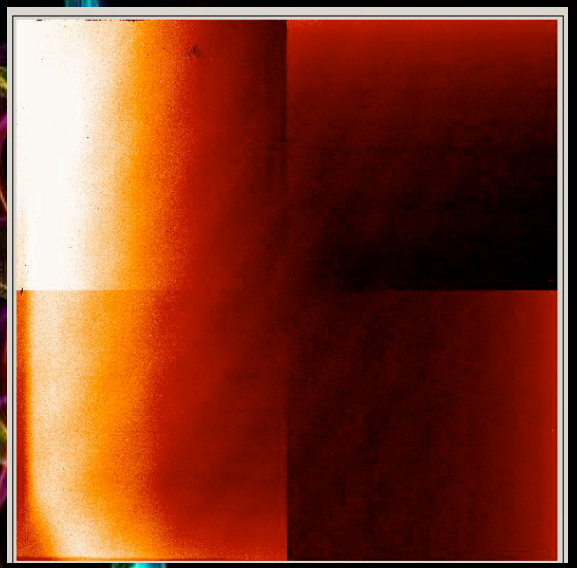
# Time/technical loss: TF error

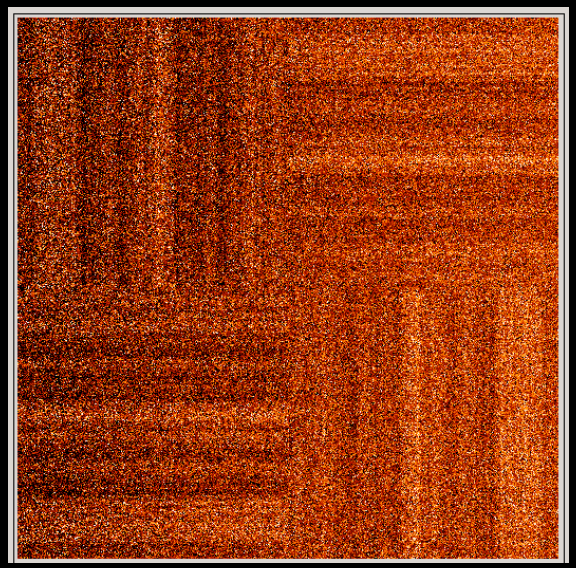
- Symptoms: OS got stuck in a "busy" state and prevented us observations. Required multiple reboots of FIERA, RTC, HVA (in the dome!), SW environments.
- Mostly affected SD1
- Not fixed, but fail-safe "mother-of-all" recovery procedures provided by SW prevented large losses afterwards.
- Cost: few hours on sky.

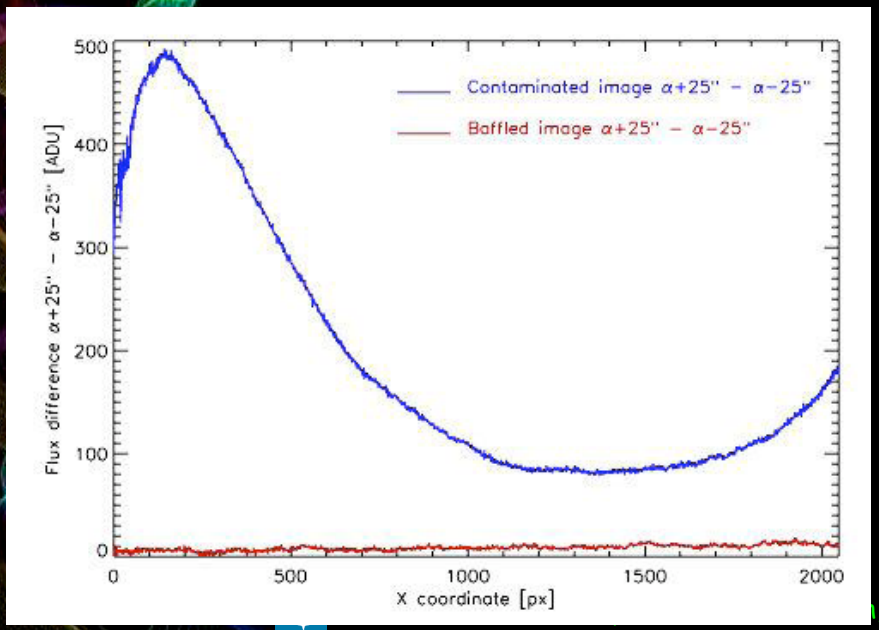
# Quality/efficiency loss: "The Beagle"

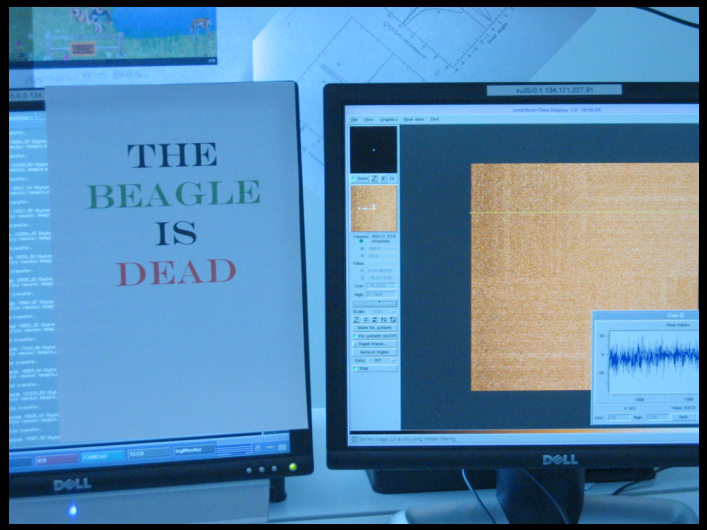
- Dependent on:
  - Camera position
  - DIT
  - Observing conditions (brightness of the sky, time of observation, etc)
- Variable in time (sky variability) with timescales of few minutes (independently of observing filter).
- Cannot be perfectly corrected even when the camera kept in position.
- Effects minimized at the cost of observing efficiency

# "The Beagle"

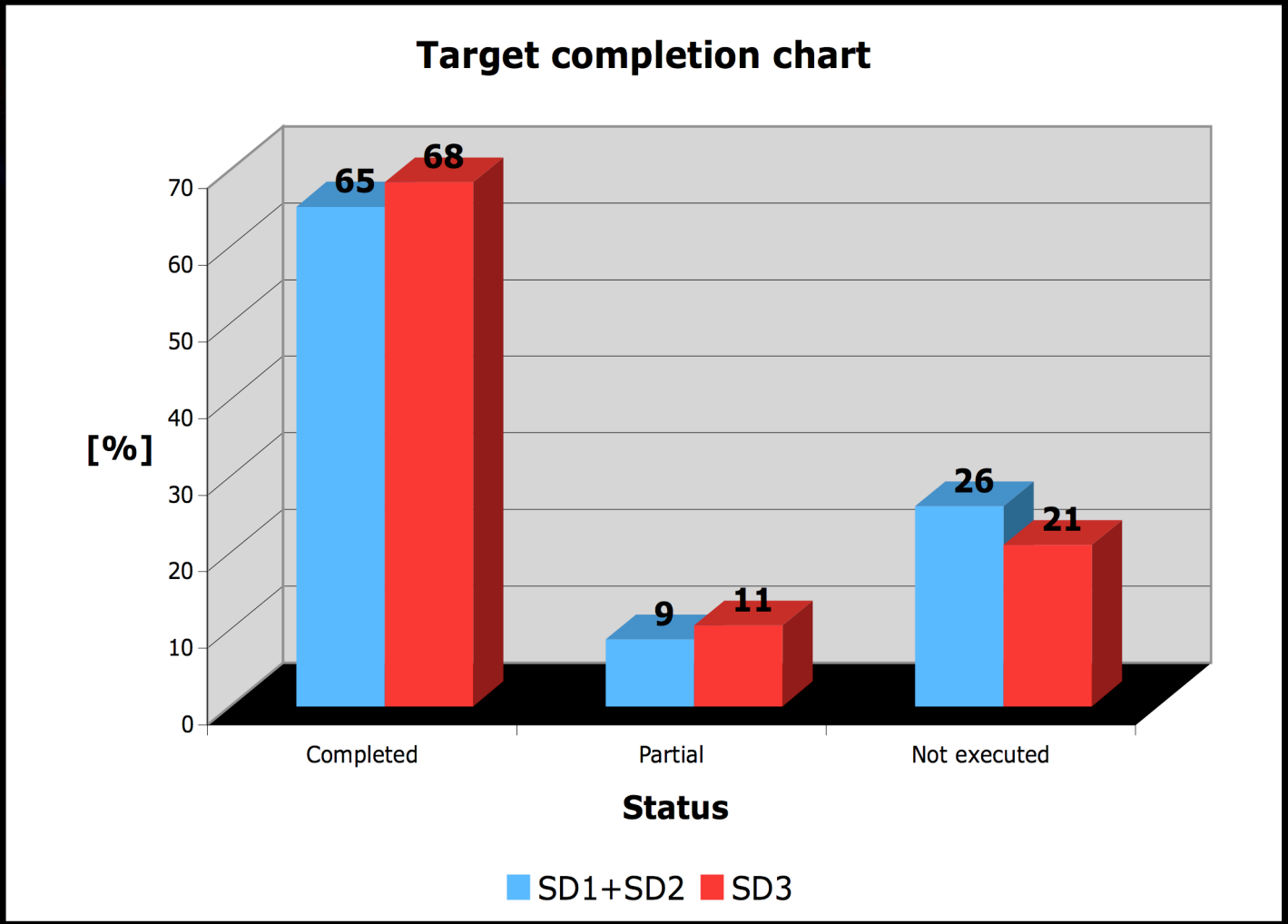





Contaminated image α+25'' − α−25''
Baffled image α+25'' − α−25''
Flux difference α+25'' − α−25'' [ADU]
X coordinate [px]
0
100
200
300
400
500
0
500
1000
1500
2000


THE
BEAGLE
IS
DEAD

# MAD Science


Target completion chart
[%]
70
60
50
40
30
20
10
0
65
68
9
11
26
21
Completed
Partial
Not executed
Status
SD1+SD2
SD3

# Typical AO acquisition (e.g. NACO Imaging)

## Automatized/Template driven:

1. Preset the telescope/Instr. setup
2. AO setup
3. AO guide star (1! TTS + laser star in LGS mode) acquisition (sky subtraction + centering).
4. Optimization
5. Close the loop
6. Target acquisition (centering of the field on CONICA)

# MAD acquisition steps

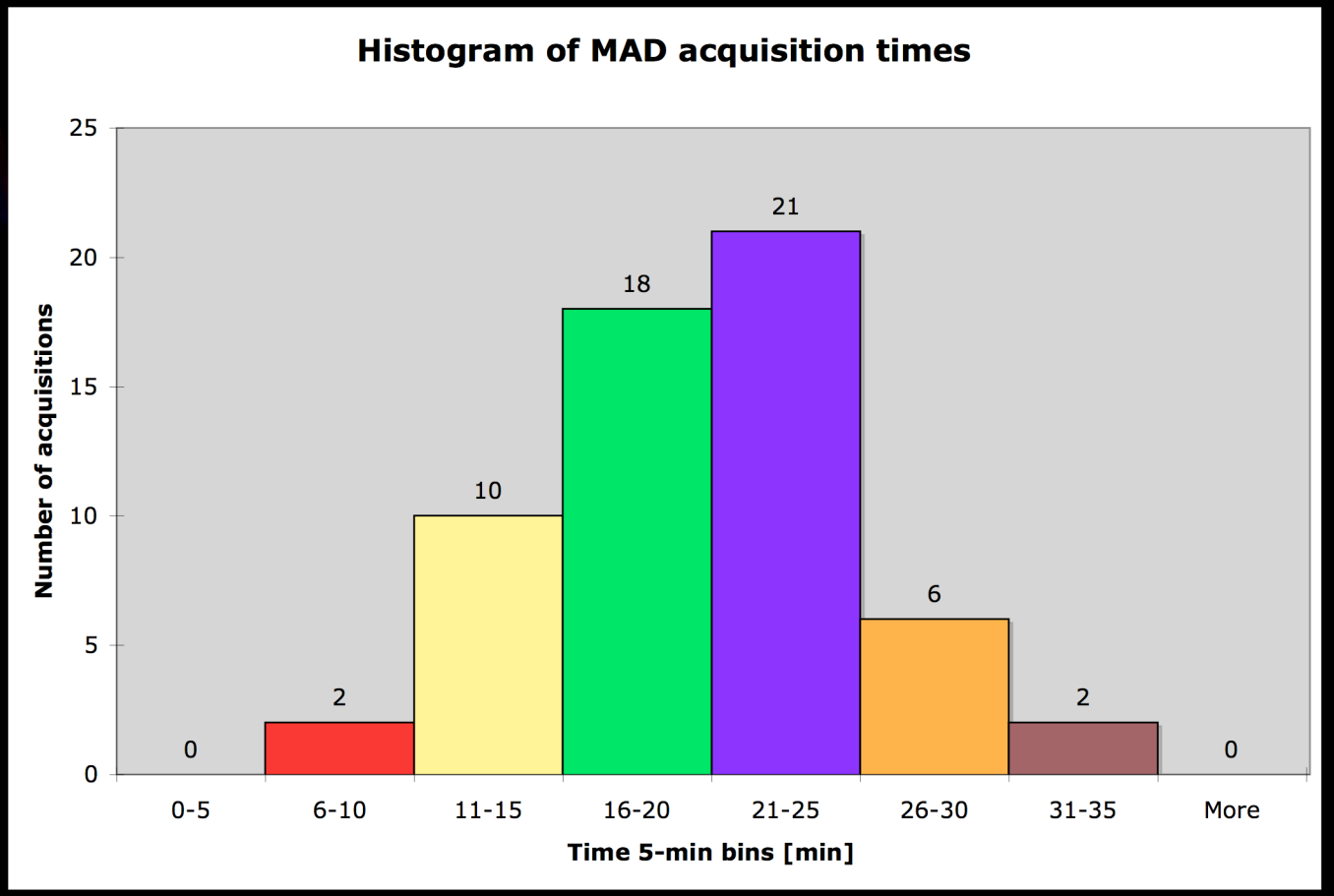
## Template driven:

1. Preset the telescope
2. AO Setup
3. Acquire the 3 (!) NGSs
4. Target acquisition (Center the science field)

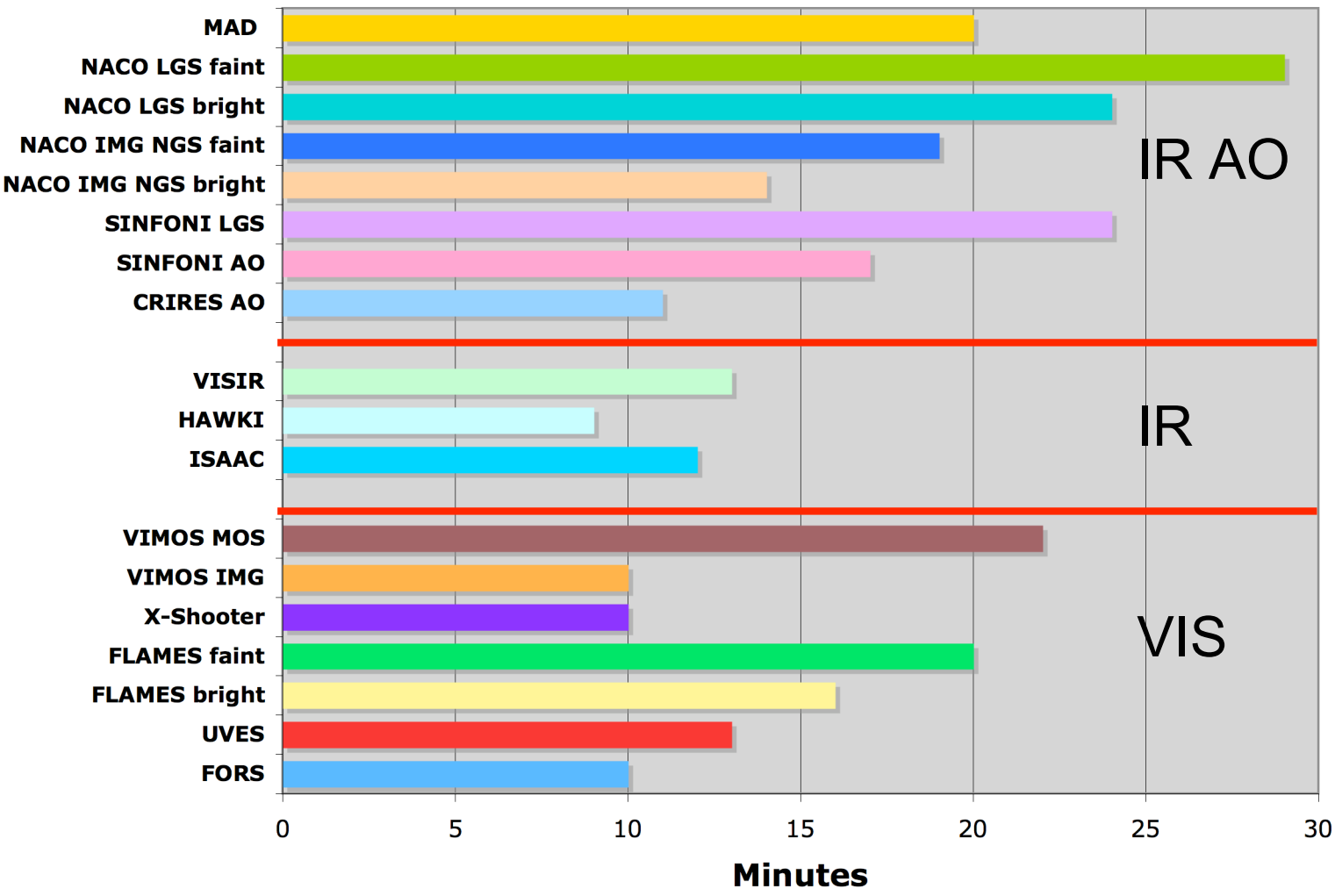
## Performed manually:

5. Centering of the 3 (!) NGS on WFSs
6. Adjust AO parameters and reacquire NGSs
7. Measurement of the IM/CM (various steps)
8. Close the loop - Optimize (e.g loop gain)
9. CAMCAO setup (focus)
10. Measure magnitudes

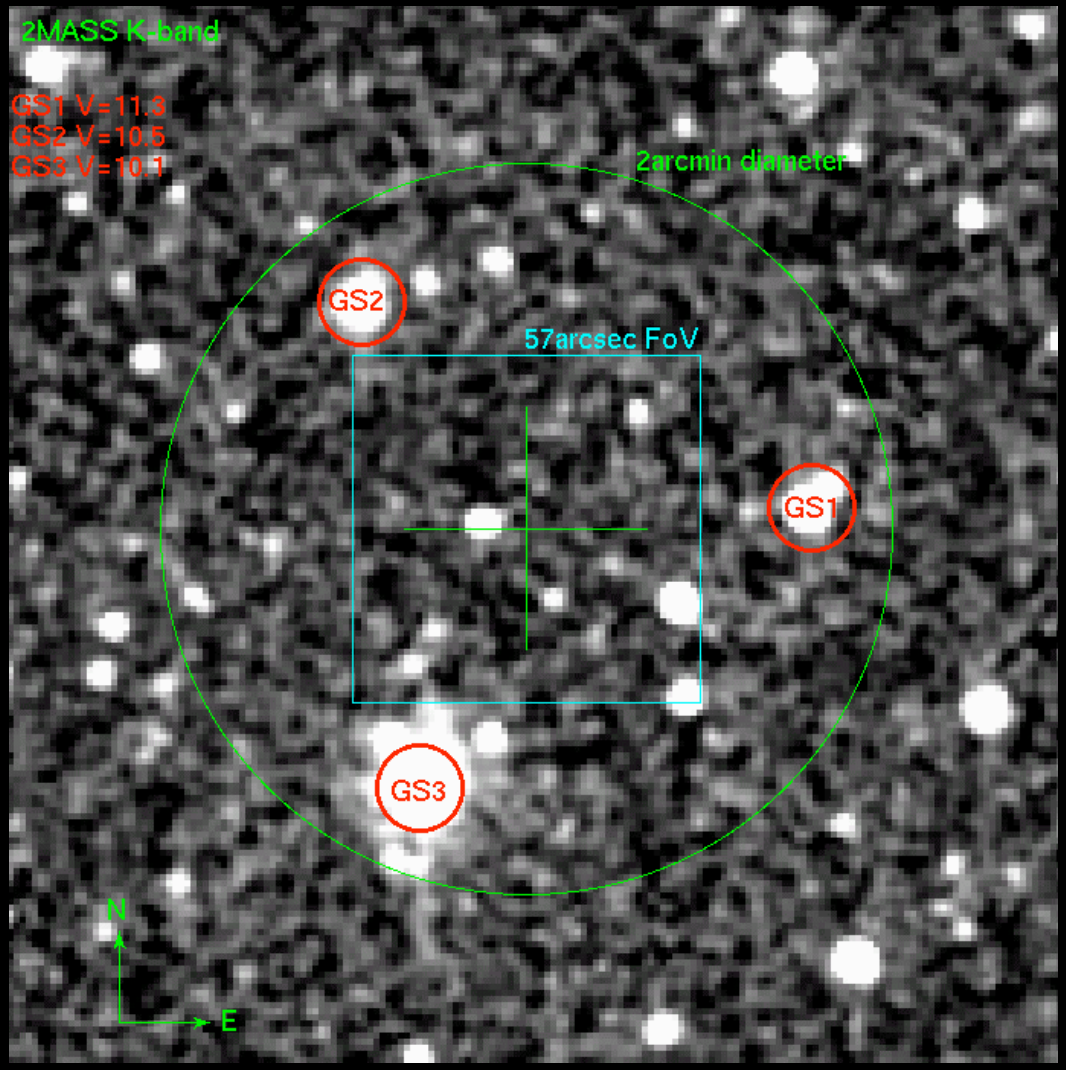
# MAD Acquisition time



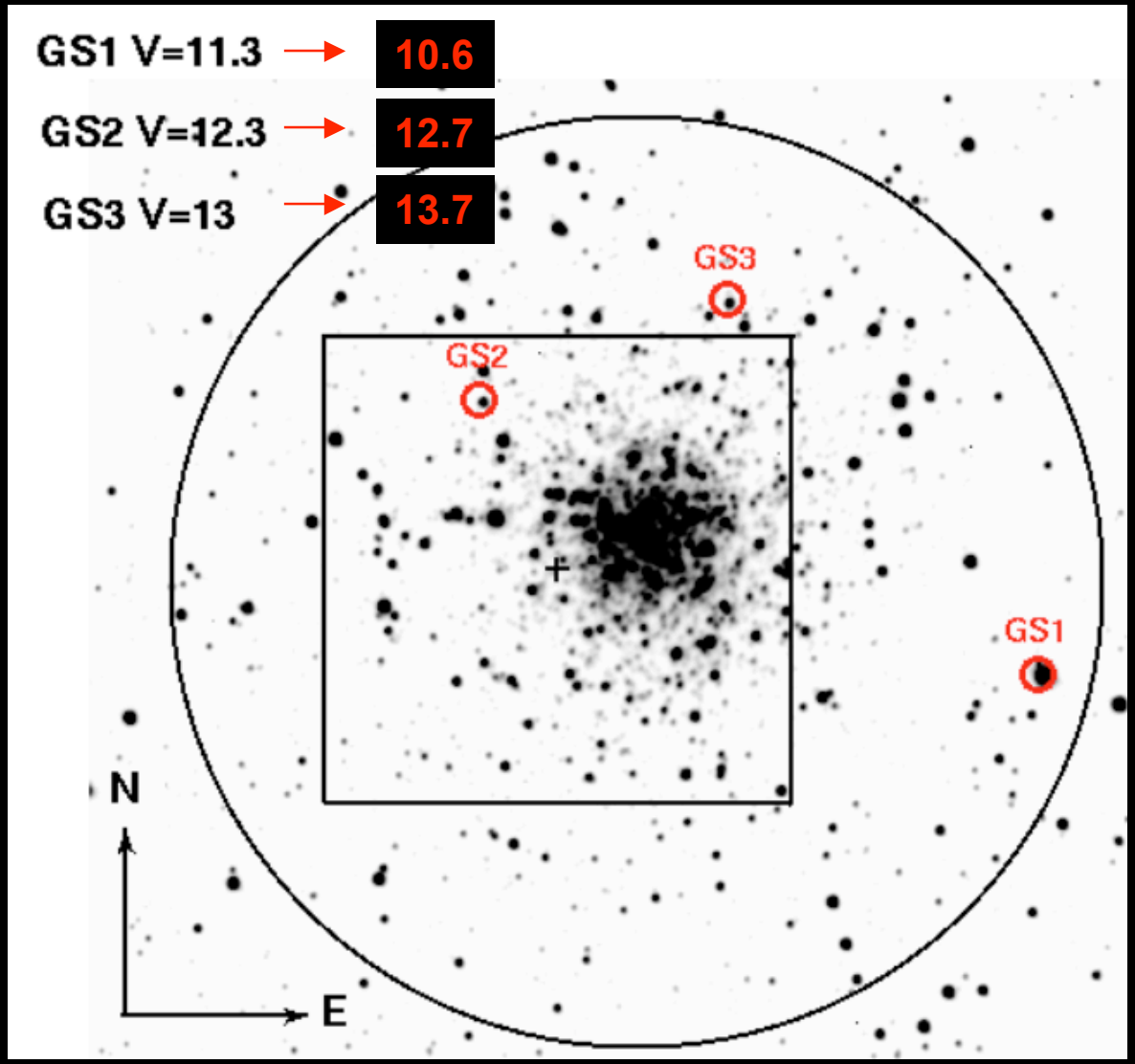

Mean value is 20.3 ± 5.0, Min=9, Max is 32.
It includes the 6 minutes telescope preset


VLT Instruments acquisition times
(including 6 minutes telescope preset)
MAD
NACO LGS faint
NACO LGS bright
NACO IMG NGS faint
NACO IMG NGS bright
SINFONI LGS
SINFONI AO
CRIRES AO
IR AO
VISIR
HAWKI
ISAAC
IR
VIMOS MOS
VIMOS IMG
X-Shooter
FLAMES faint
FLAMES bright
UVES
FORS
VIS
0
5
10
15
20
25
30
Minutes

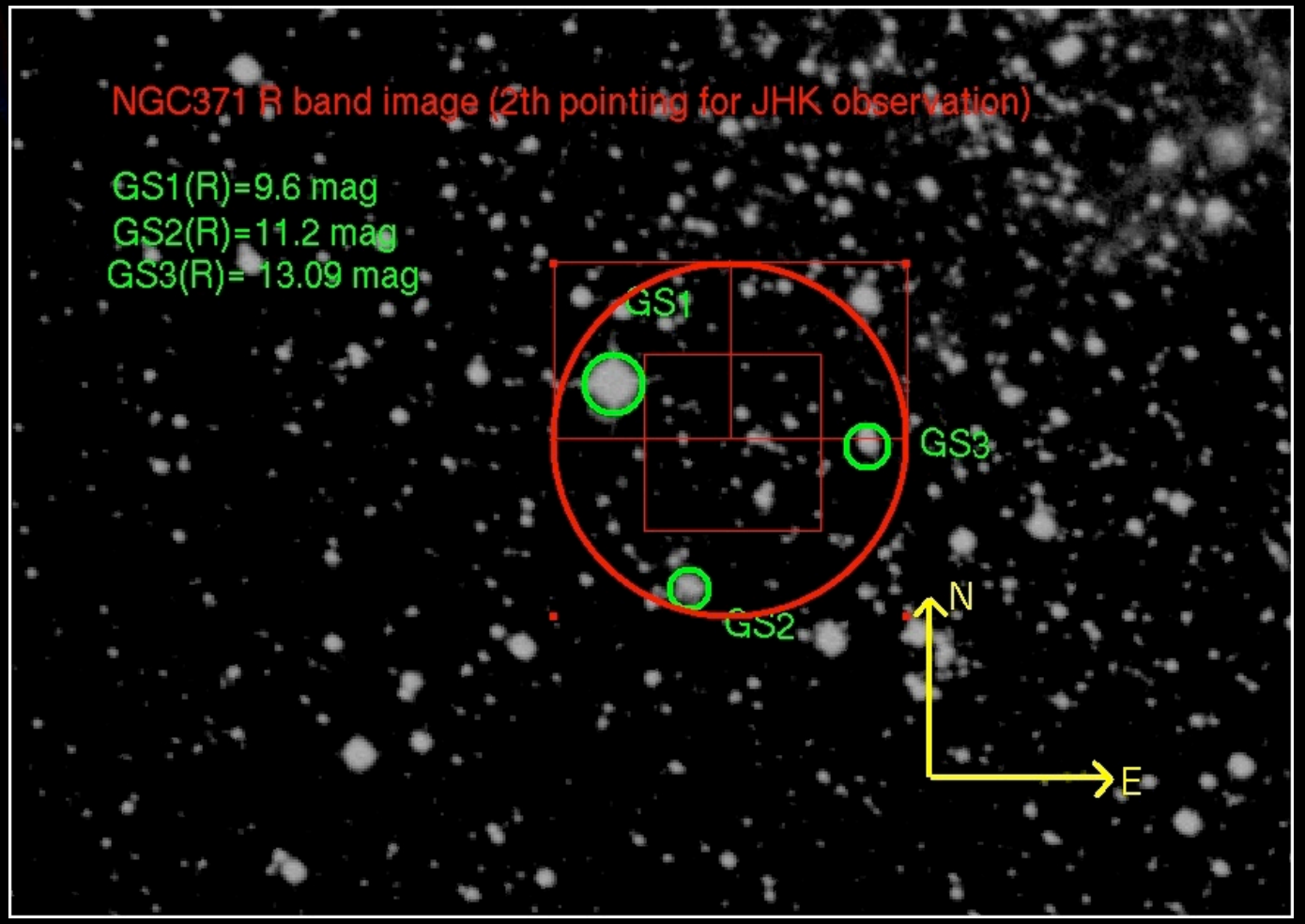
# The perfect MAD asterism (Thank you Ric!)



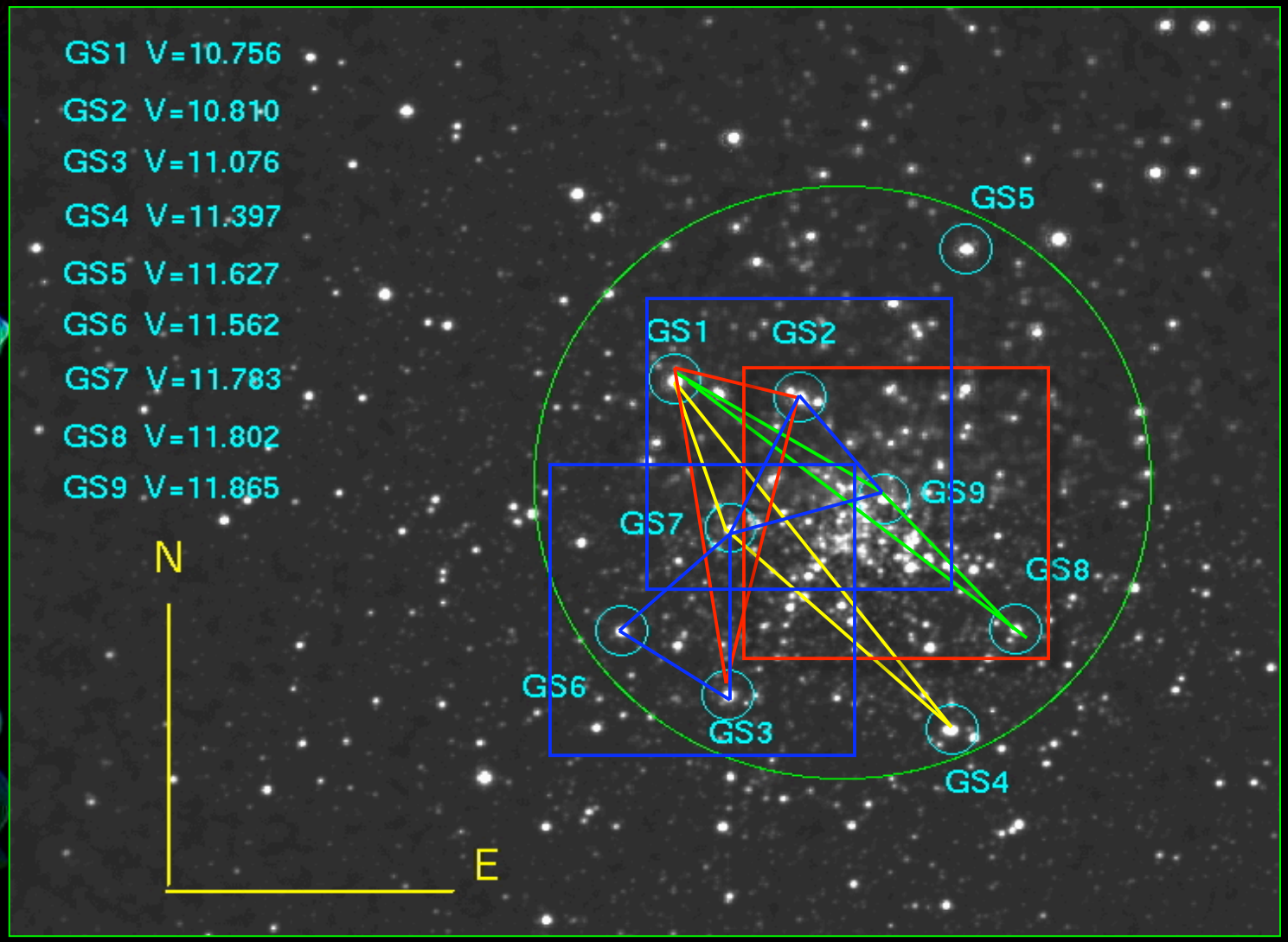
# A difficult asterism



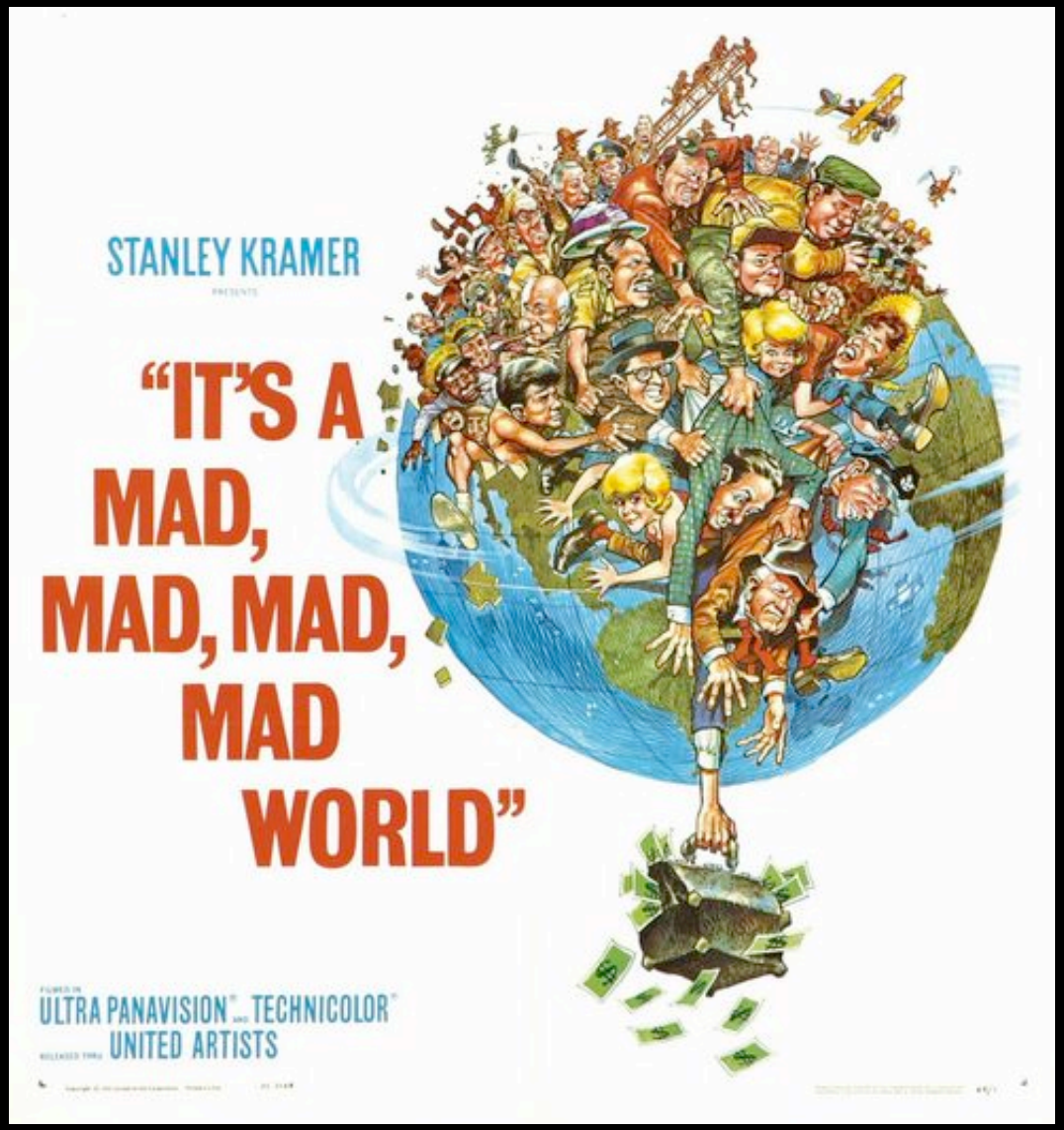
# A non-advisable asterism
# Magnitude ratios



# Non-feasible asterisms
# Wrong geometries



# Questions ?


STANLEY KRAMER
"IT'S A MAD, MAD, MAD MAD WORLD"
ULTRA PANAVISION AND TECHNICOLOR
UNITED ARTISTS