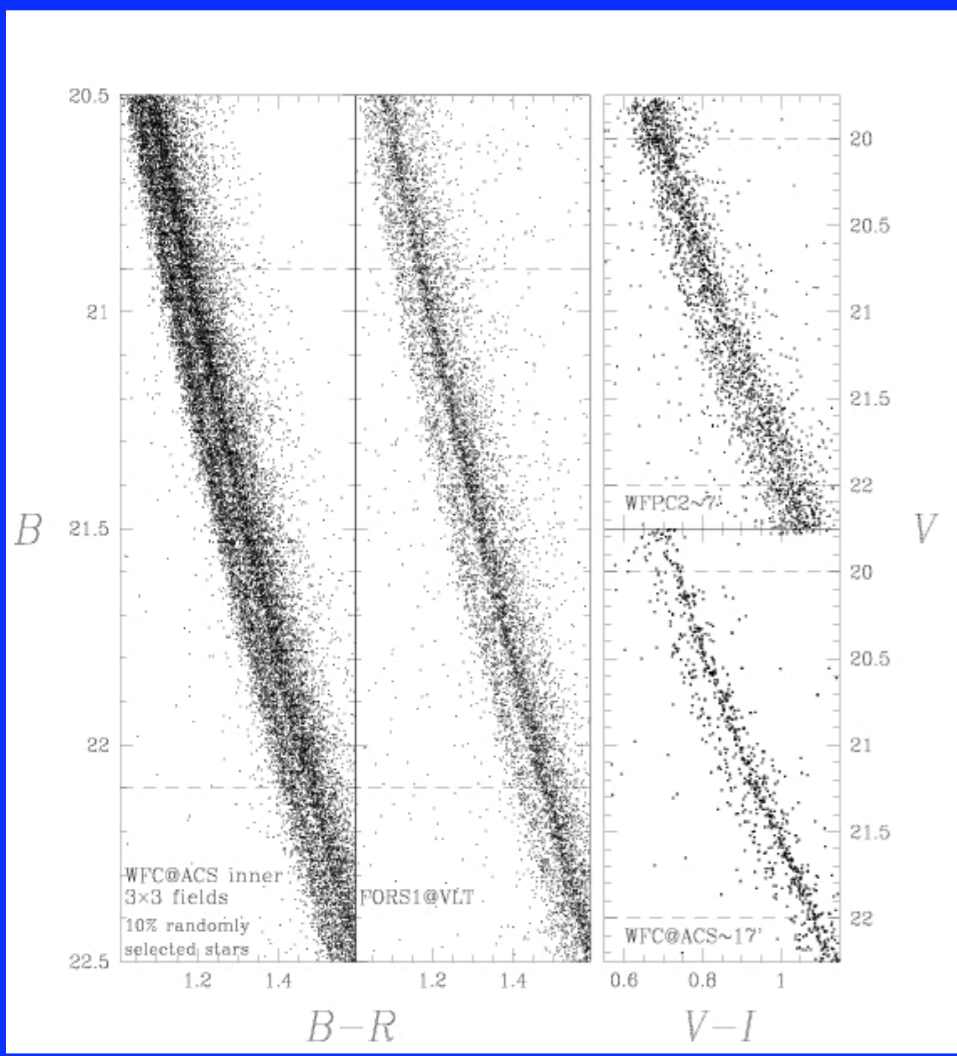


PERFORMANCES AND SKY COVERAGE OF MAD-MAX FOR GLOBULAR CLUSTERS

A . M O R E T T I (I N A F / O A P D)

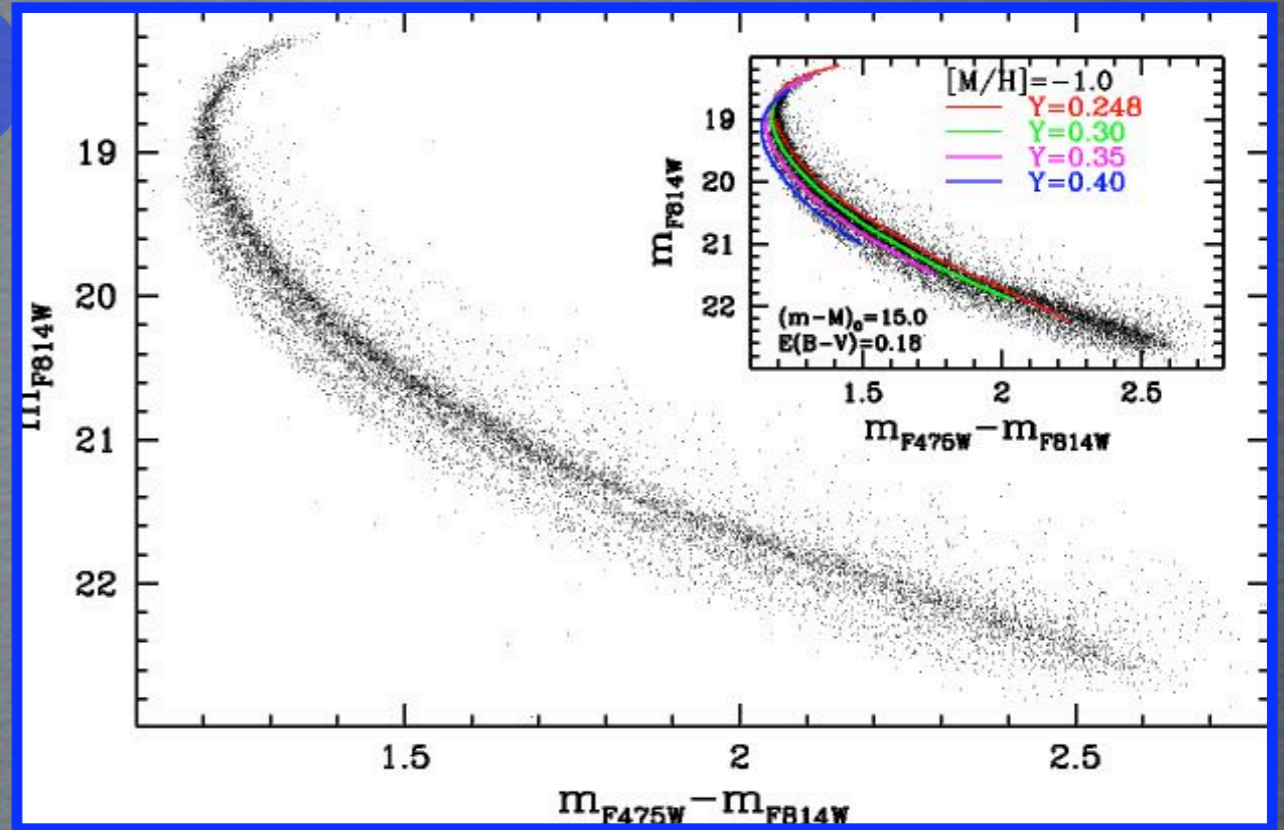
GCs multiple sequences

HST

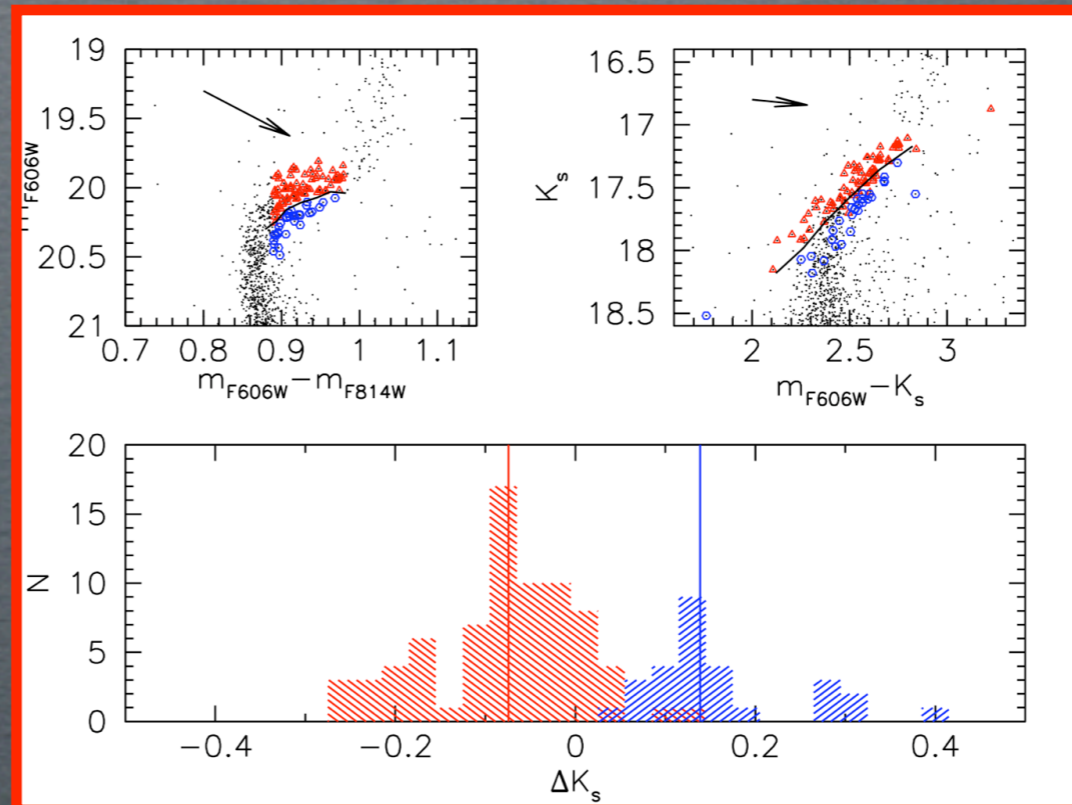


Bedin et al., 2004
MS of Omega Cen

HST



Piotto et al., 2007
MS of NGC 2808



HST+MAD

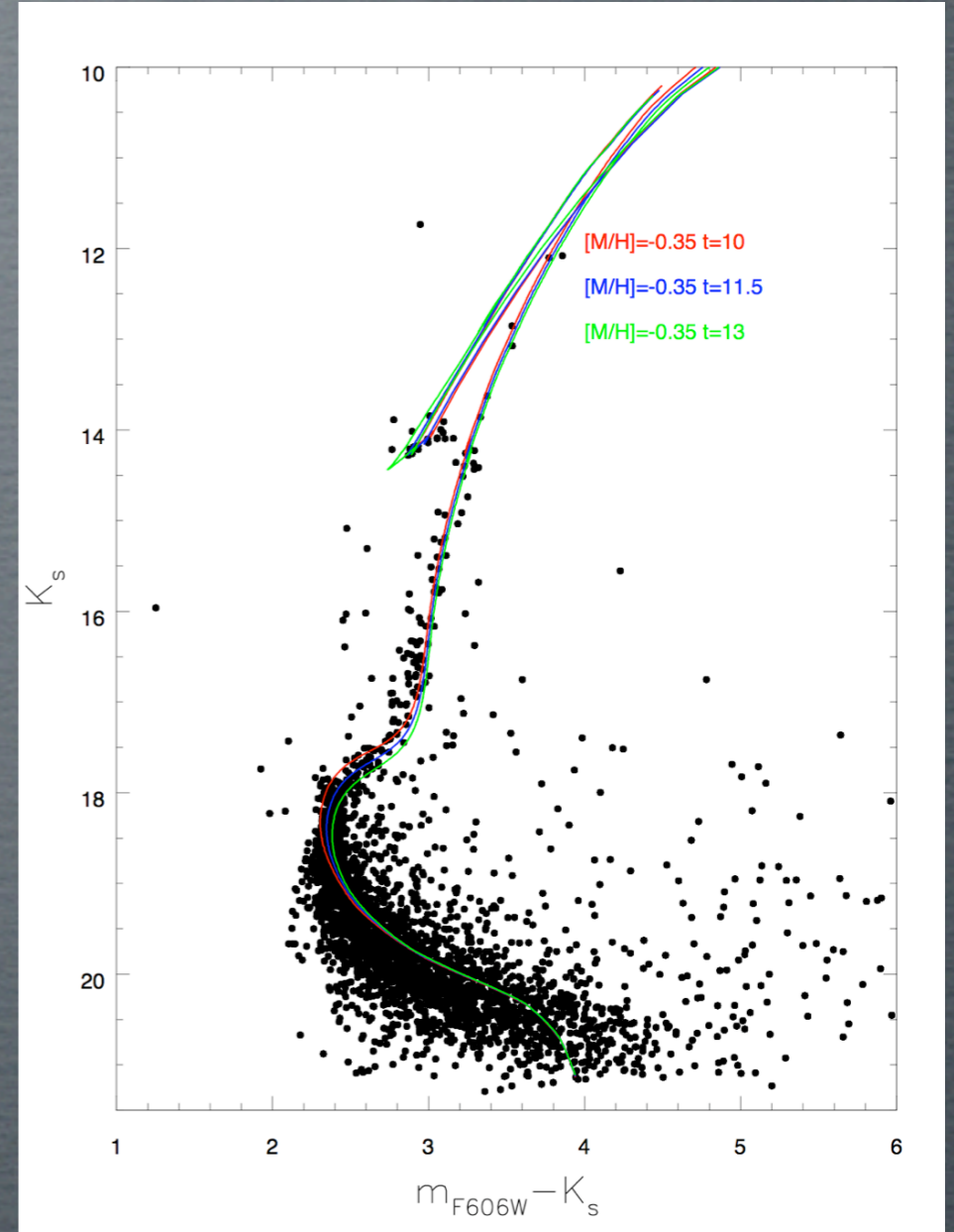
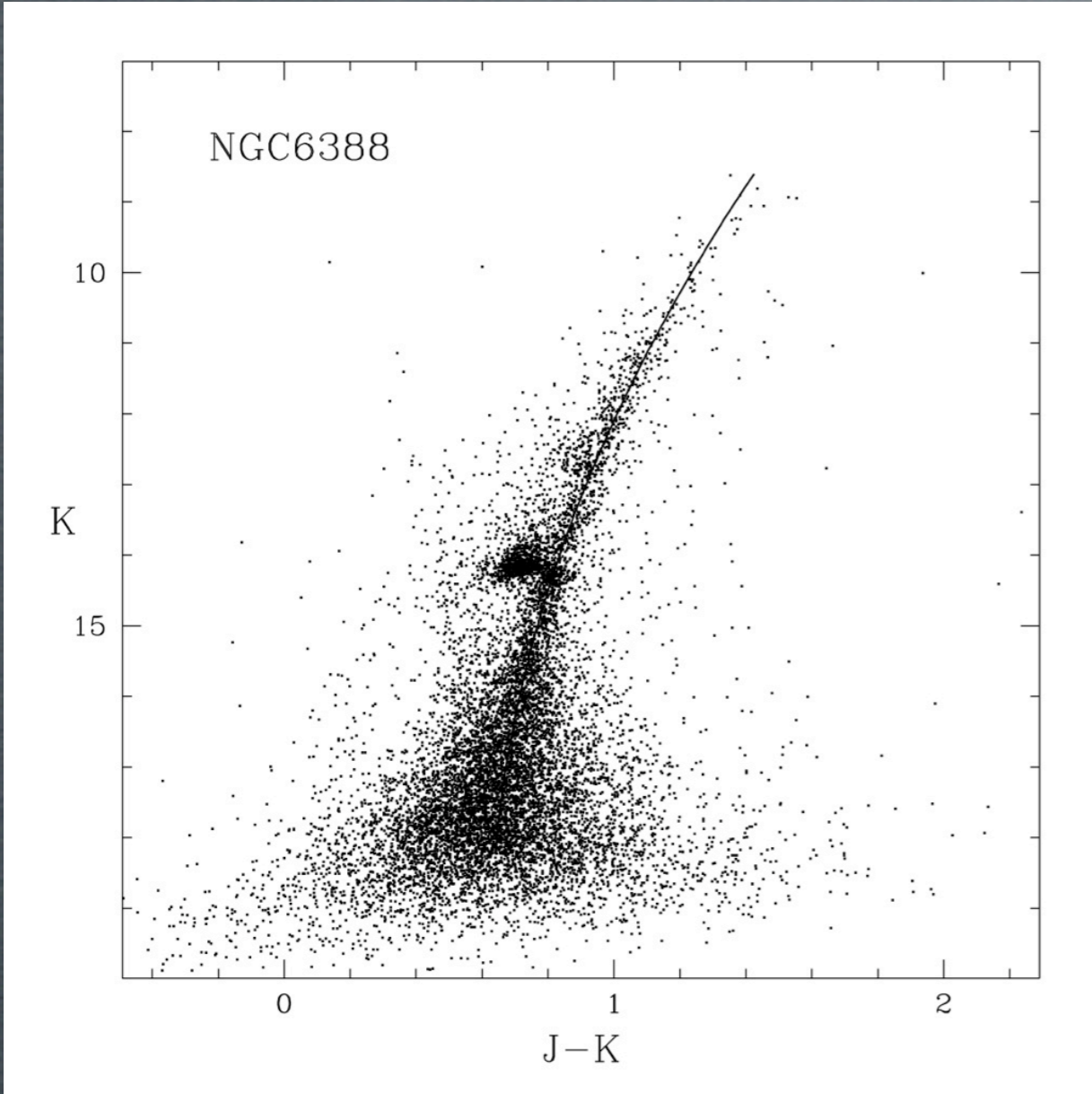
Moretti et al., 2009
SGB of NGC 6388

Science with GCs (IR + MCAO)



Important part of Galaxy clusters hidden in the Bulge => need IR coverage

Multiple sequences (if any) need high precision => need MCAO correction



Valenti et al., 2006

SOFI@NTT

Moretti et al., 2009

MAD@VLT+ACS

MAD contribution: our target

Obtain deep and accurate NIR photometry of GCs to discover possible multiple sequences, coupling IR with optical (HST) data

→ extending the color baseline (better separation of MS components)

→ reduce the effect of differential reddening

In order to reach the goal we need

→ large number of stars, to sample a possible intrinsically poor population (in some cases <10% stars)

→ high S/N (>50) down to 1.5-2 mag below the turnoff

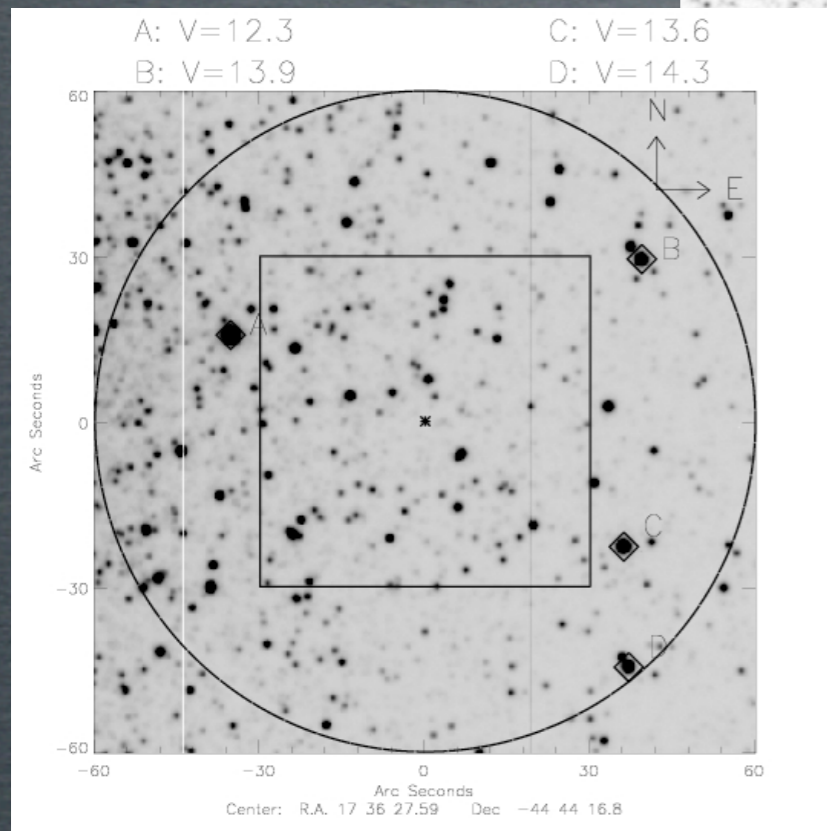
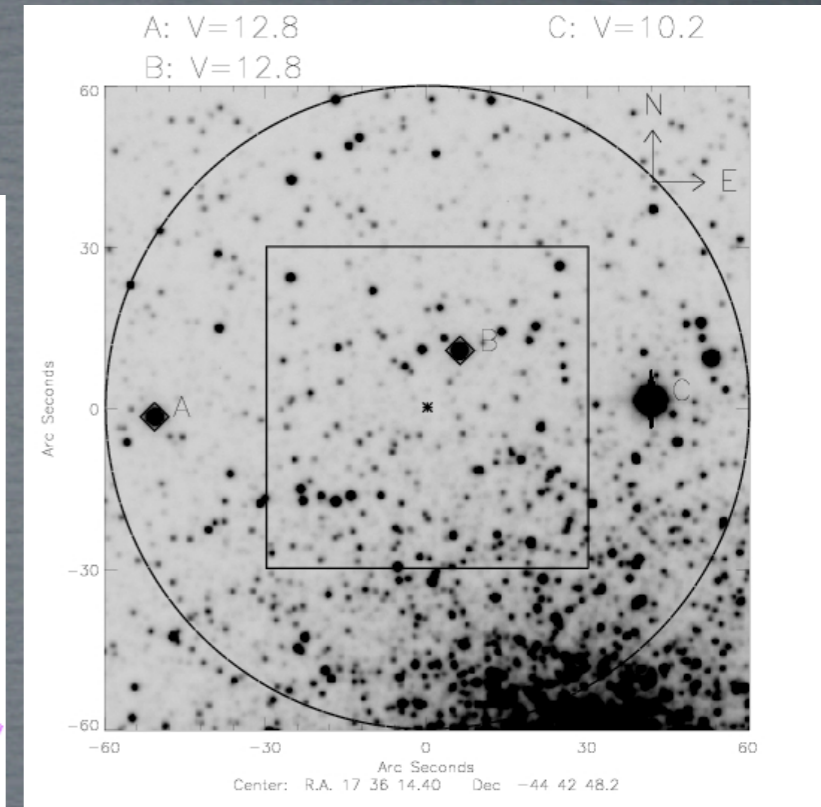
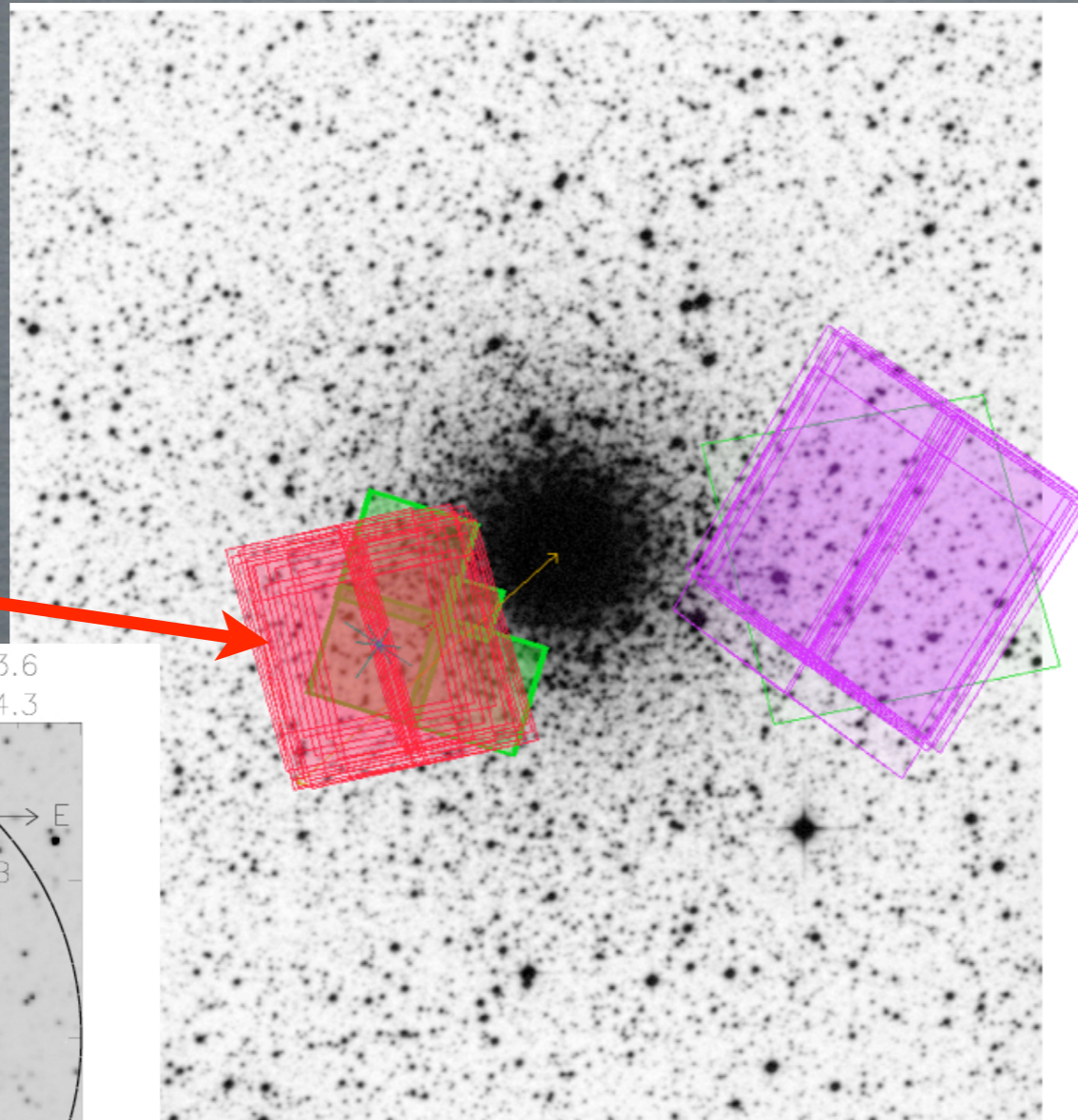
Double SGB detectable for 105/149 clusters

Double sequences (TO+2) for 36/149

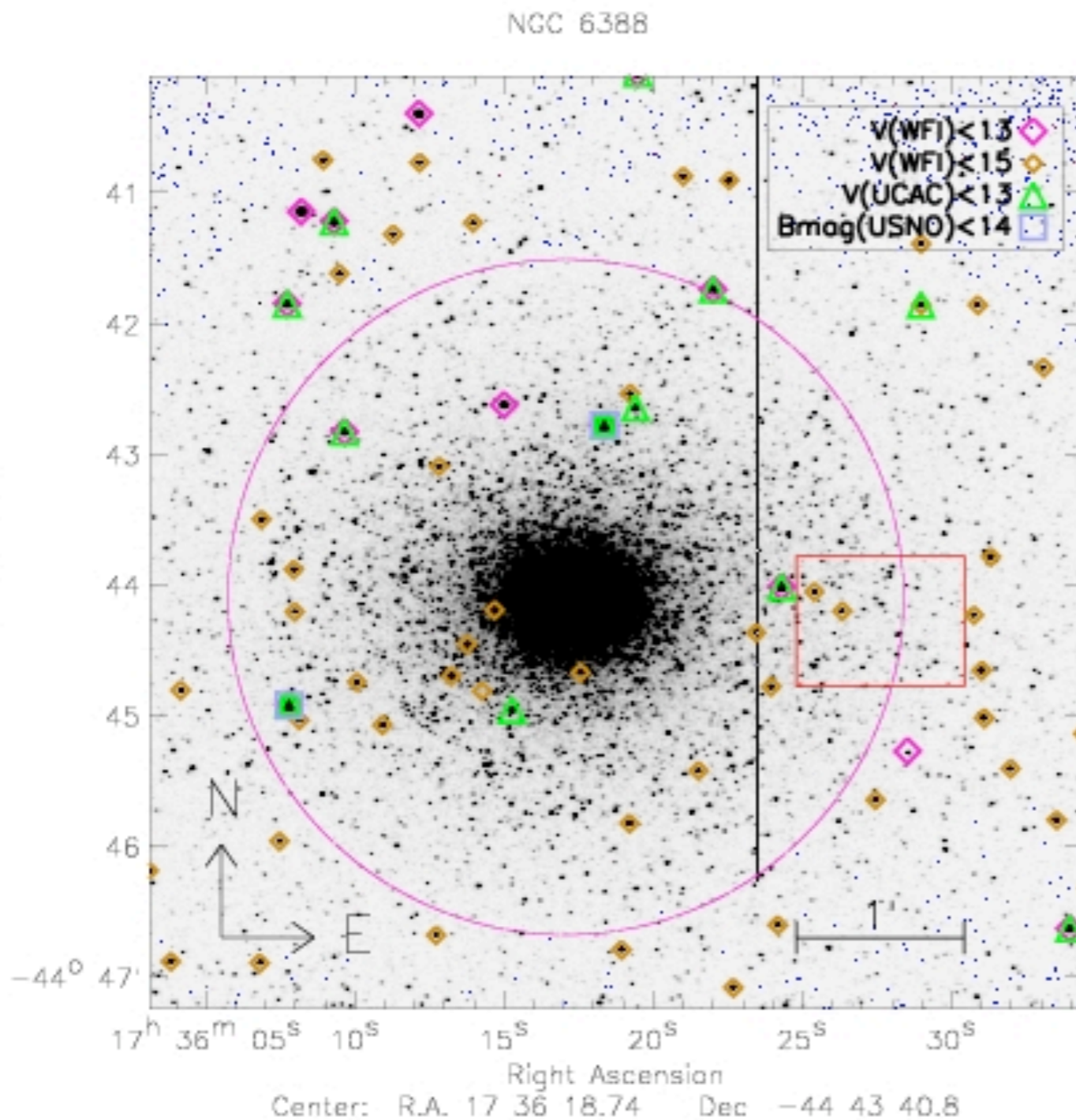
Example: NGC 6388

MAD SD proposal

The most interesting field: not enough bright stars



Example: NGC 6388



1) not enough bright ($V < 13$) stars in the field with overlapping HST images

2) not enough bright stars inside $3 * r_{\text{hm}}$

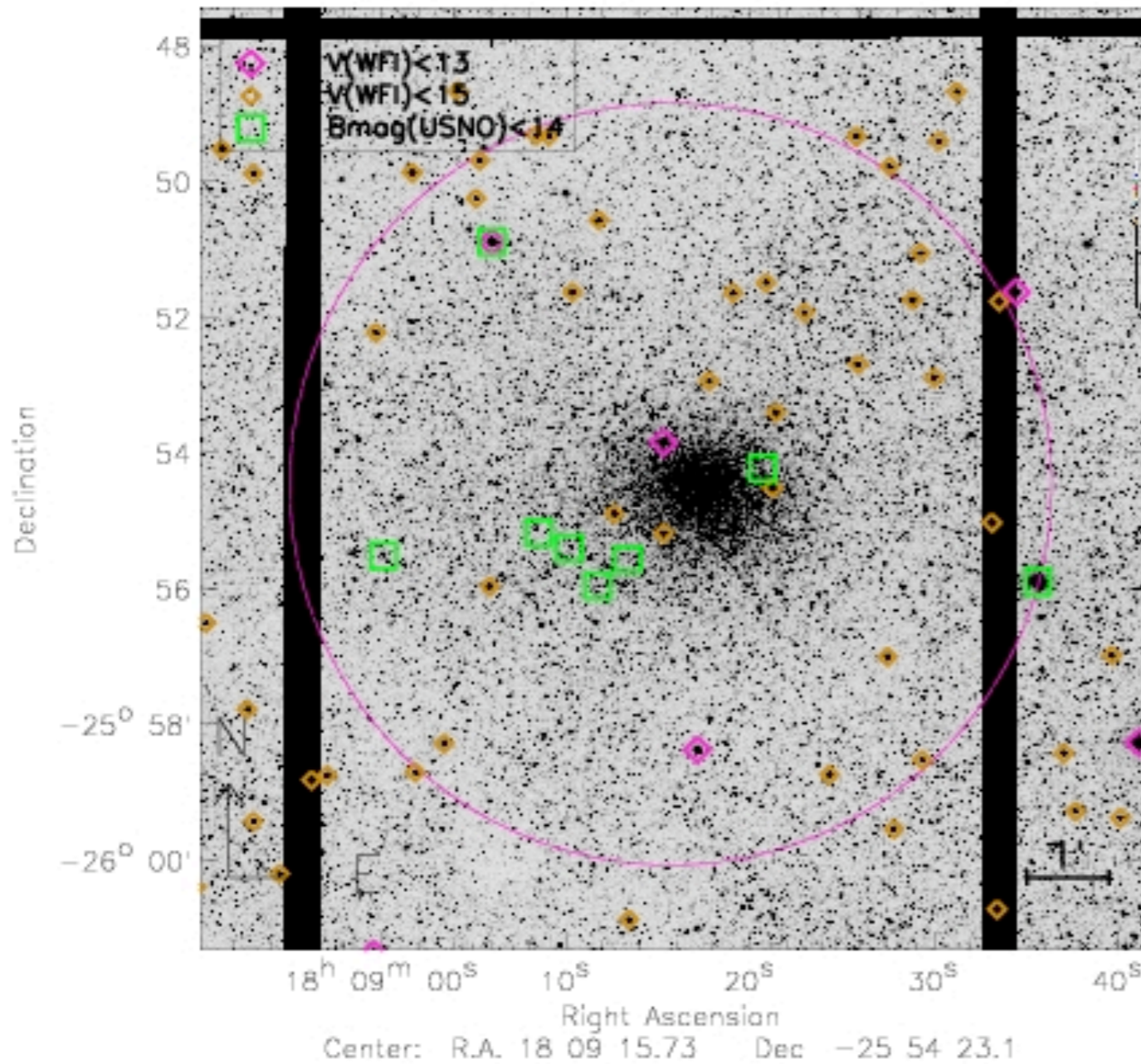
3) USNO mags not always reliable (see NGC 6553)

MAD-MAX

Complete coverage
(and using stars with $V < 15$)

Example: NGC 6553

NGC 6553



1) not enough bright ($V < 13$) stars in the field with overlapping HST images

2) not enough bright stars inside 3^*_{rhm}

3) USNO mags not always reliable

MAD-MAX

34% coverage
(using stars with $V < 15$)

An attempt toward (GC) sky coverage calculation

MAD

3 stars with $V < 13$
in 2'x2' field

MAD-MAX

3 stars with $V < 15/16$
in 2'x2' field

MAD/LO

Less than 5 stars with
 $V_{\text{int}} < V_{\text{max}}$ in 2'x2' field

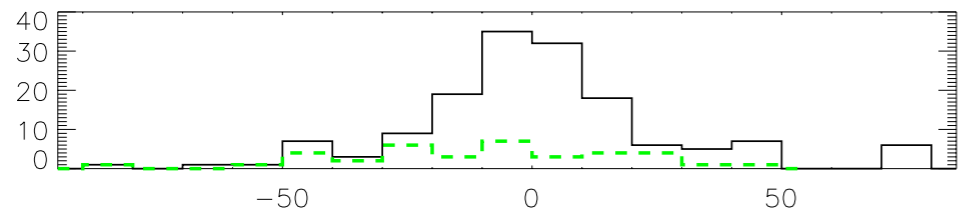
Stars magnitude comes from:

- GCG Padova: 37 GCs observed with 2.2m WFI
- Stetson public calibration catalogs
- (USNO)

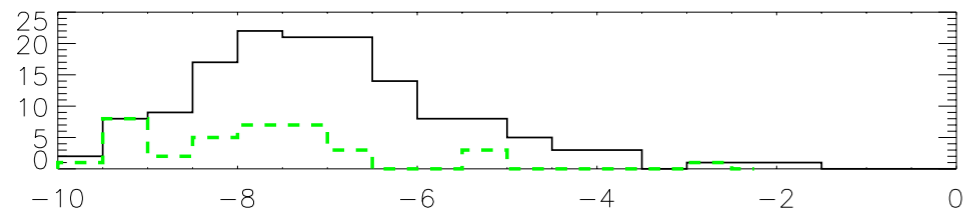
Analyzed area

- 3 x half mass radius

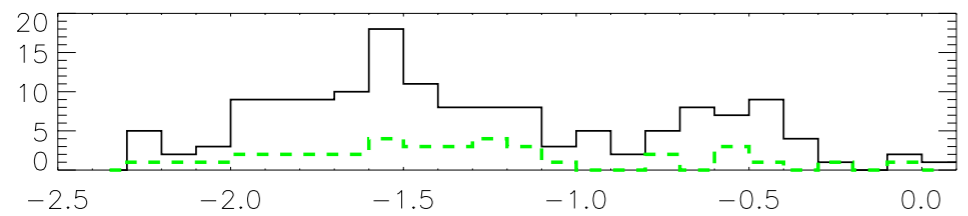
GC sample analyzed



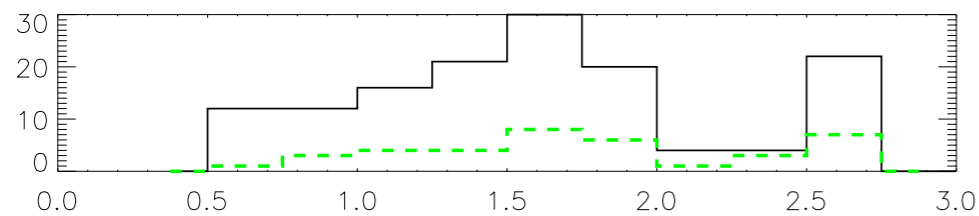
Galactic latitude



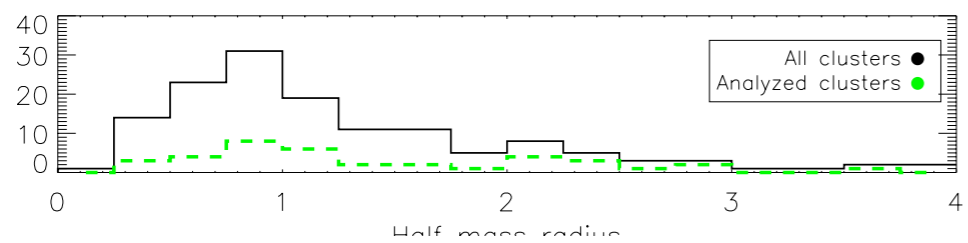
M_v



$[Fe/H]$



Concentration

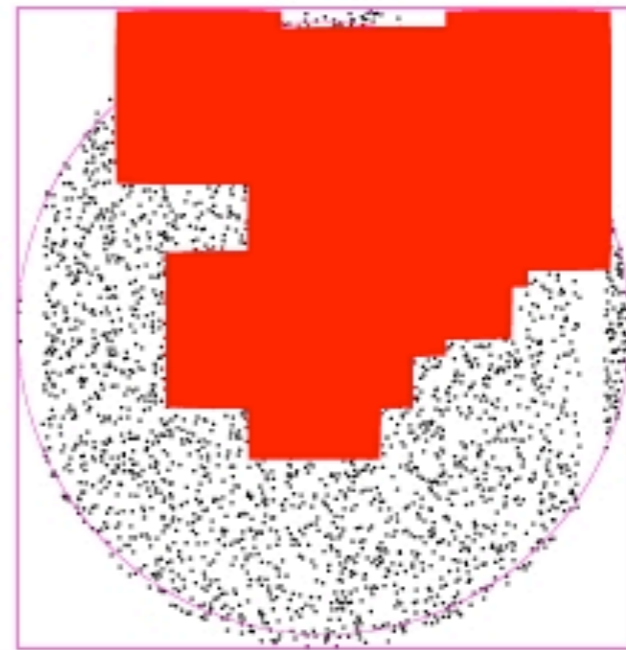


Half mass radius

MAD-MAX (V15)

MAD-MAX (V16)

Example (NGC6553)



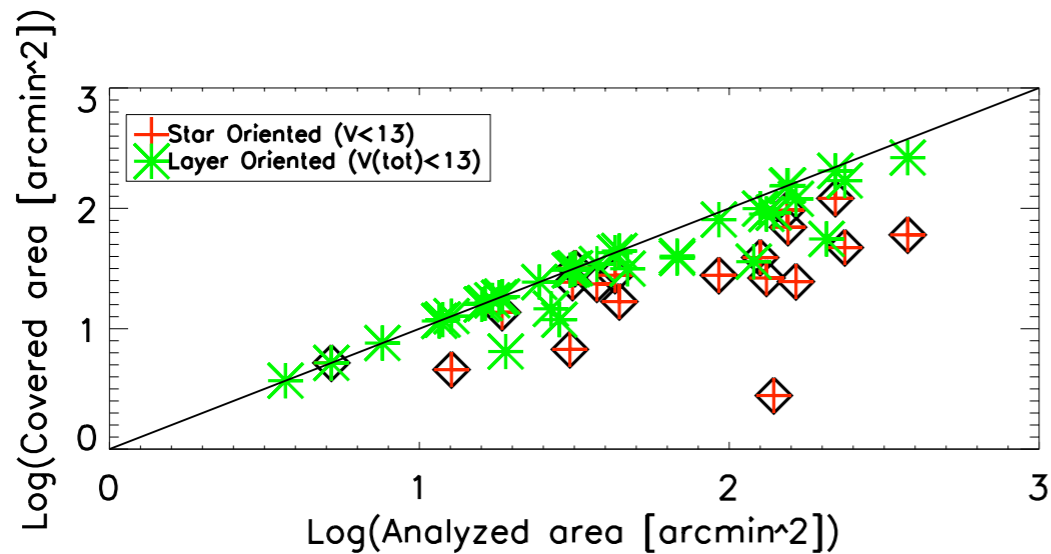
34%



100%

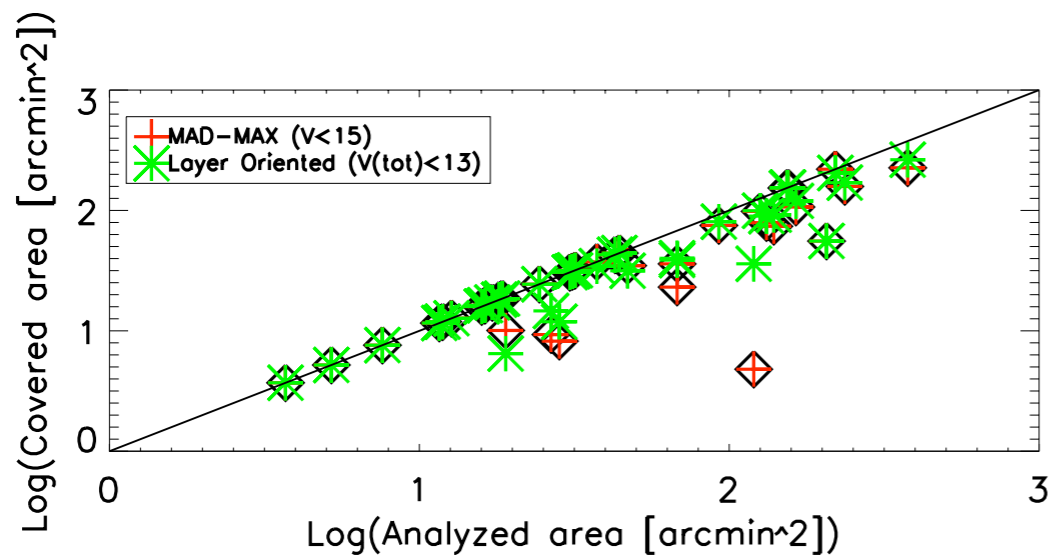
Results

“old” MAD



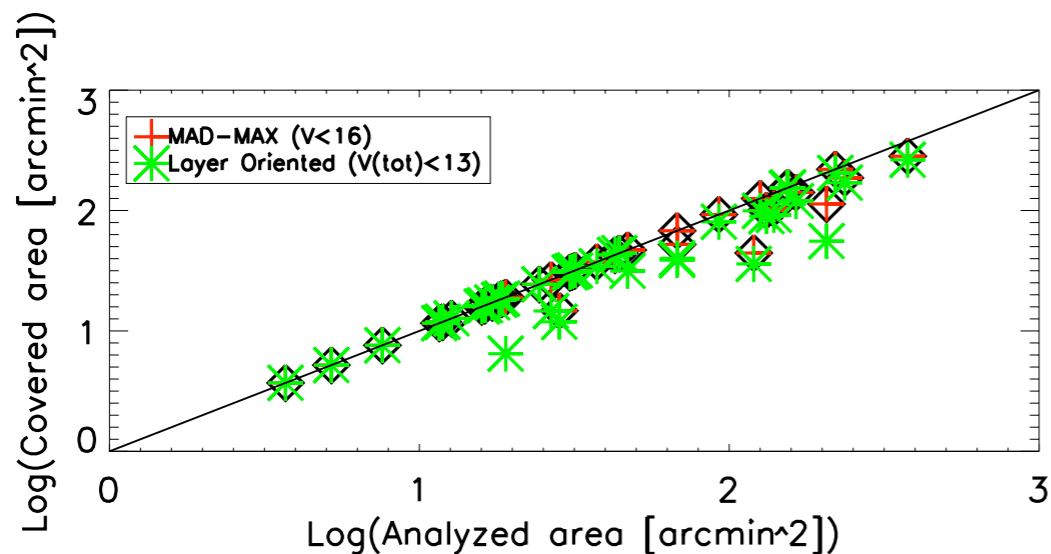
MAD-MAX ($V < 15$)

FWHM ~ 0.125 if seeing = 0.9 + 3 stars in 2'x2'



MAD-MAX ($V < 16$)

FWHM ~ 0.11 if seeing = 0.7 + 3 stars in 2'x2'
FWHM ~ 0.21 if seeing = 0.9 + 3 stars in 2'x2'



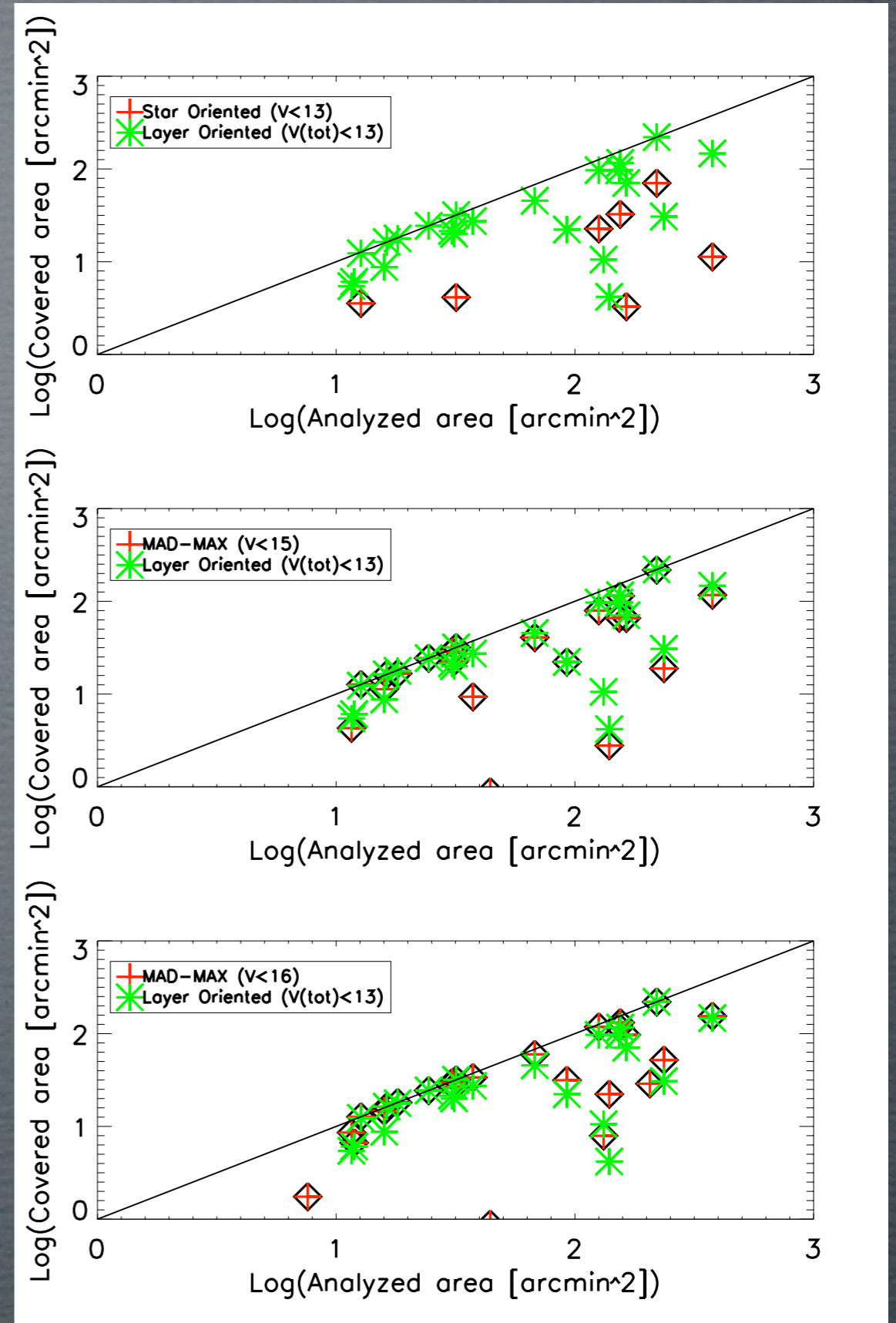
Results

“old” MAD

MAD-MAX ($V < 15$)

MAD-MAX ($V < 16$)

Stetson catalogs



MAD & GCs

- There are ~ 40 clusters for which it is possible to reach the MS with $S/N > 50$
- They have all overlapping HST observations
- They can be easily observed with MAD-MAX

Requirements

Good initial seeing ($0.7''/0.9''$)

5-6 hours for J+K observations for $1' \times 1'$ field of each cluster



Let's do it!