l'Observatoire de Paris | GEPI

Galaxies Étoiles Physique et Instrumentation

LITHIUM IN A METAL-POOR EXTERNAL GALAXY: ω CENTAURI

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- This investigation is led by L. Monaco (Univ. Concepción, Chile)
- Based on data acquired with FLAMES @ VLT programme 079.D-0021(A)

ω CENTAURI

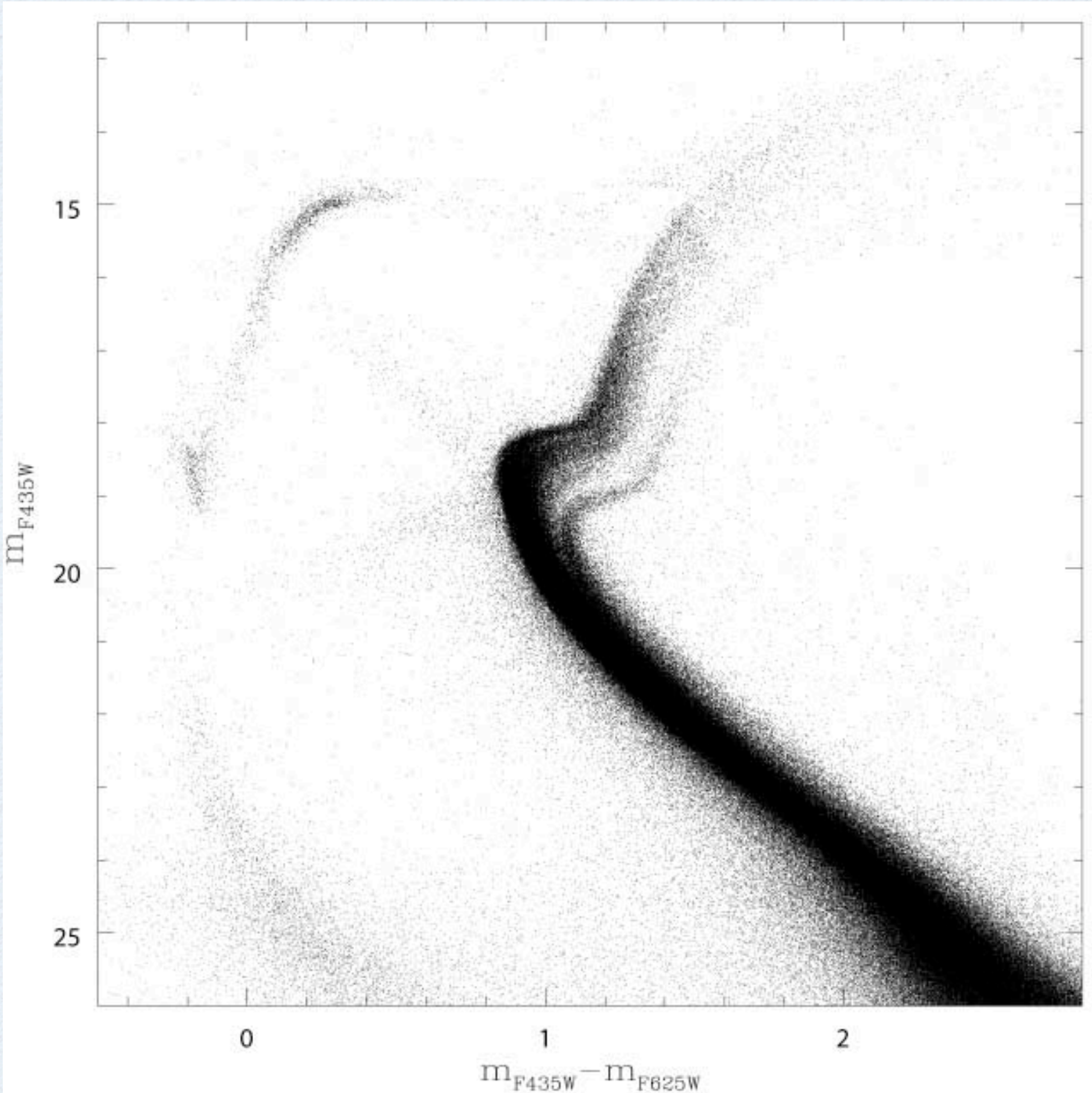
- One of the brigthest objects of the southern sky (V=5.33) initially misclassified as star (hence the name, but also CD -46 8646, CPD -46 6348, HD 116790)
- Then classified as Globular Cluster (NGC 5139)
- It is currently accepted to be a satellite galaxy, the mass was probably larger in the past.

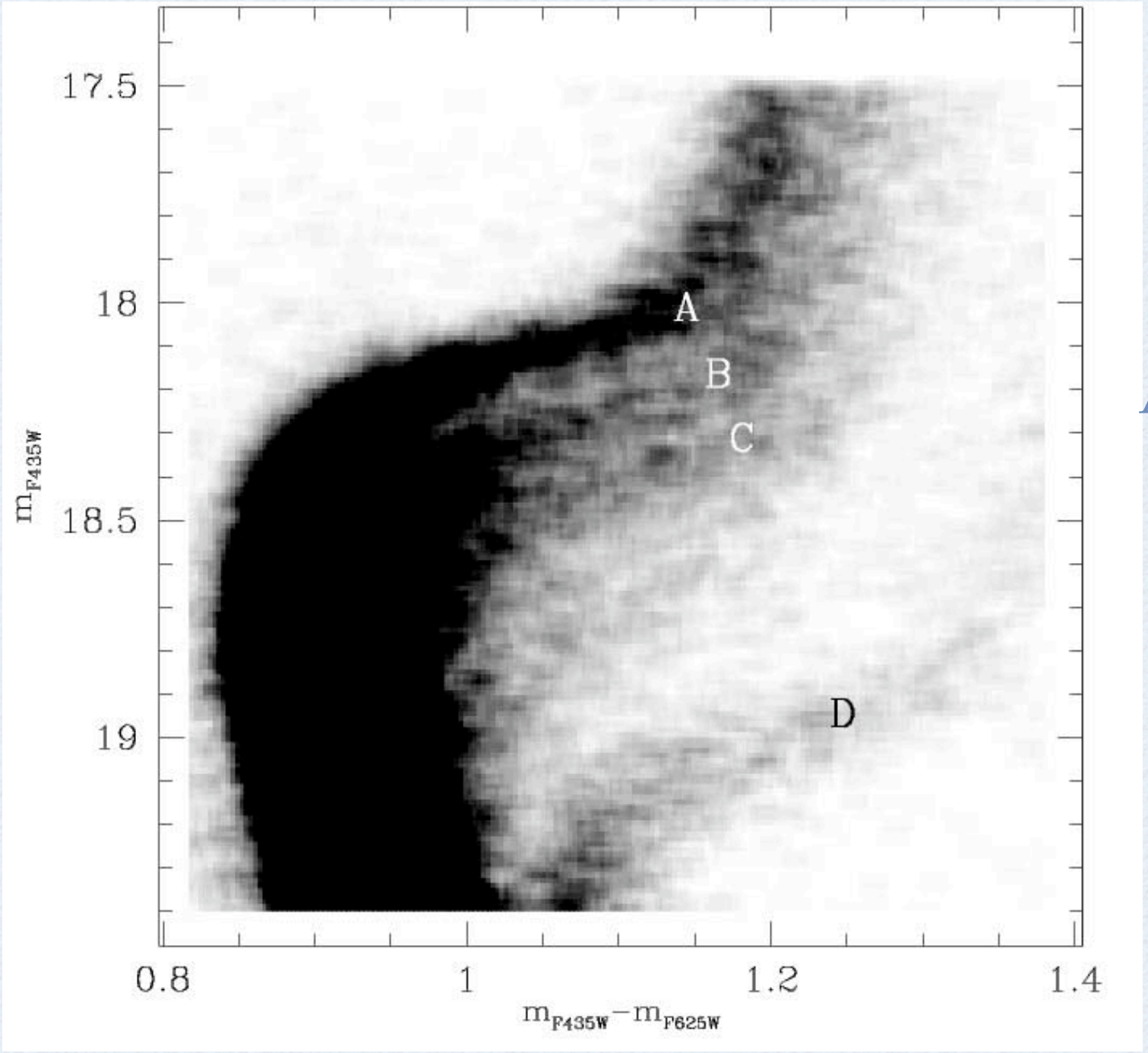
ESO /MPI 2.2m + WFI

WHY IS ω CEN A GALAXY ?

- Its mass: 3×10^6 M ⊙ is larger than any other GC
- Its orbit: large negative Lz (retrograde motion), but low total energy
- flattened shape, sizeable rotation
- highly complex stellar populations, different metallicities & ages

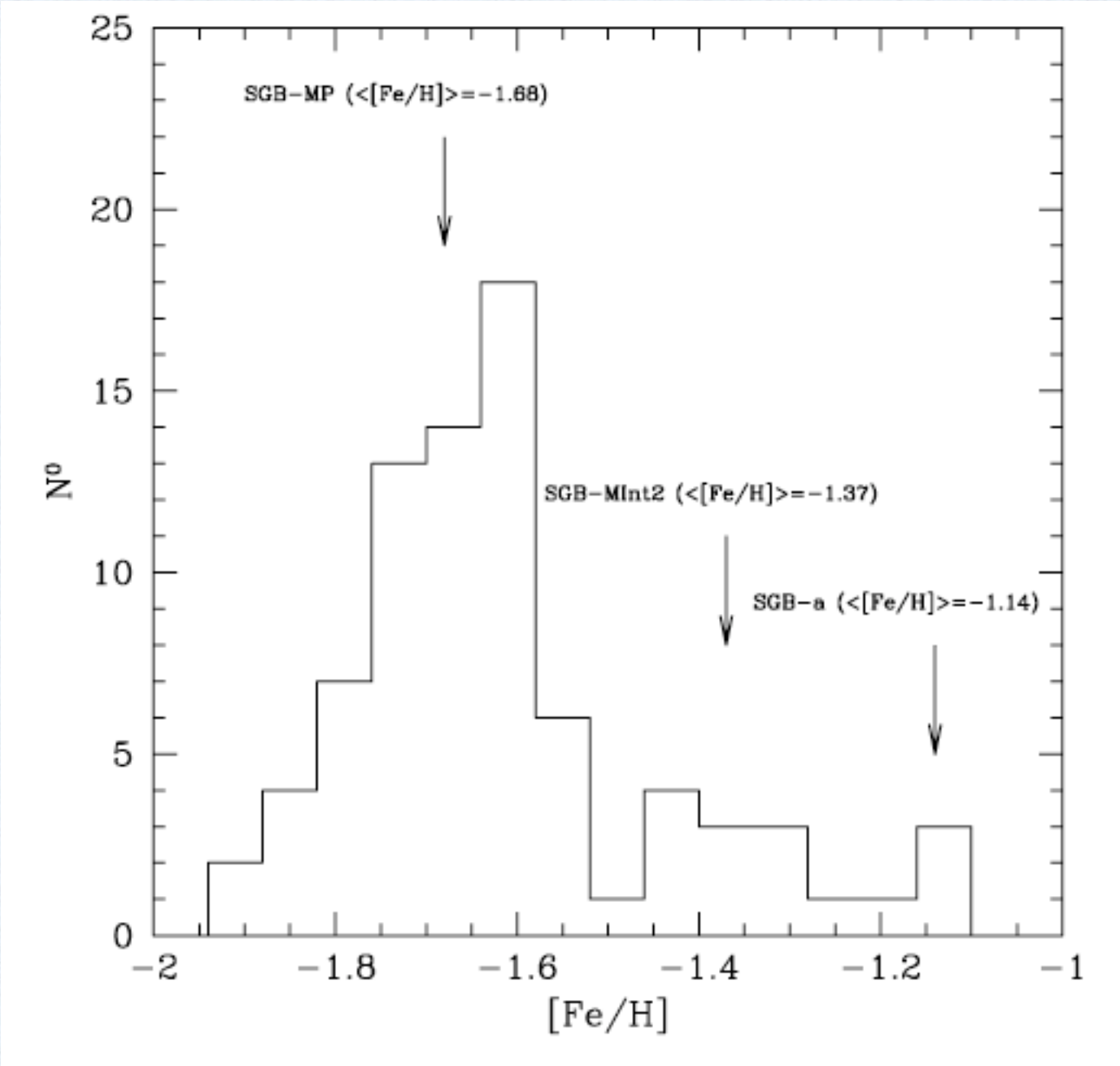
HST CMD of ωCen (Villanova et al. 2007) Combined with spectroscopic metallicities this allows relative ages accurate to 0.2-1 Gyr



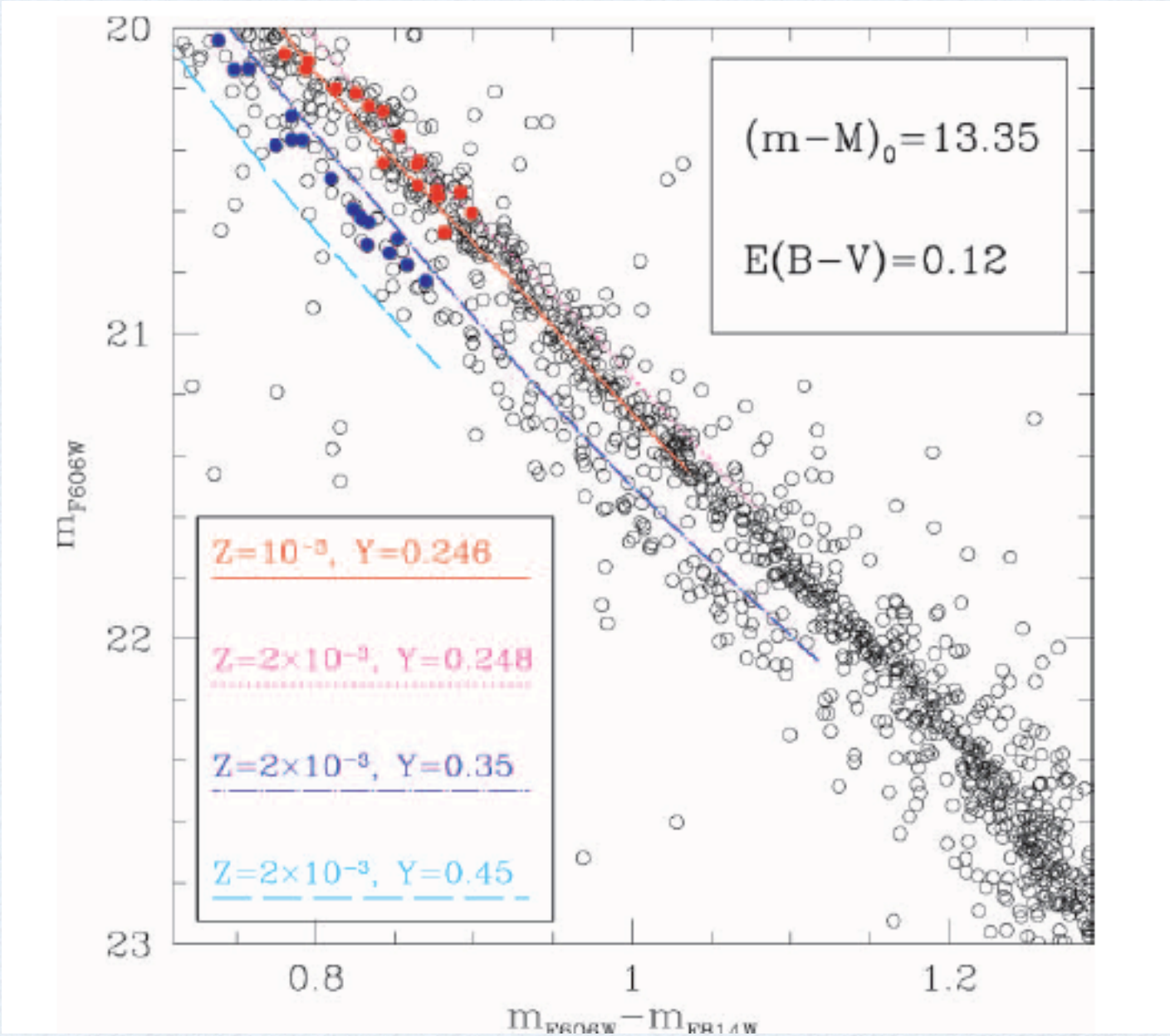


A Hess diagram clearly shows the higly complex population mix

The age span is greater than 5 Gyr



The metallicity distribution of the SGB from FLAMES blue spectra (Villanova et al. 2007)



(Piotto et al. 2005)

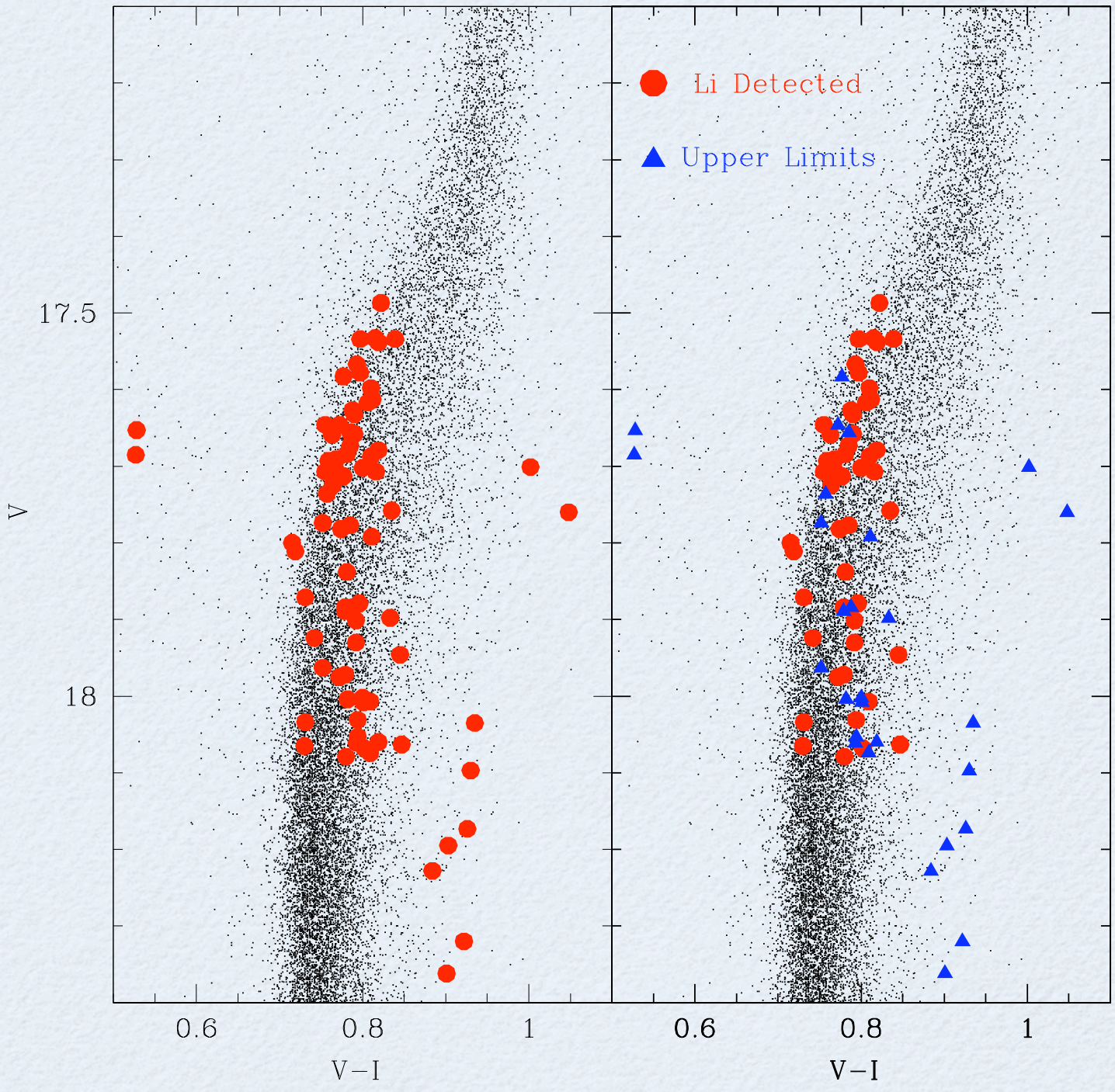
Surprise ! the blue Main Sequence is more metal-rich (by a factor of 2) than the red Main Sequence. This can be explained IF the bMS is HIGHLY He-rich

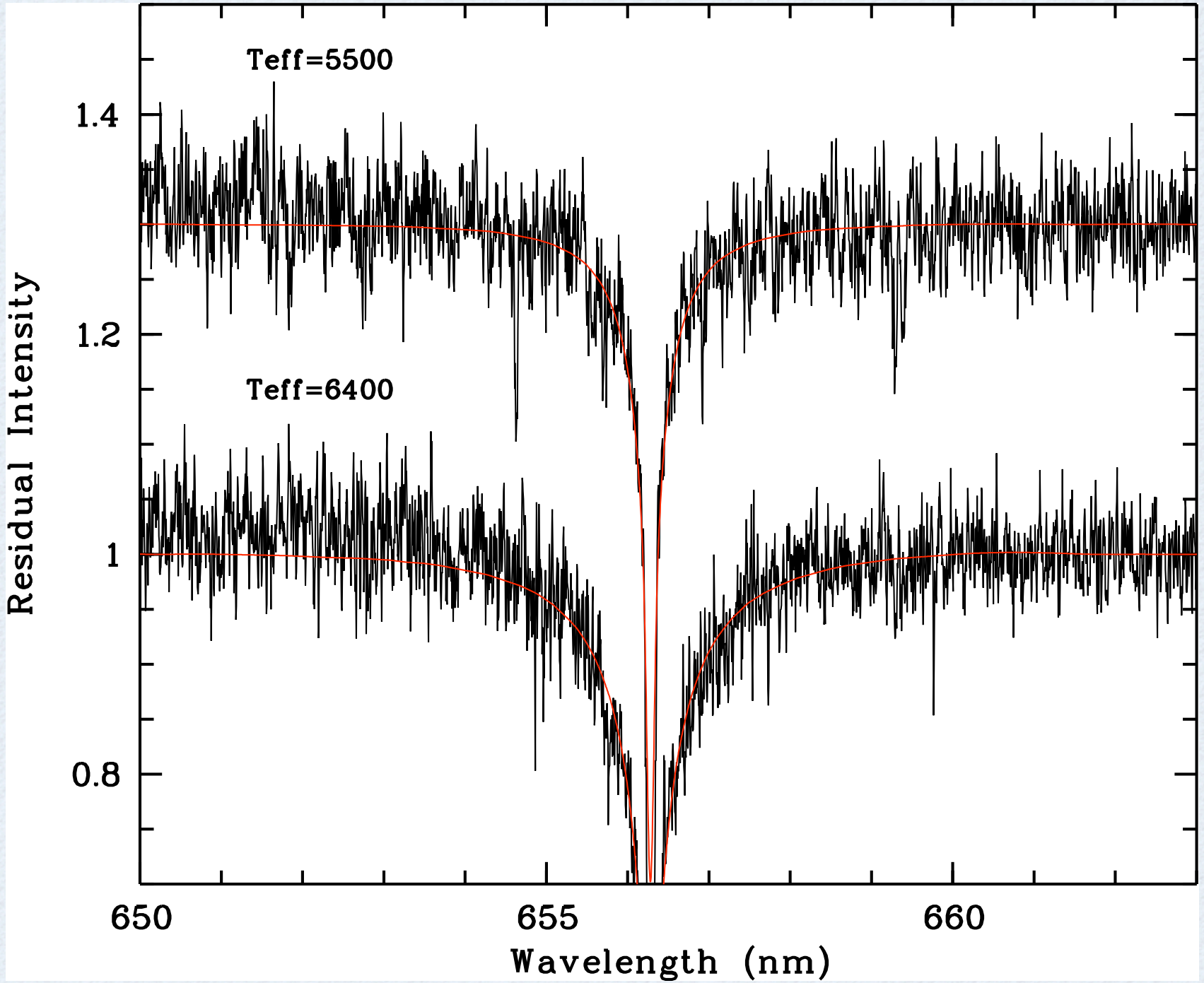
WHAT CAN LI TELL US ?

- This is the first opportunity to probe Li in an external galaxy. Can falsify the "early distruction" mechanism of Piau et al. (2006, i.e. 50% of the mass of the Galactic Halo processes by Pop III stars to reconcile Spite Plateau with WMAP)
- The stars in ω Cen span an age range of 5 Gyr, much larger than available in the Galactic Halo.
- If there are stars with Y=0.40 in ω Cen, then they should also be Li-free. We expect a large fraction of stars with no Li.

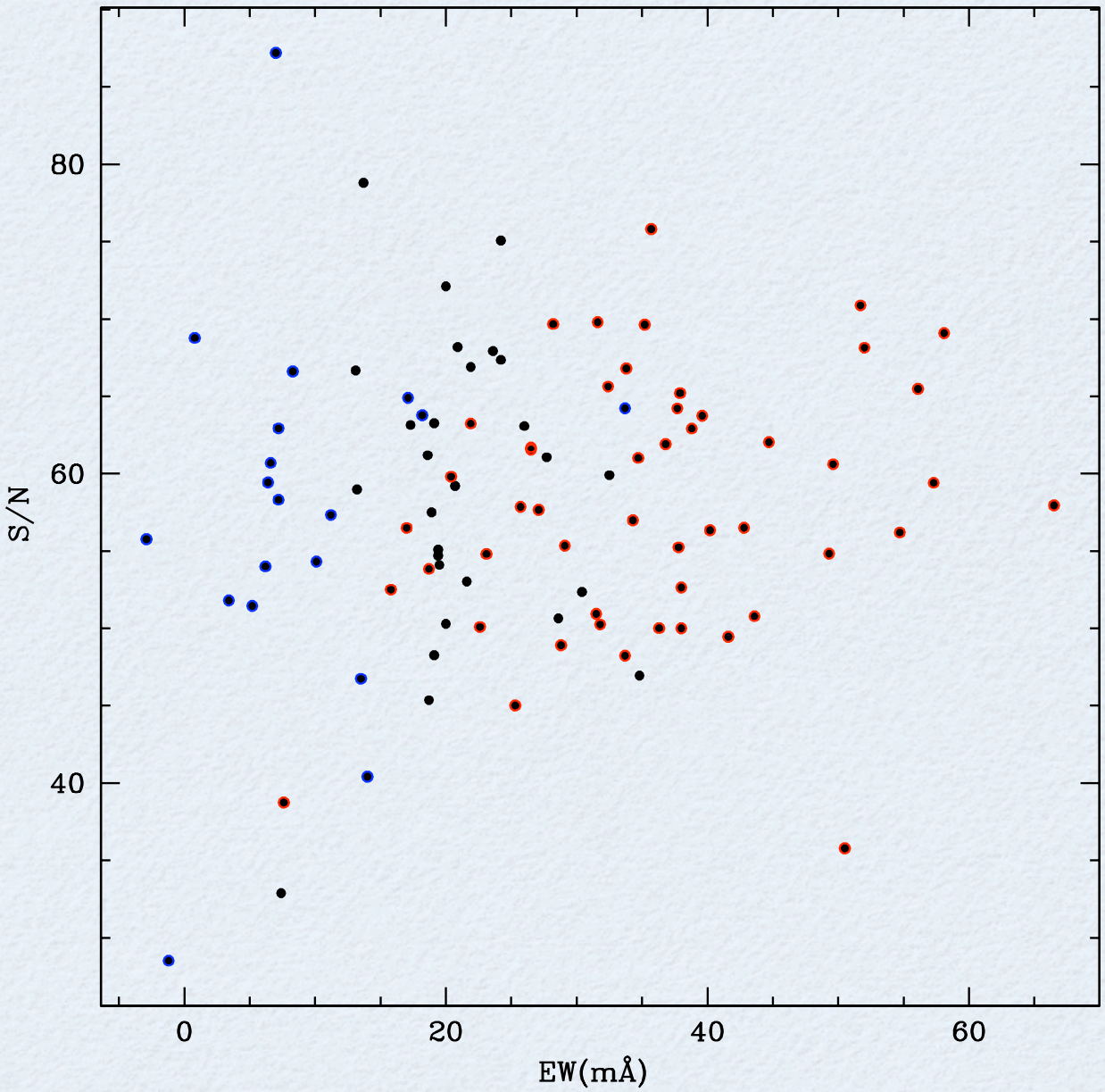
FLAMES @ VLT

- 3 nights in April 2007, observer L. Monaco
- setting HR15n (Hα + Li)
- 30% of the time lost due to weather
- 9×2h observations for about 100 targets

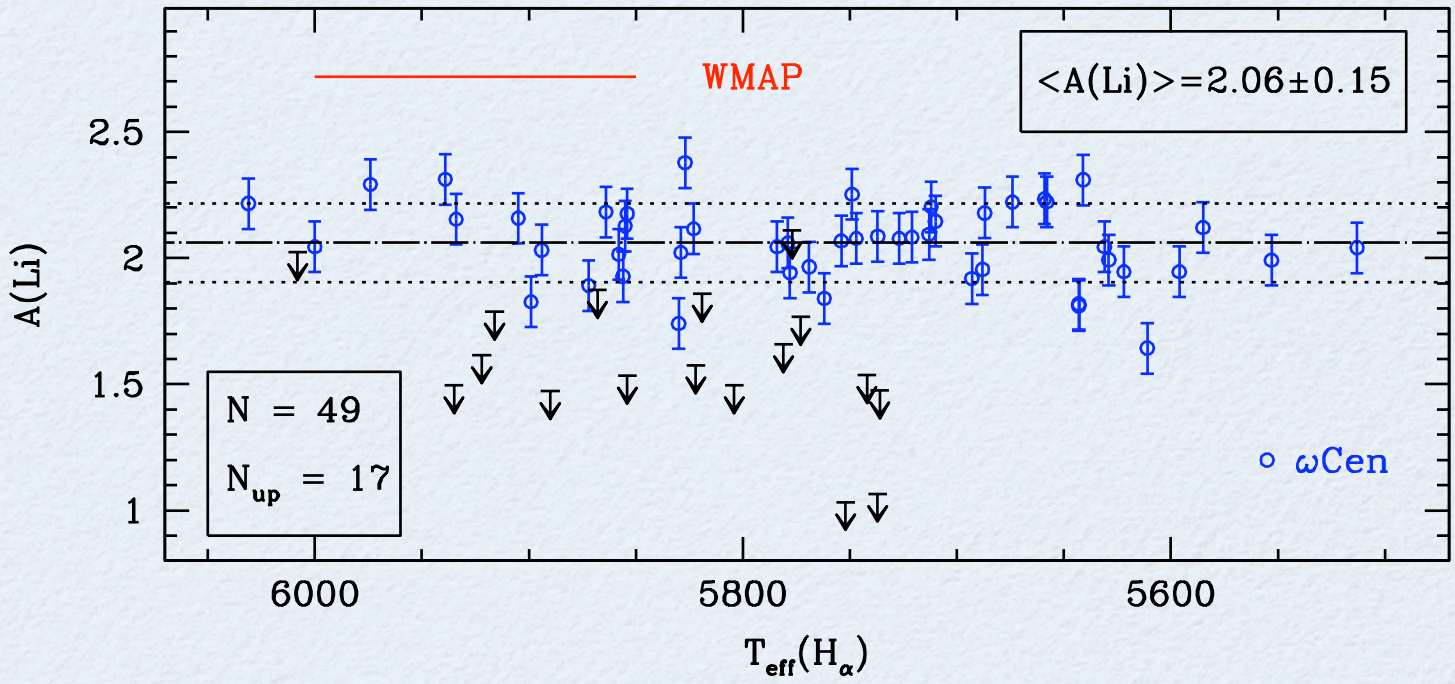

Li Detected
Upper Limits
17.5
18
V
0.6
0.8
1
V−I
0.6
0.8
1
V−I

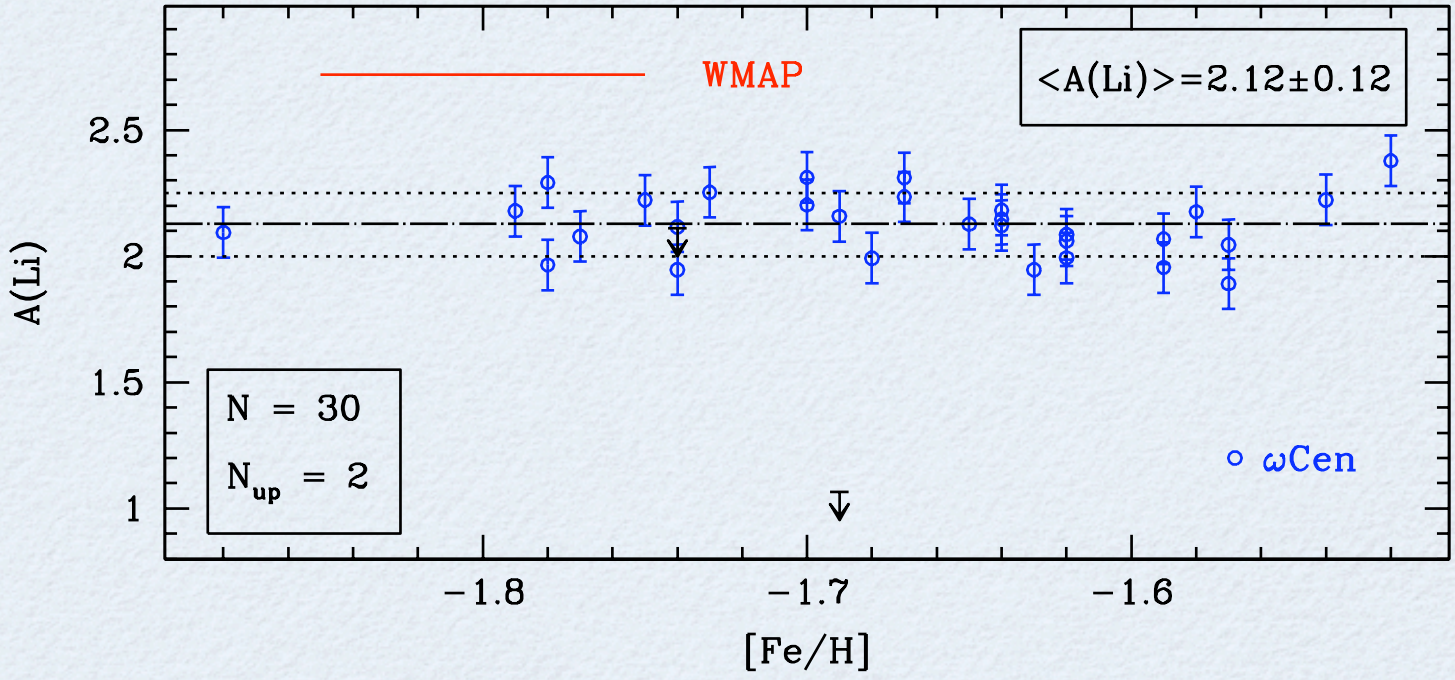


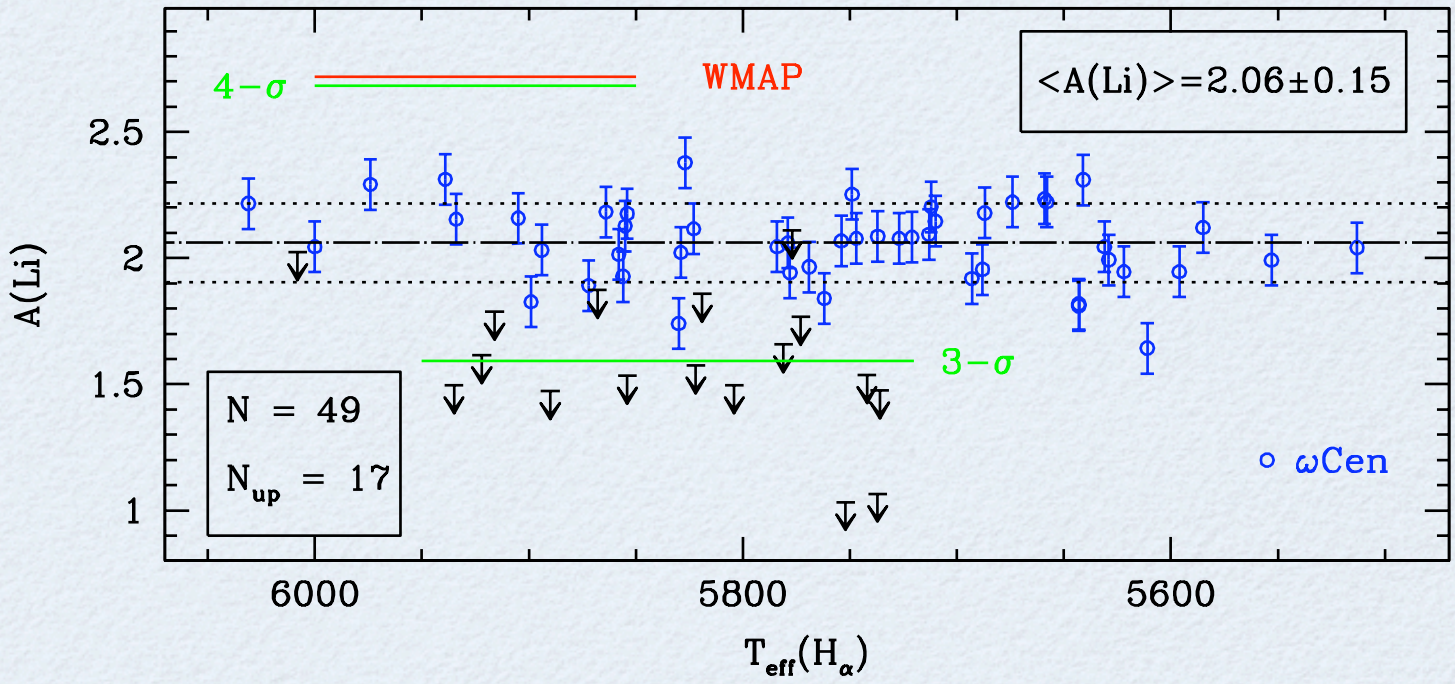
Teff from Hα wings, Barklem et al. broadening, 1D ATLAS model atmospheres

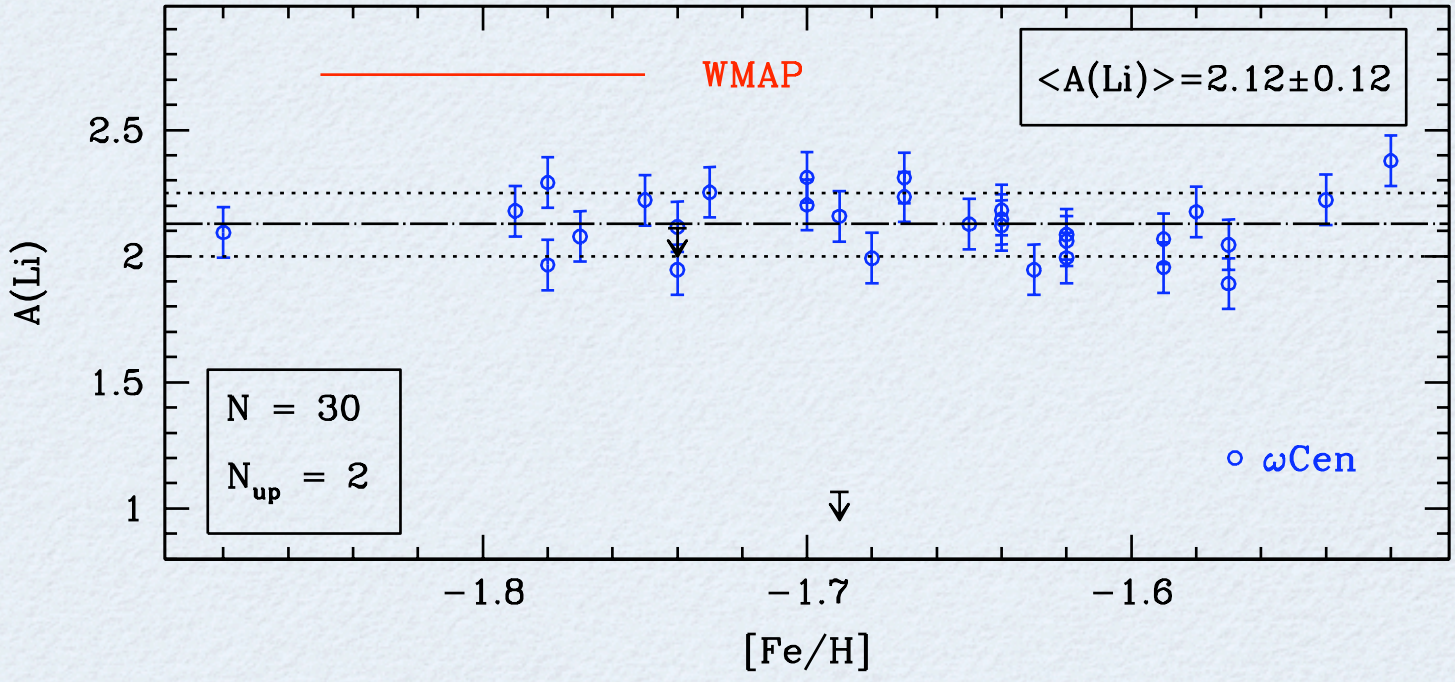


EW of Li from synthetic profile fitting, abundance from COG, (ATLAS model + SYNTHE)


WMAP
<A(Li)>=2.06±0.15
N = 49
N_up = 17
ω Cen
A(Li)
2.5
2
1.5
1
6000
5800
5600
T_eff(H_α)


WMAP
<A(Li)>=2.12±0.12
N = 30
N_up = 2
ω Cen
A(Li)
2.5
2
1.5
1
−1.8
−1.7
−1.6
[Fe/H]


4−σ
WMAP
<A(Li)>=2.06±0.15
3−σ
N = 49
N up = 17
ωCen
A(Li)
2.5
2
1.5
1
6000
5800
5600
T eff (H α)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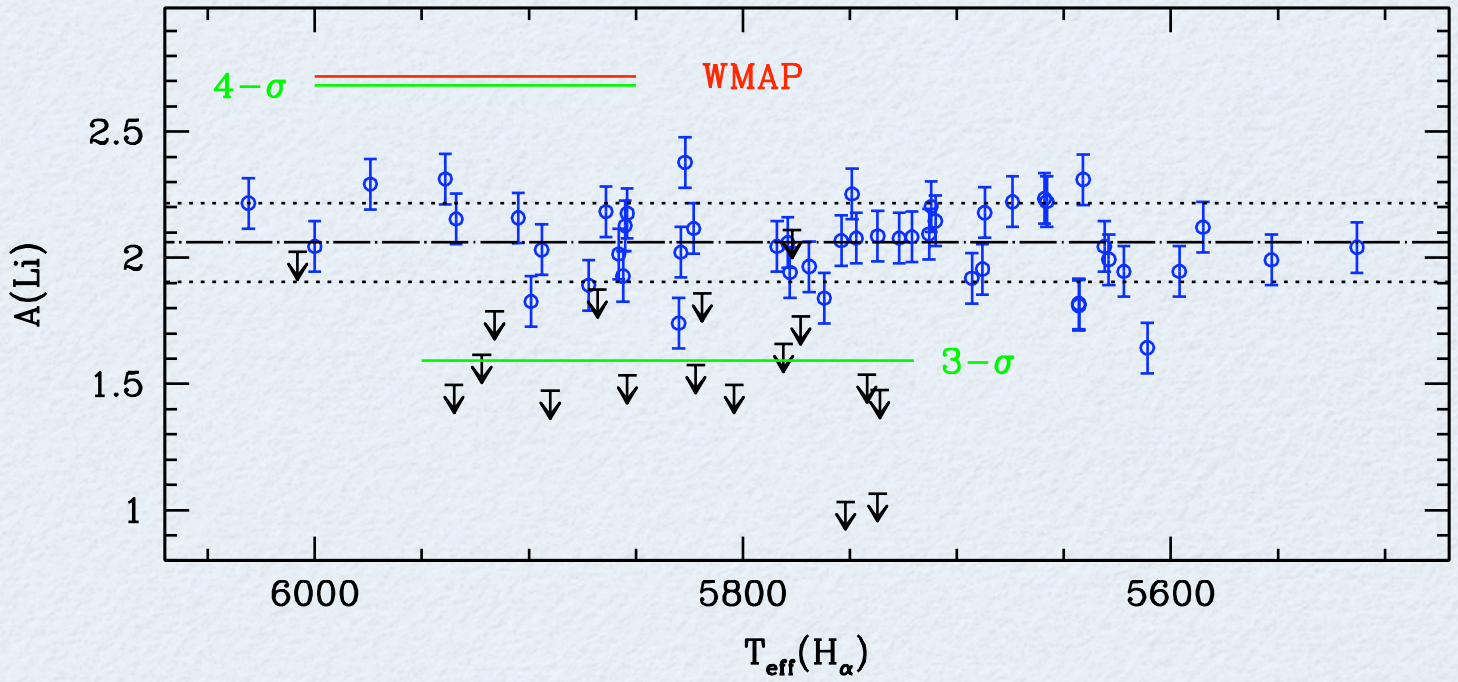
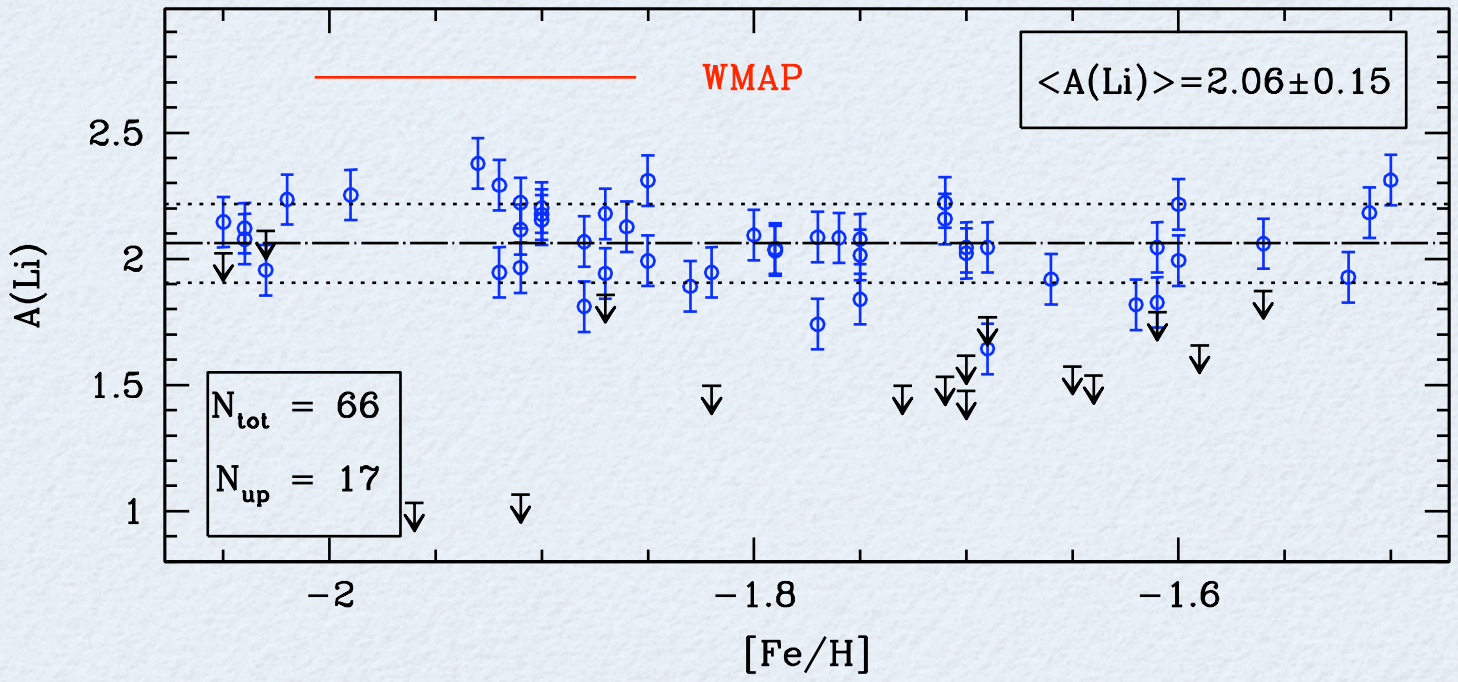
[Fe/H]

Così fan tutte ?





Merci

(please do not shoot on the speaker)