



Garik Israelian

E. Delgado Mena, C. Doniguez Cerdena, R. Rebolo (IAC)

N. Santos & S. Sousa (Portugal)

M. Mayor & S. Udry (Geneva)

S. Randich (Italy)

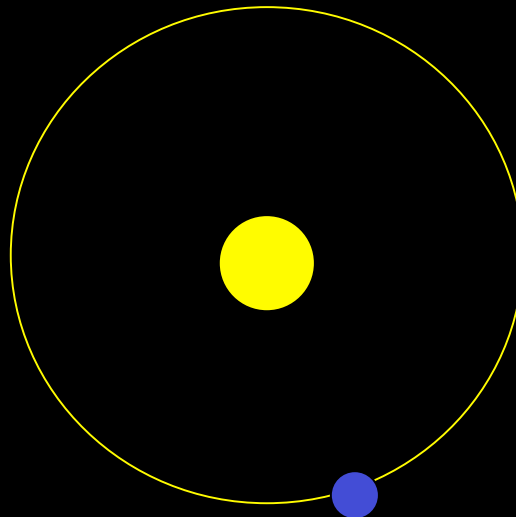
Lithium in stars with exoplanets

It is possible, in principle anyway, that the low Li abundances of the Sun and 16 Cyg B with respect to 16 Cyg A may be related to the presence of planetary companion. Li abundances of 47 UMa, and HD114762 might further support such a connection between planets/disks, angular momentum evolution, and photospheric Li abundance.

King et al. (AJ, 113, 1871, 1997)

16 Cyg B

Log Li ~ 0.6



16 Cyg A

Log Li ~ 1.3



Is Lithium low in stars with exoplanets ?

YES or NO

Gonzalez & Laws (2000)	yes
------------------------	-----

Ryan (2000)	no
-------------	----

Israelian et al. (2004)	yes
-------------------------	-----

Takeda & Kawanomoto (2005)	yes
----------------------------	-----

Chen & Zhao (2006)	yes
--------------------	-----

Luck & Heiter (2006)	no
----------------------	----

Takeda et al. (2007)	yes
----------------------	-----

Gonzalez (2008)	yes
-----------------	-----

Israelian et al. (2009)	yes
-------------------------	-----

Problems ?

Comparison sample

Precise stellar parameters

Unbiased & homogeneous study

Small statistics

Our strategy

Unbiased & homogeneous study

Statistically significant

No young stars (Age < Hyades)

No subgiants

No peculiar stars

New comparison sample from HARPS (GTO)

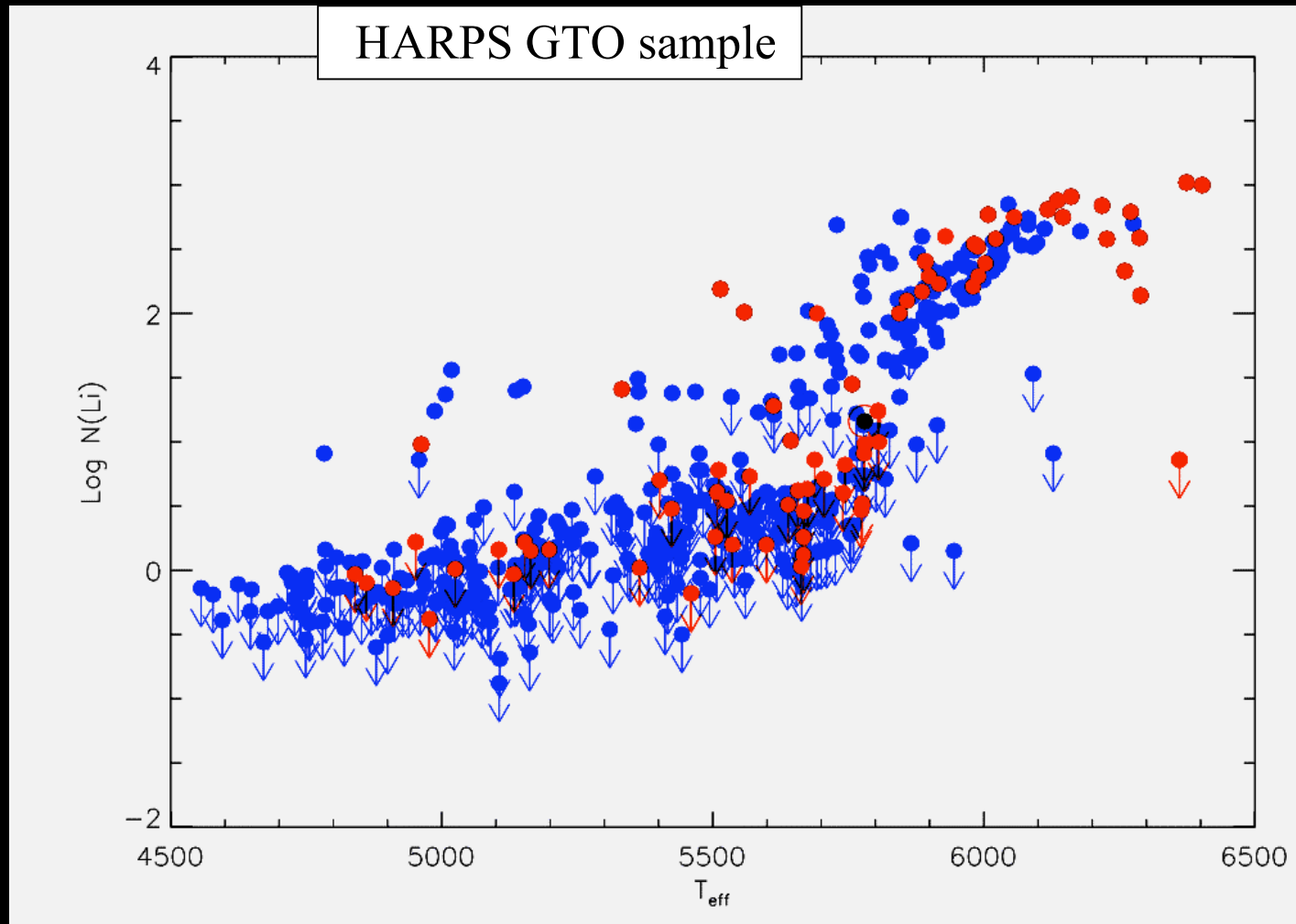
RV precision < 1m/sec

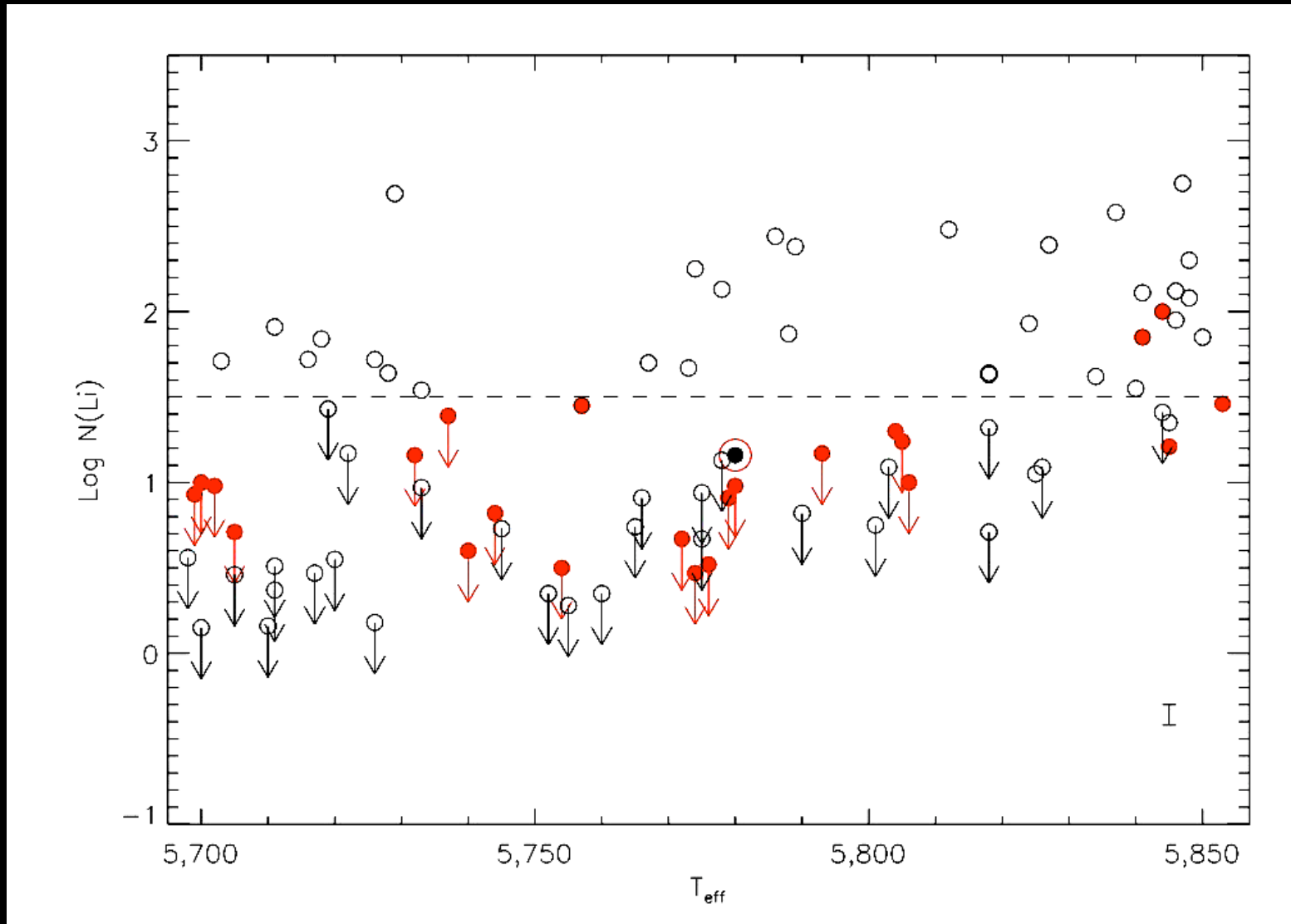
Precise stellar parameters (Sousa et al. 2008)

30 K (T_{eff}), 0.03 dex (Fe/H), 0.04 dex (log g)

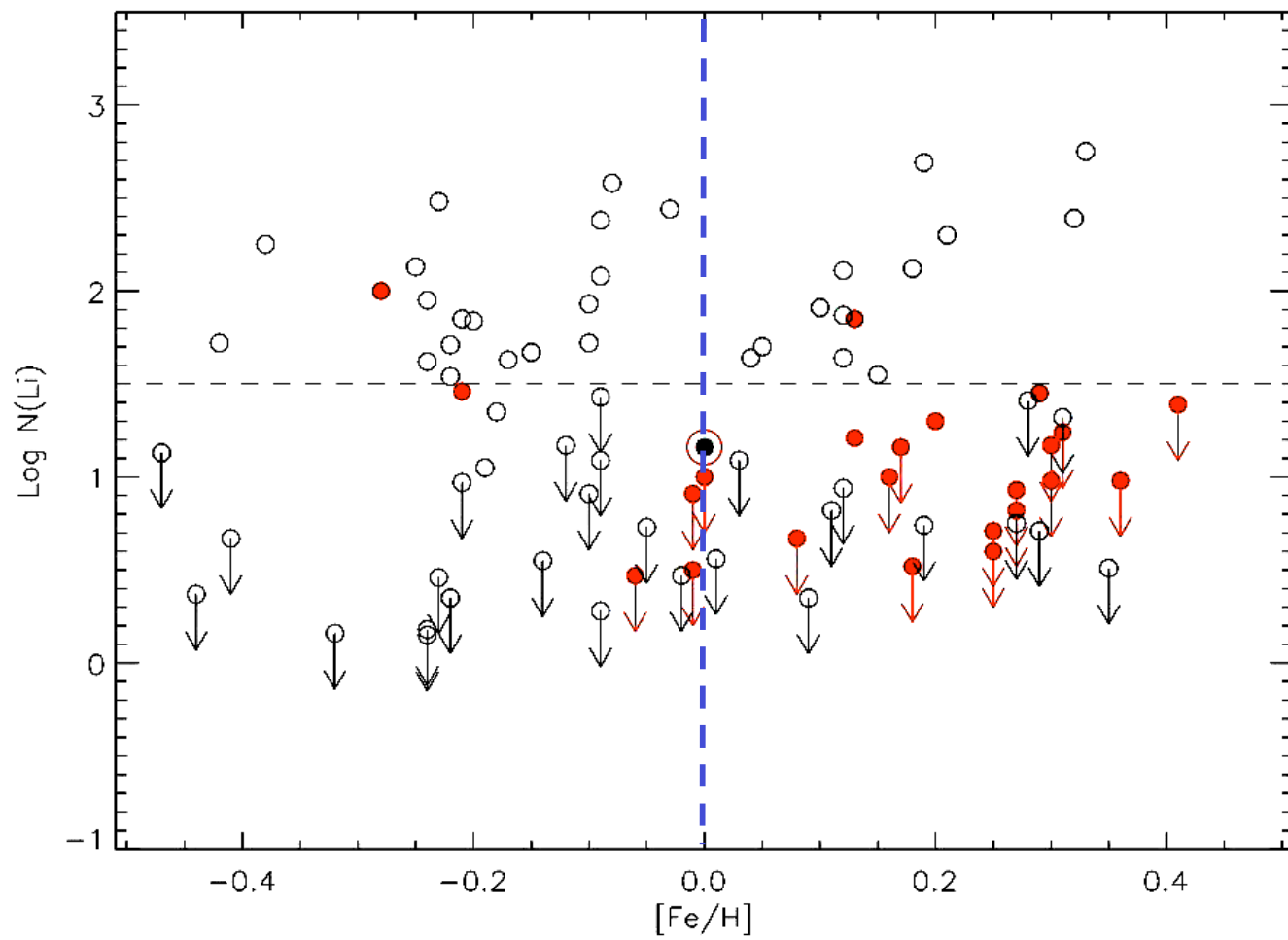
● Planet hosts

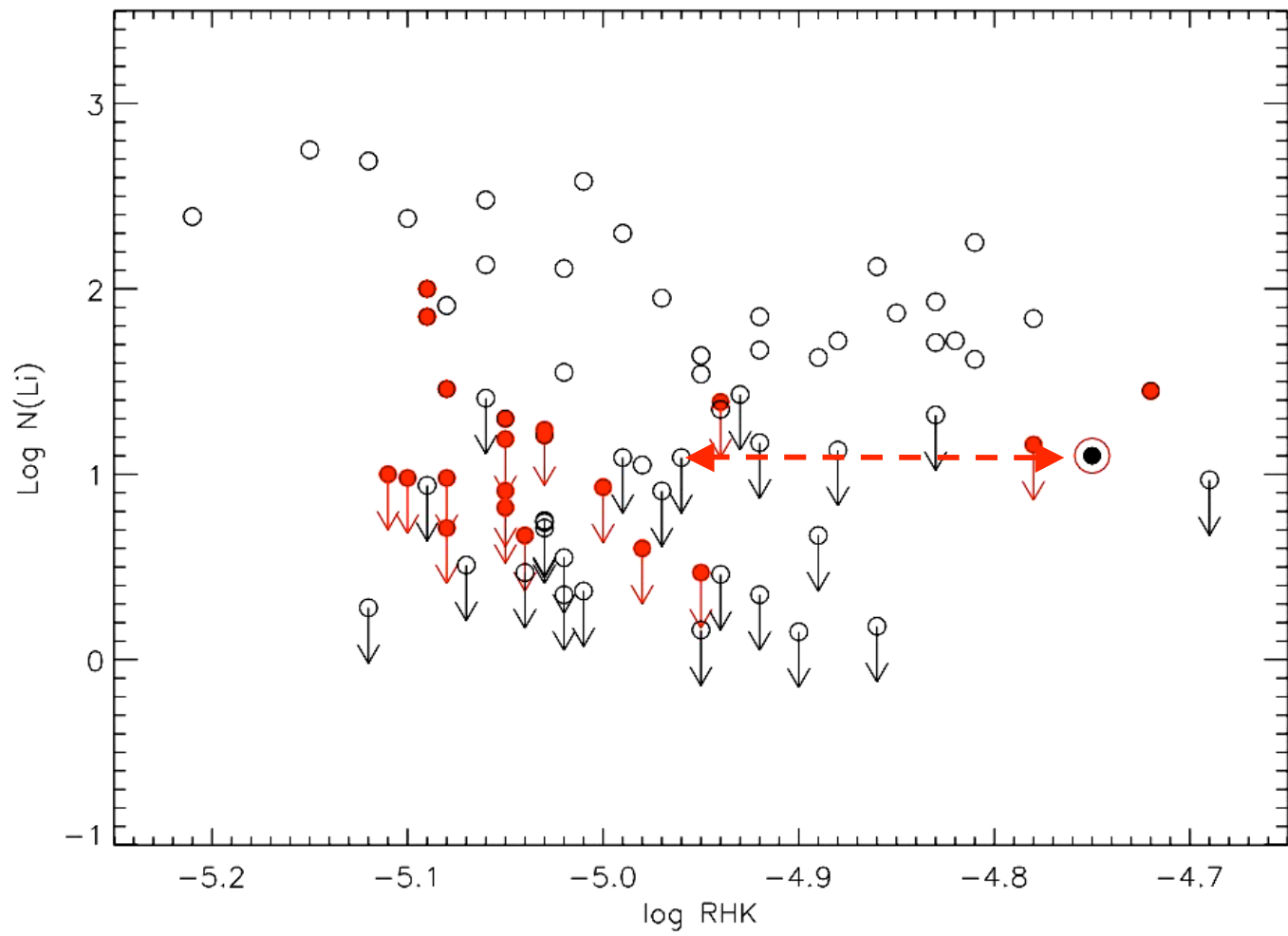
● Single stars

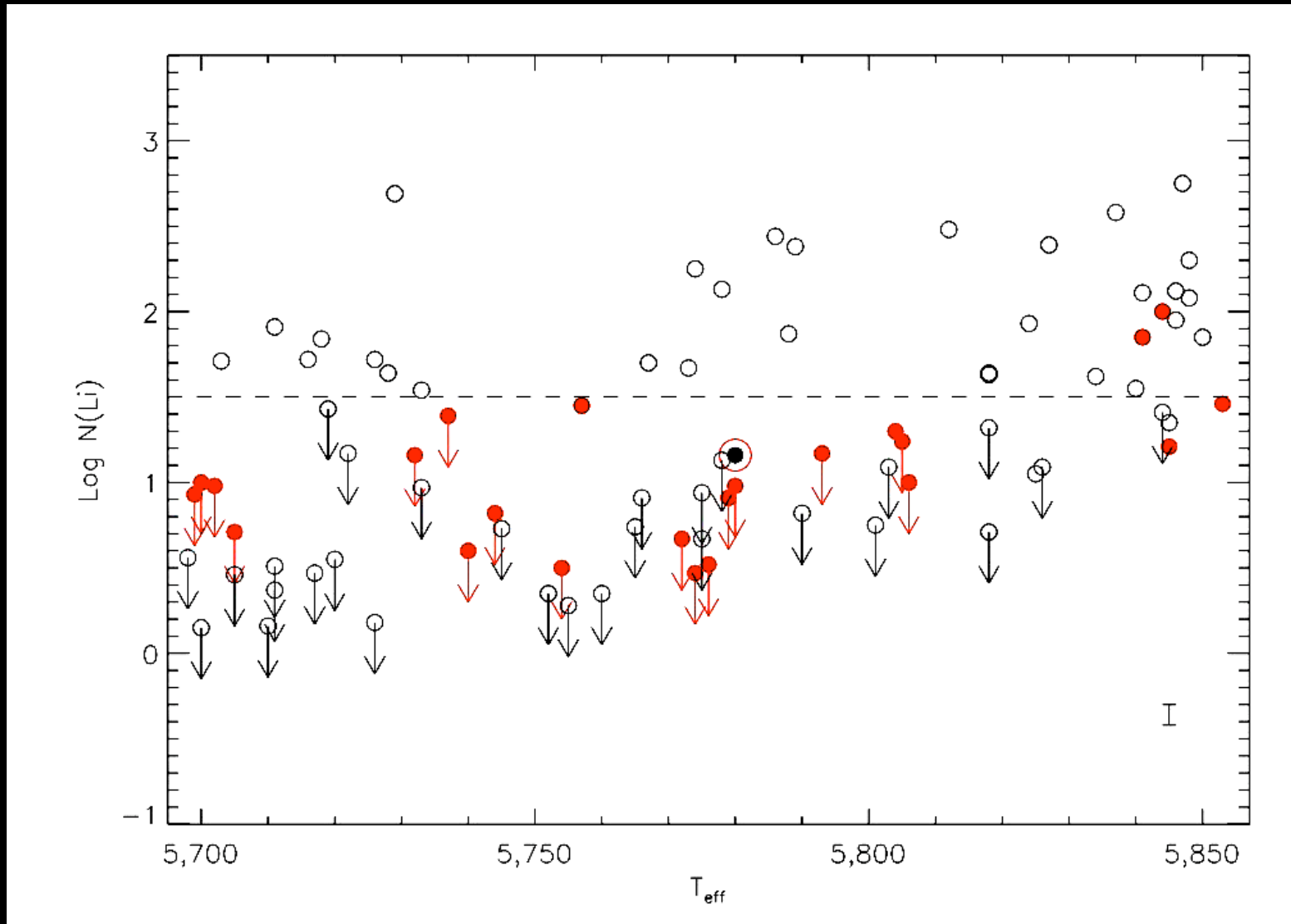




$-0.45 < [\text{Fe}/\text{H}] < +0.45$







What does this mean ?

Lithium depletion depends on at least one more parameter

Field stars

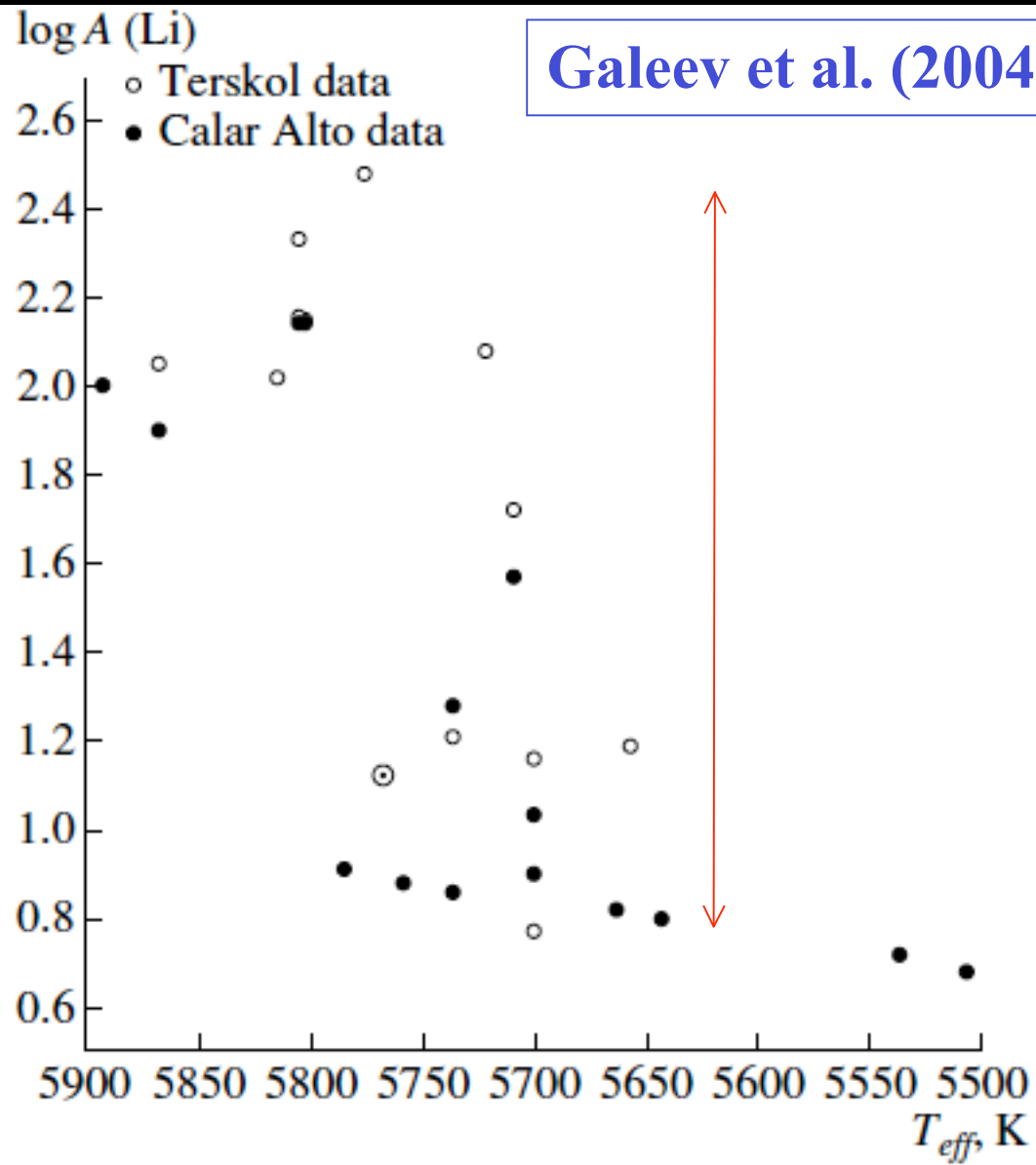
**Favata et al. (1994), Pasquini et al (1994),
Chen et al. (2001), Galeev et al. (2004),
Lambert & Reddy (2004)....**

Open clusters

Randich (this conference)

16 Cyg – type binaries

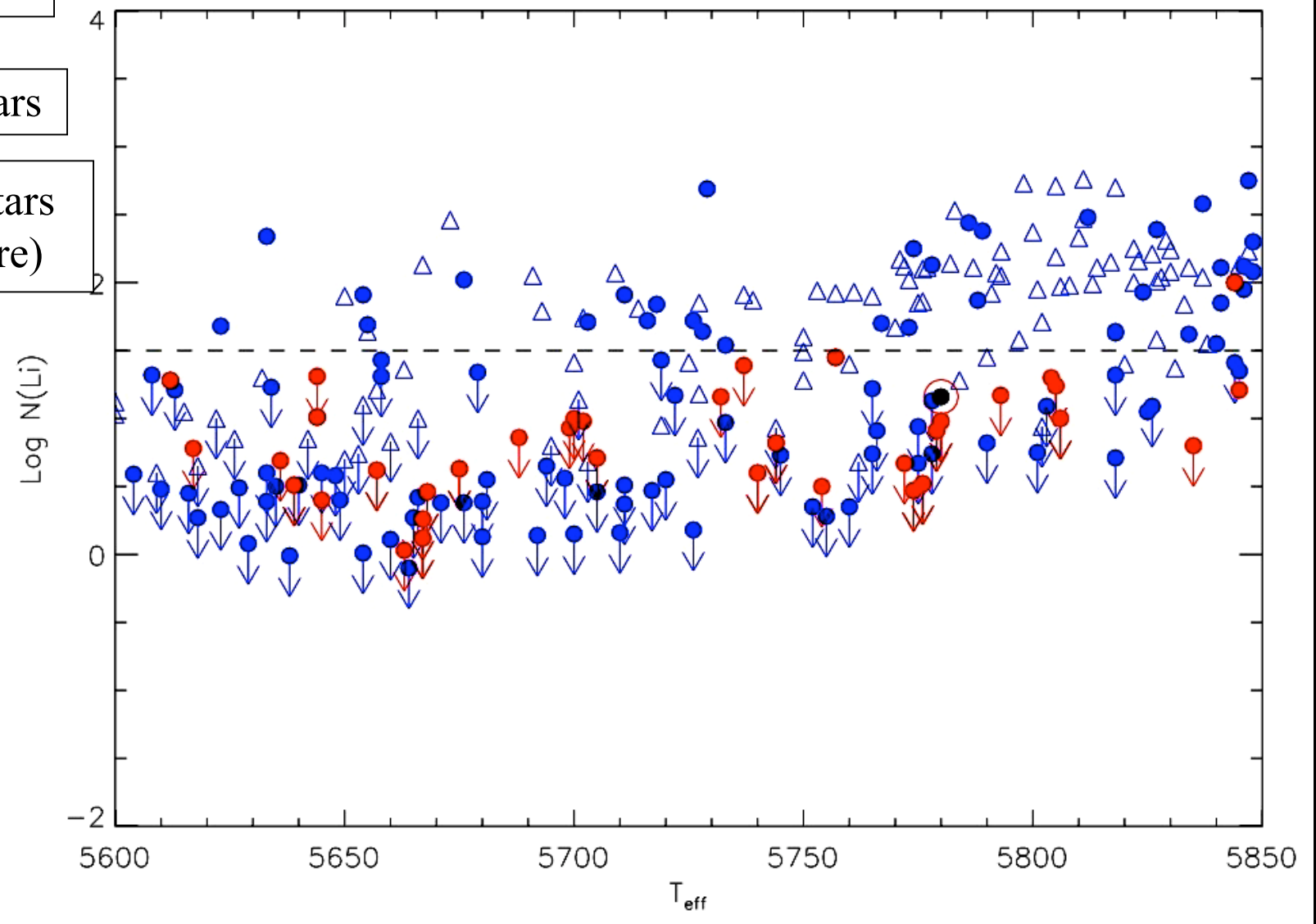
King et al. (1997), Martin et al. (2004)



● Planet host

● Single stars

△ Single stars
(Literature)

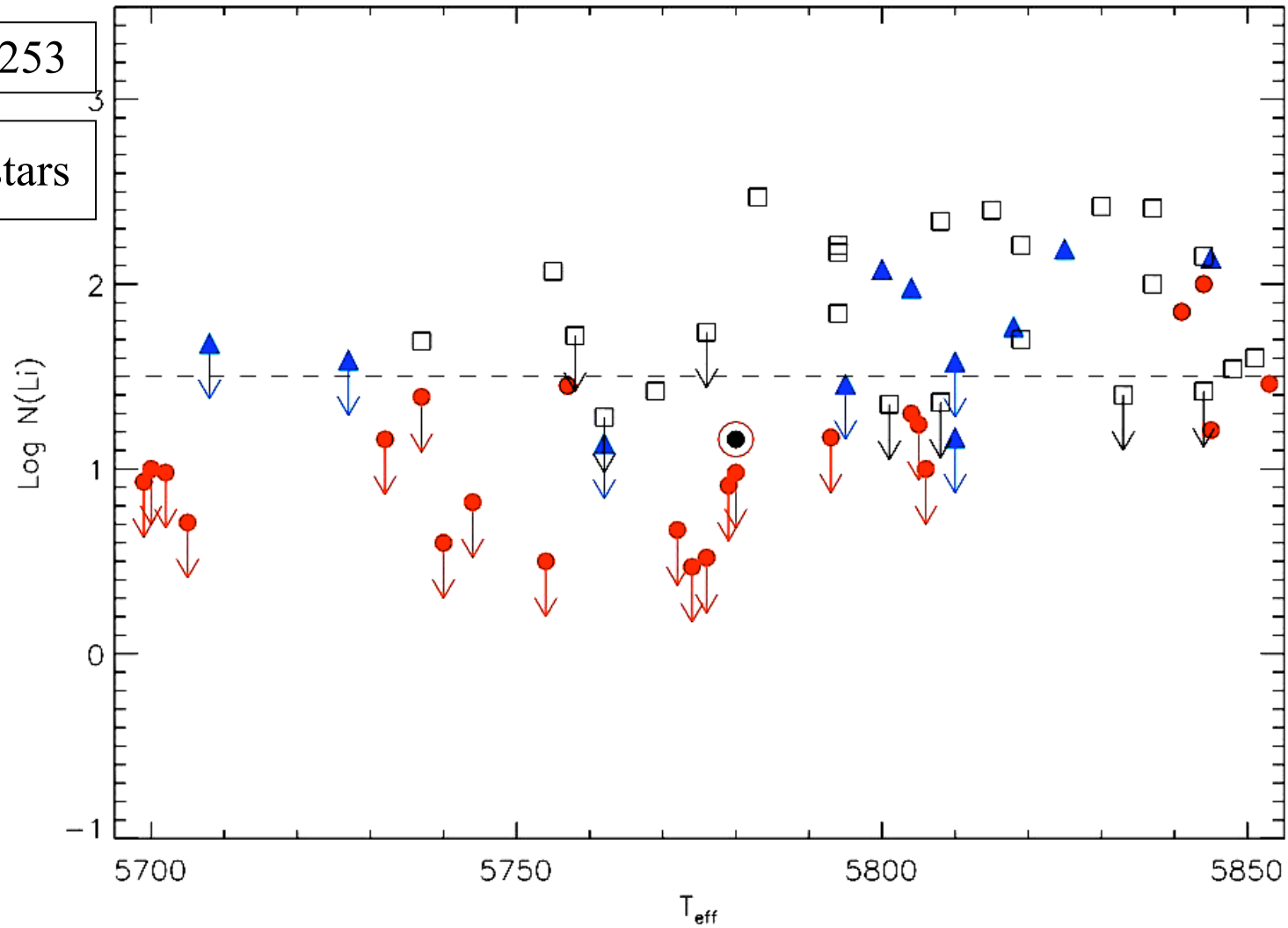


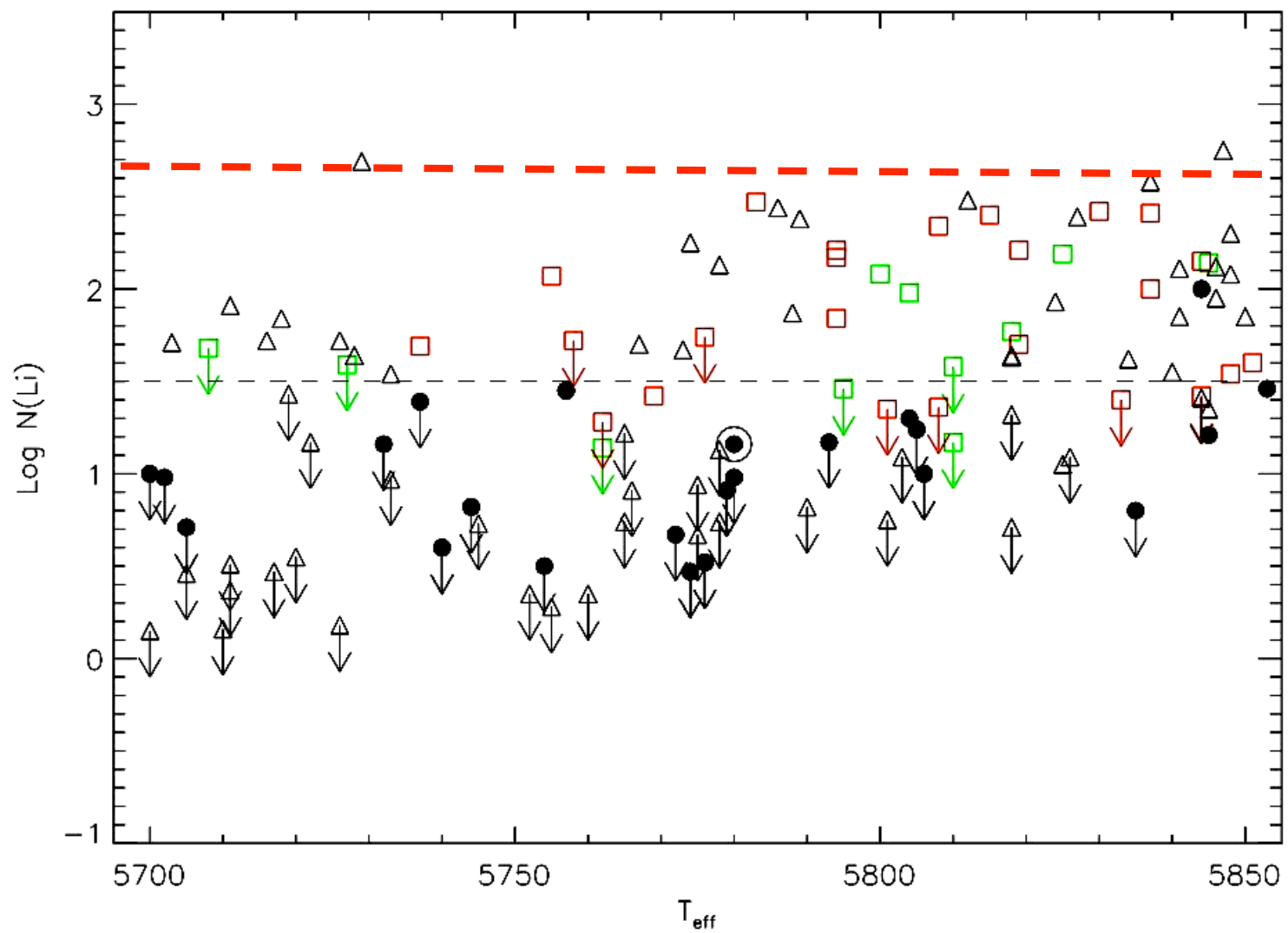
● Planet host

NGC6253 Age=3 Gyr, Fe/H= + 0.35

□ NGC 6253

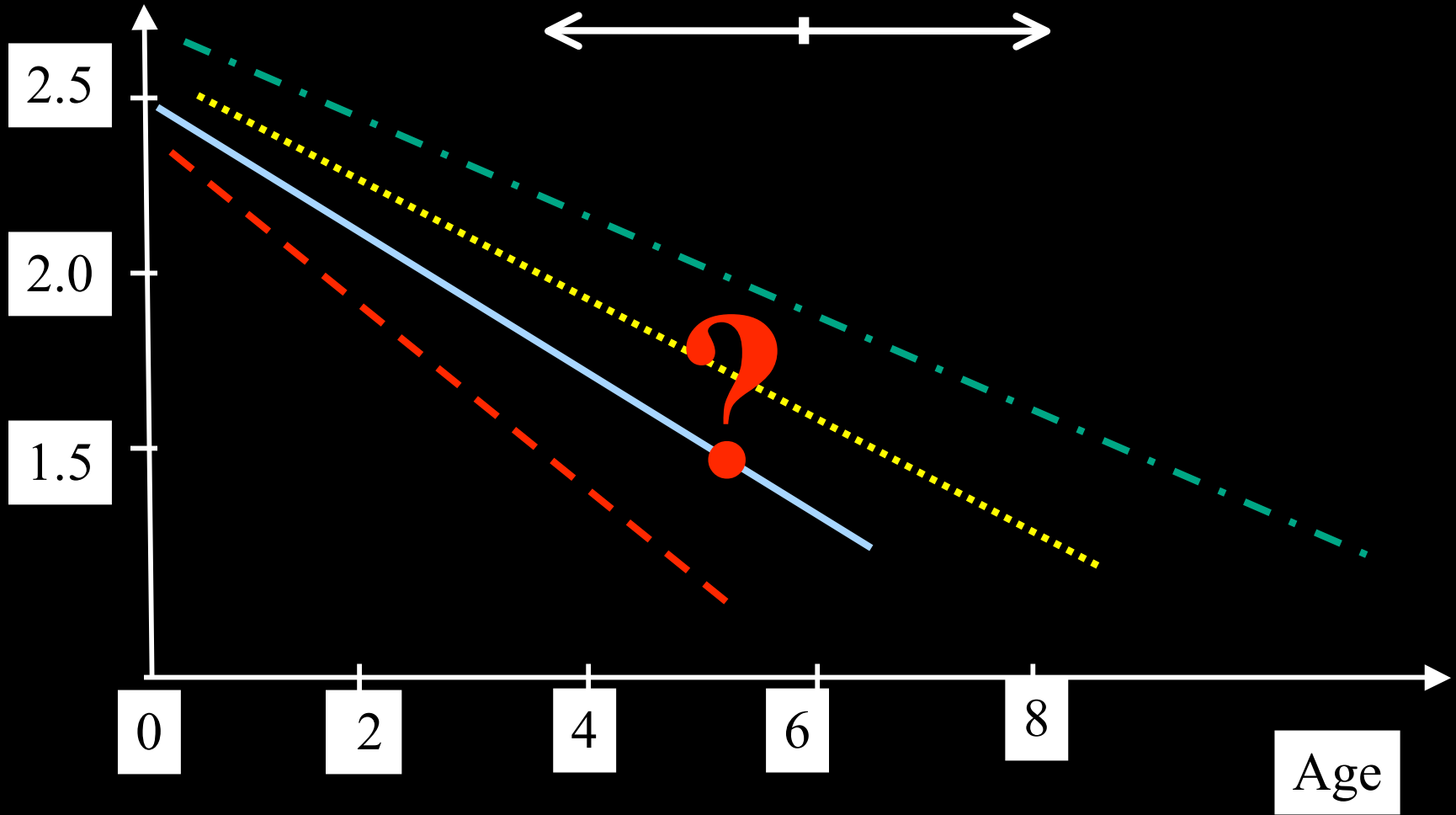
▲ M67 stars

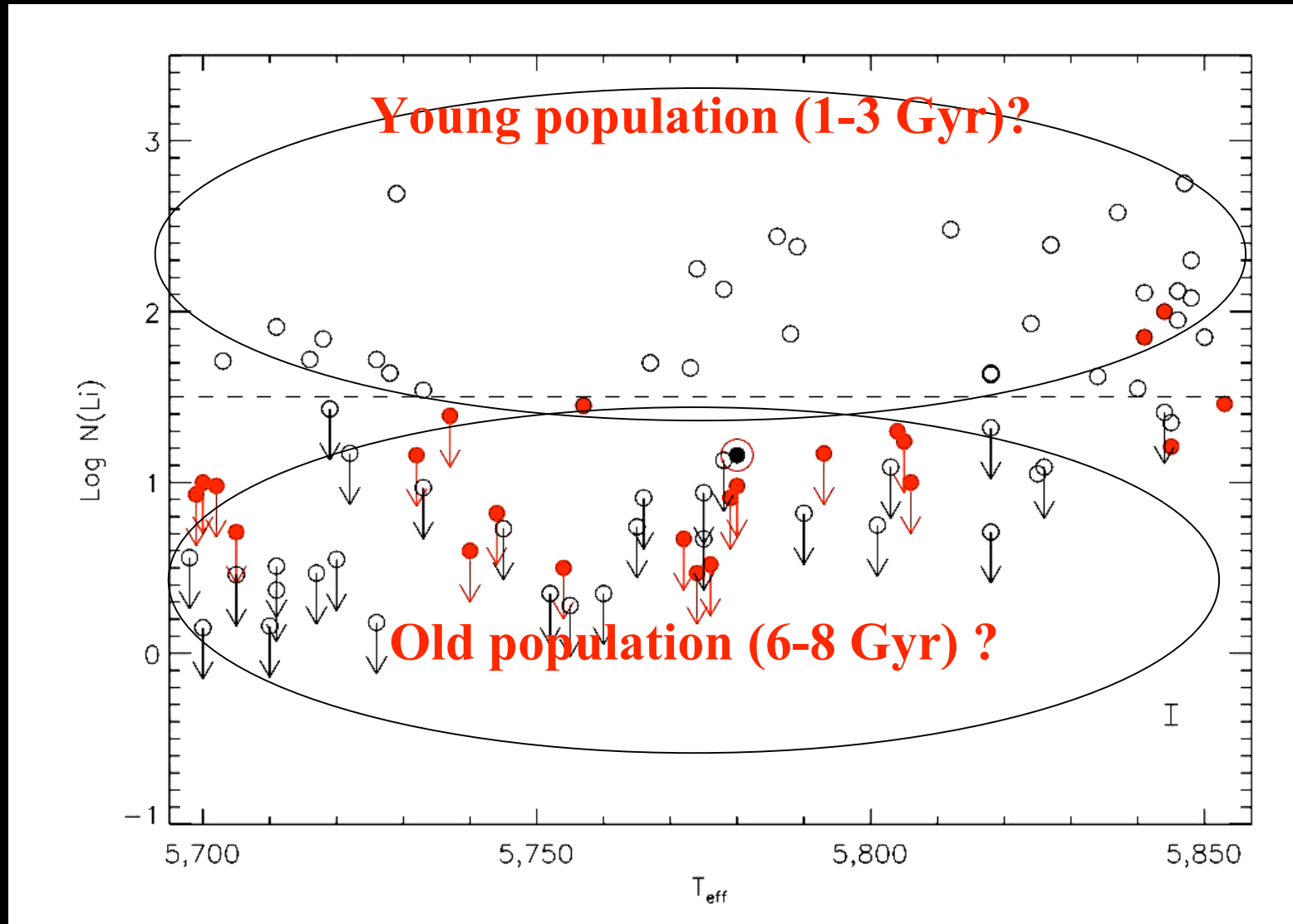




Log Li

Age errors





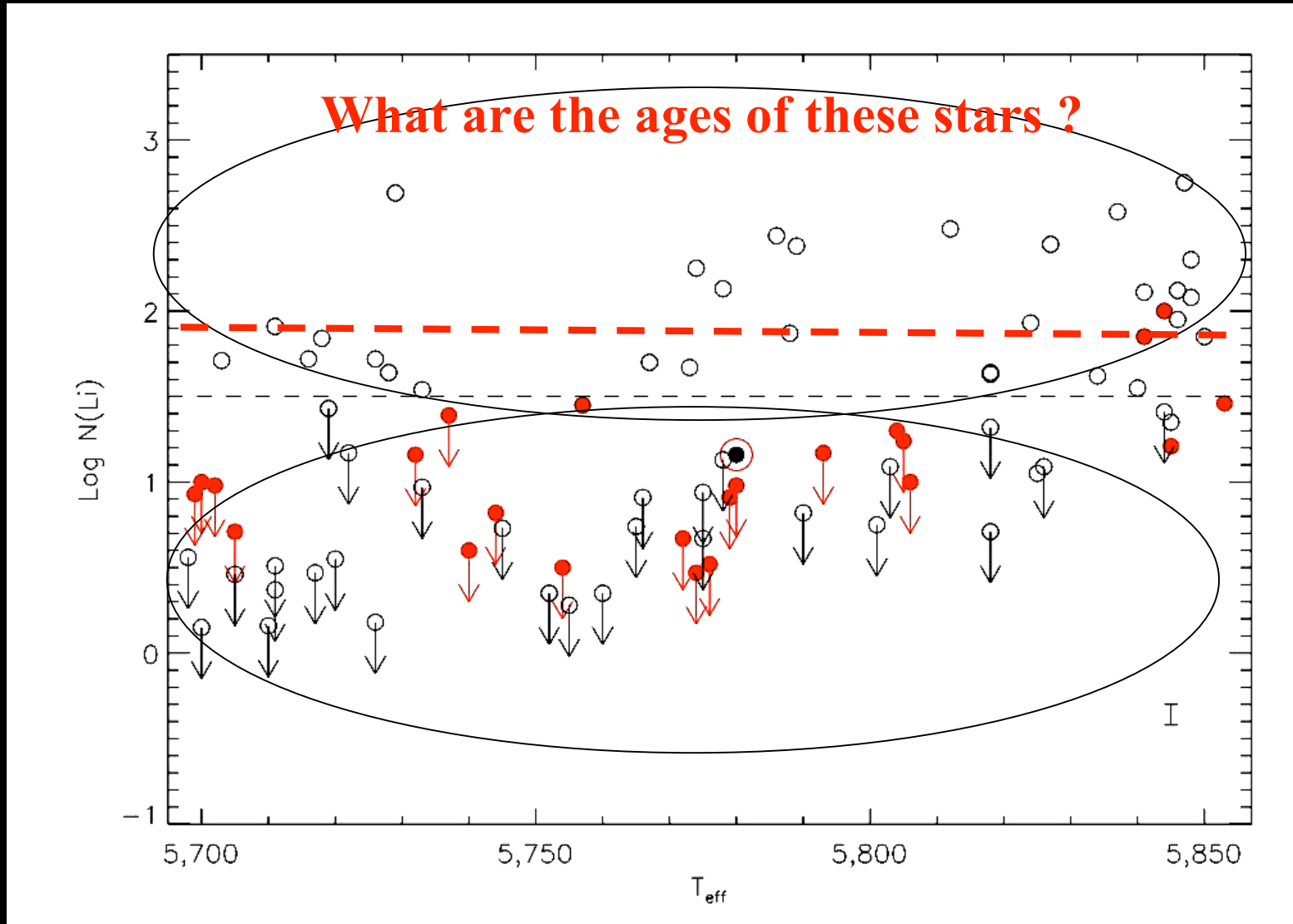
Age effect/bias ?

**Why HARPS avoids 2-3 Gyr systems ?
(same $v_{\text{ sini}}$, non active targets etc.)**

Lack of planetary systems 2-3 Gyr old ?

Impossible !

No Li-age correlation for open clusters
(Sestito & Randich 2005), Randich (2008)
Randich (this conference)



Age effect/bias ?

12 “single” stars with $\log \text{Li} > 1.9$

1 “single” star with
Age = 0.7 Gyr

1 “single” star with
Age = 1.4 Gyr

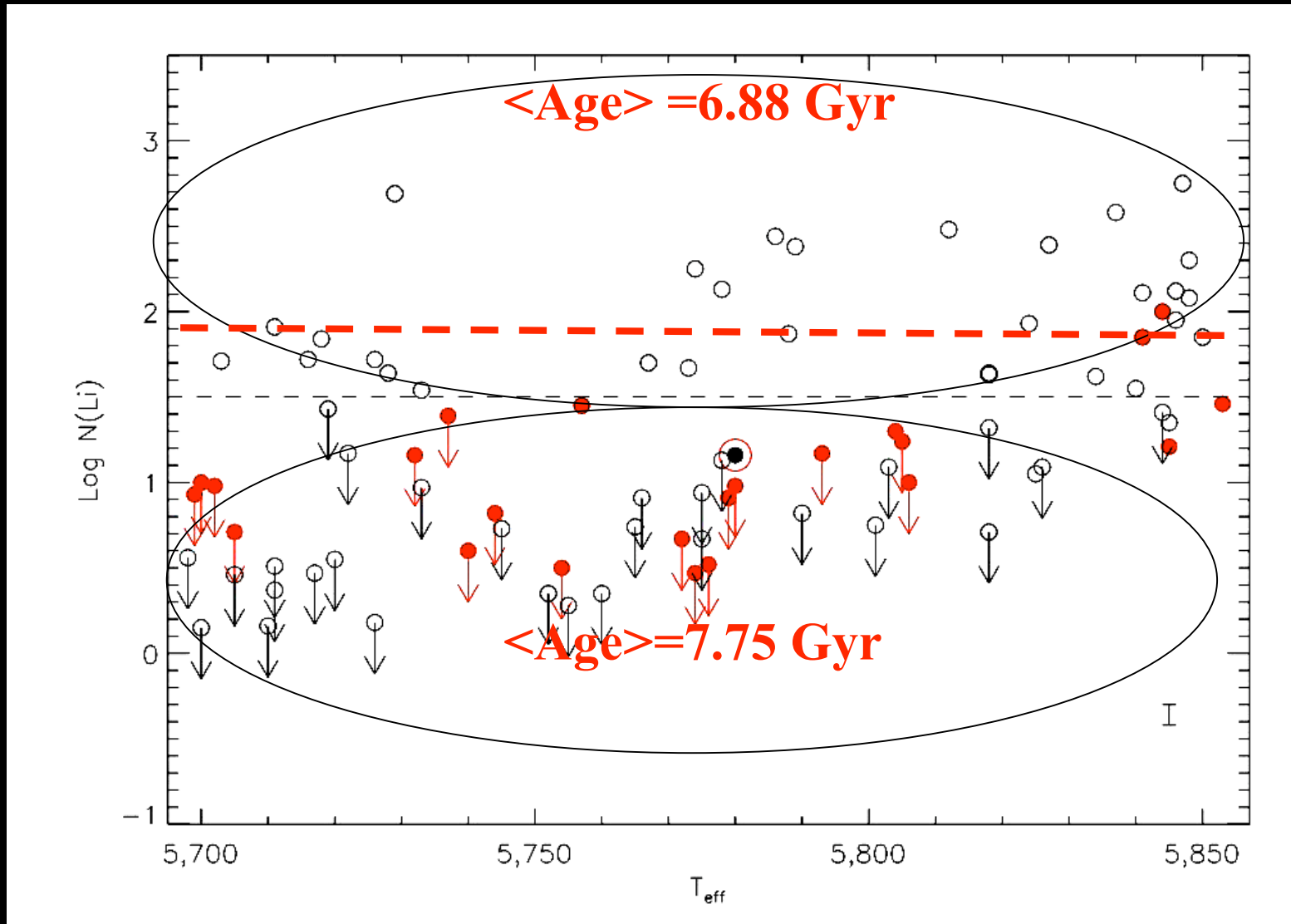
10 stars with
 $4.5 < \text{Age} < 7.9$ Gyr
 $\langle \text{Age} \rangle = 6.88$ Gyr

Holmberg et al. 2007 (Geneva-Copenhagen Survey)

planet host stars $\langle \text{Age} \rangle = 7.75$ Gyr

HD 215456: $T_{\text{eff}}=5789$ K, $\log g=4.2$, $[\text{Fe}/\text{H}]= - 0.09$
 $v_{\text{ sini}}=2$ km/s, $\log R_{\text{HK}}= - 5.1$ $\log \text{Li}=2.4$

Age = 7.3 Gyr



Age effect/bias ?