Lithium abundances to trace the polluter of the second-generation stars in NGC 6752

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NGC 6752
Credits: ESO

Introduction

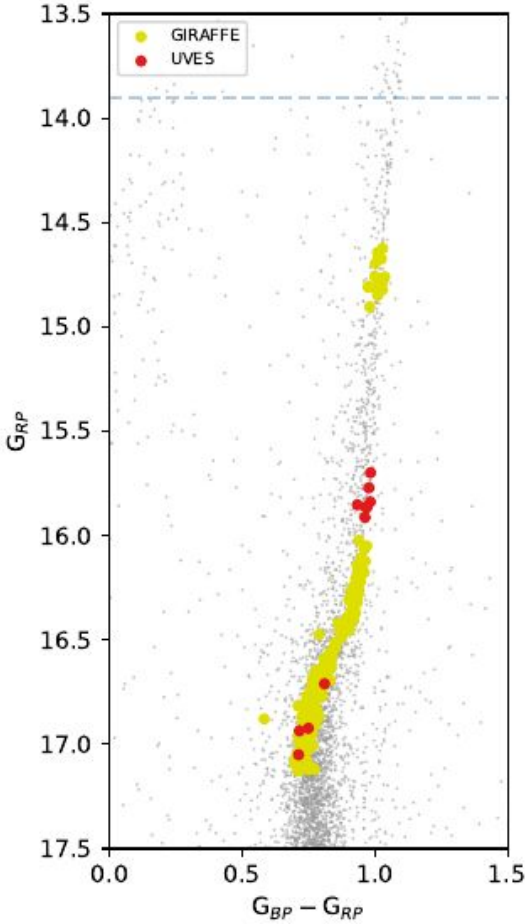
- Spectroscopy as a tool to study in detail the composition of stars. It is crucial to shed light on MSP.
- New star generations with altered composition of some key elements (e.g. C, N, O, Na, Mg, Al and also heavy elements in some cases).
- In this sense, lithium can be an important key to address them, especially in relation with p- (Na, Al) and n-capture (e.g. Y, Ba) elements
- Characterization of the stellar population of NGC 6752 as a function of Li-rich and Li-poor stars.

Method

- We analyzed 217 ESO archival spectra of the metal-poor GC NGC 6752.

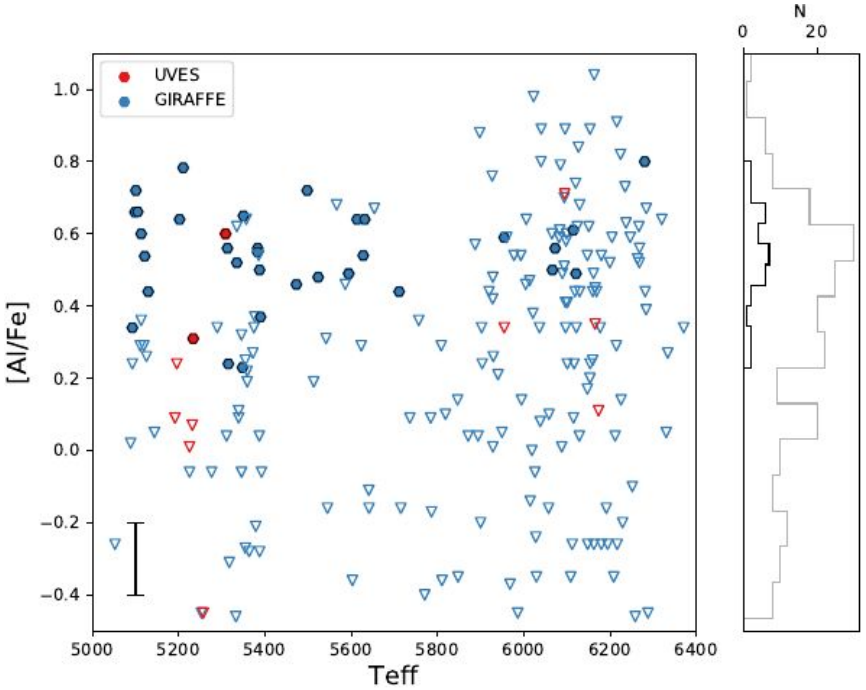
- For GIRAFFE spectra, we computed the photometric stellar parameter. For UVES spectra, we computed the spectroscopic ones.

- We synthesized the Li doublet line at 6708 Å and the Al line at 6996 Å using MOOG.

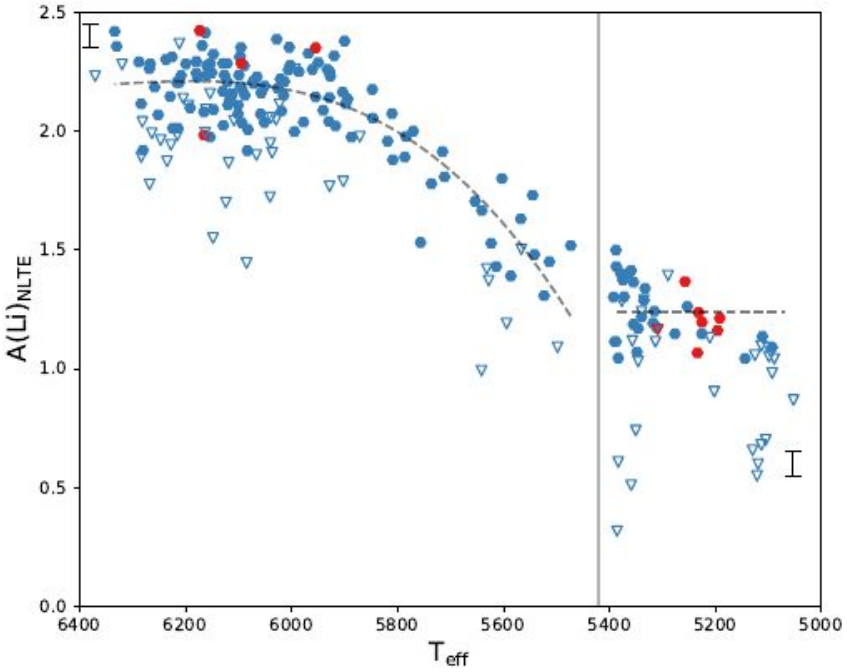


Results

- Al abundances do not seem to have a bimodal distribution, but rather a continuum

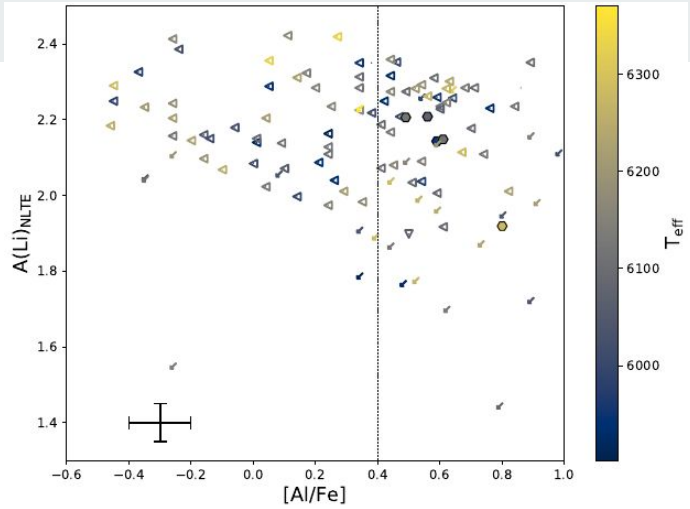


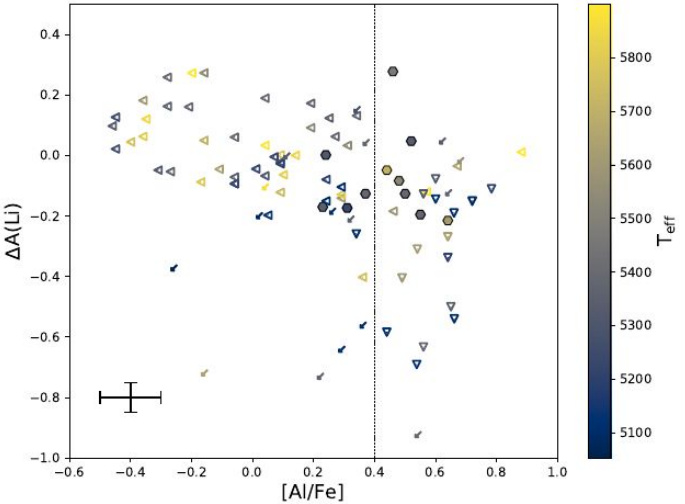
- As it is expected from the stellar evolution point of view, we found an overall decrease of Li abundances from the TO to the RGB.



Results

- We reported the presence of Li-rich stars among both first- and second-generation stars.
- We concluded that Li production is needed. This requires that AGB did contribute to the pollution of the cluster as the only possible Li producer among the polluters (Ventura+2009).
- There is no need, in our results, for the presence of other sources of self-pollution (e.g. FRMS or massive binaries), however we cannot exclude it.





A detailed paper showing our results was submitted to MNRAS (Schiappacasse-Ulloa et al. 2021)

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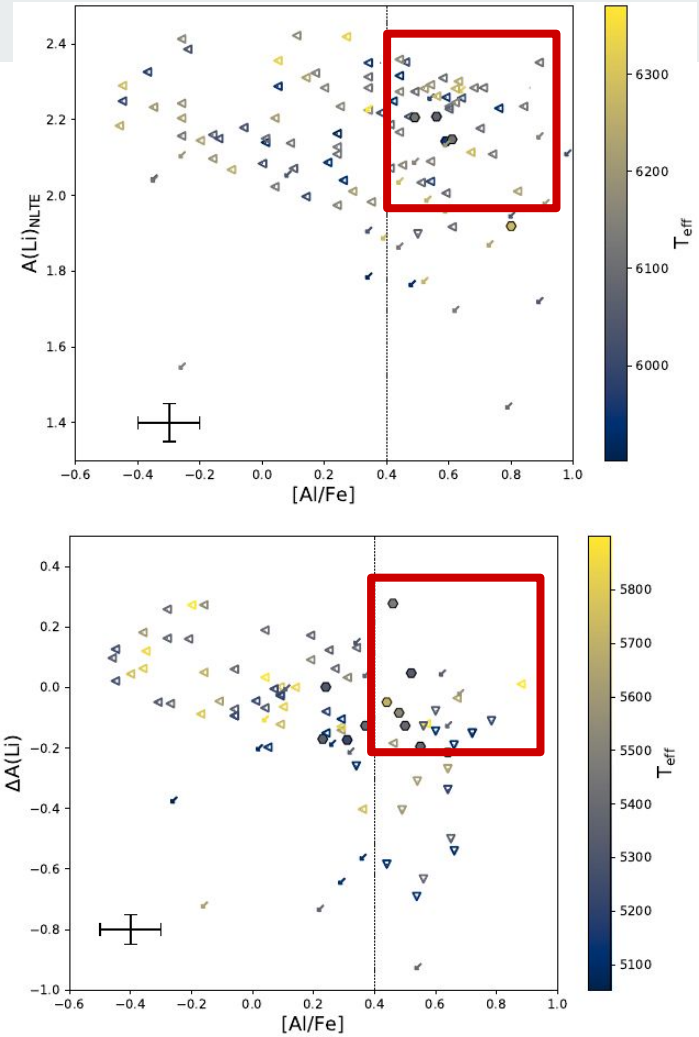

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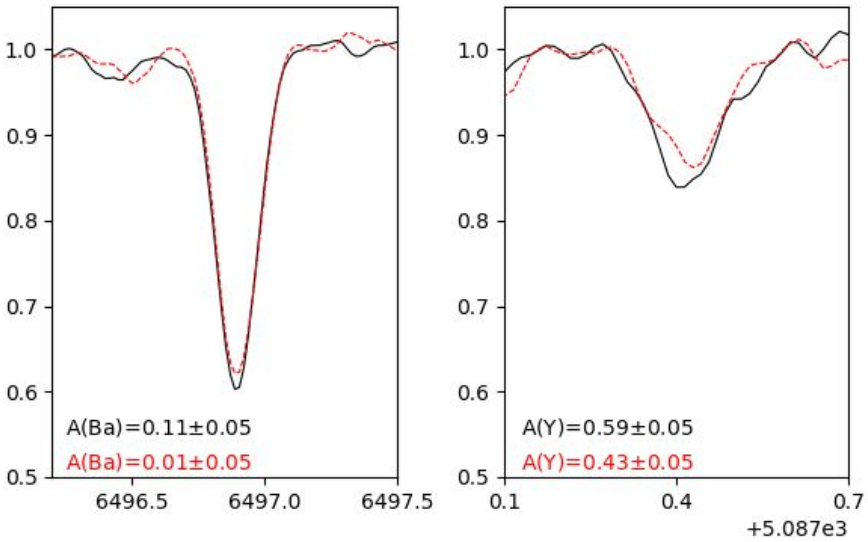
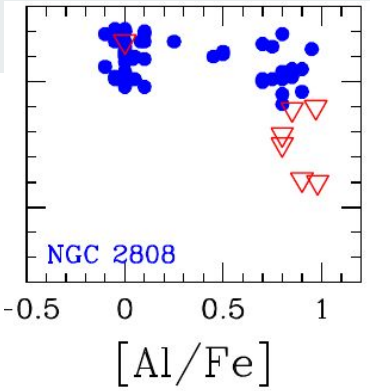
Preliminary Results

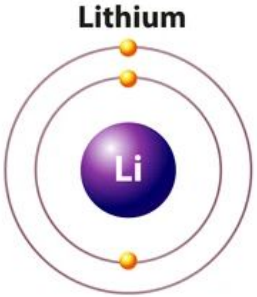


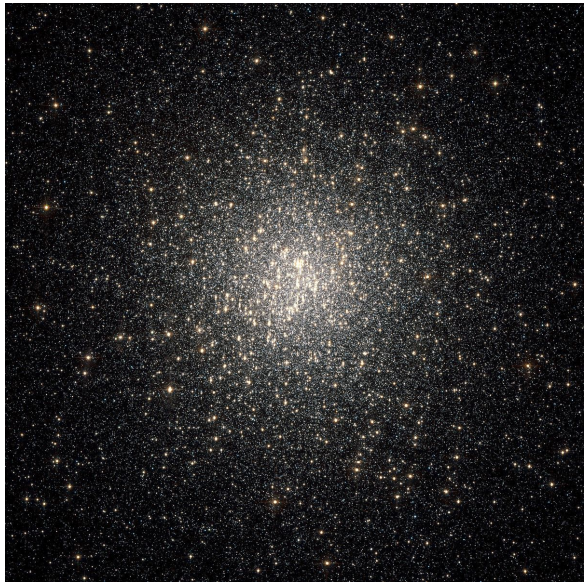
- Differential analysis between two giants with similar stellar parameters, but a moderate difference in Li content (A(Li)~0.3) shows that the Li-richer star has higher Ba (by 0.10 dex±0.07) and Y (by 0.16 dex±0.07) abundances.

- Analysis on UVES is still ongoing, where we expect to do a full n-capture element characterization. It could be useful to constrain the mass range of the polluter.



D'Orazi et al. 2015





NGC 2808
Credits: HST

Summary and Future Work

- We analysed 217 spectra of the GC NGC6752 from ESO archival data, aiming to compared Li-rich and Li-poor pollution as a function of p- and n-capture elements.
- Al abundances show continuum distribution, rather than a bimodal one.
- We found SG Li-rich stars in our sample, showing that, at least, AGB stars are one of the polluters of the cluster.
- Further differential analysis in UVES spectra could constrain the mass ranges of the polluter. (On going)
- Replicate this analysis in more globular cluster, e.g., NGC 2808.