OCCASO homogeneous sample of open clusters with precise chemical abundance determination

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The OCCASO Survey

The Open Clusters Chemical Abundances from Spanish Observatories (OCCASO) survey was designed to study homogeneously a sample of OCs to obtain precise radial velocities and detailed chemical abundances in order to analyze their kinematics and chemical trends in the Galactic disc.
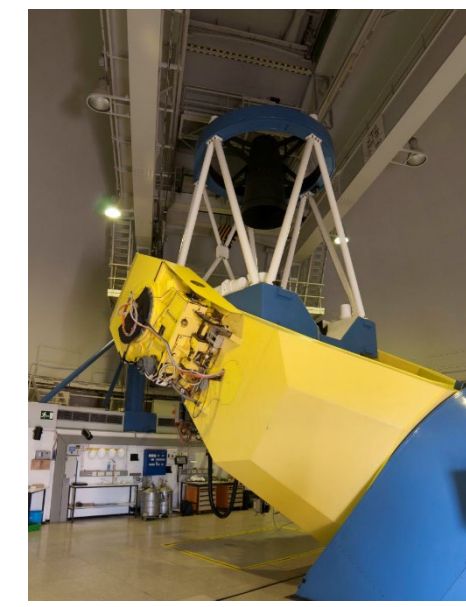
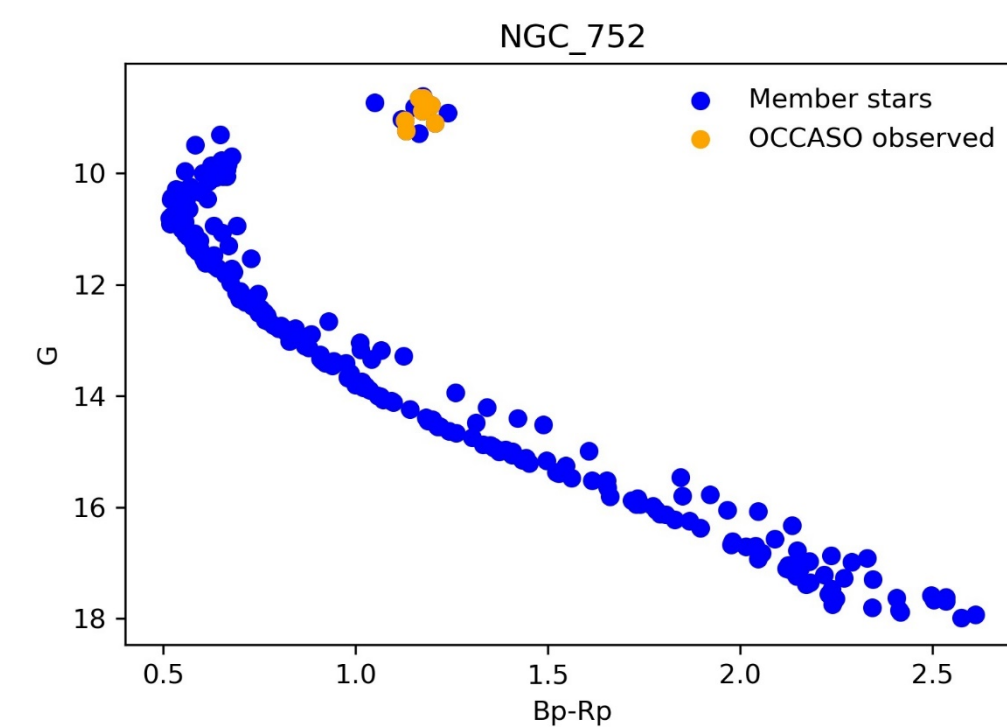**Single fiber high-resolution spectrographs used:**

Hermes @ Mercator (ORM)
Diameter = 1.2 m
R ~ 85000
Range: 377 – 900 nm
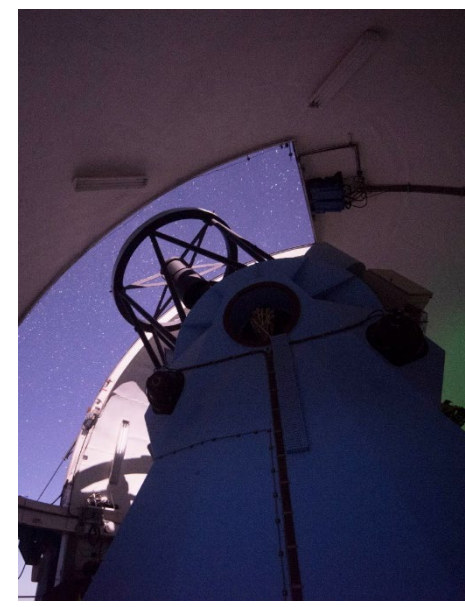
FIES @ NOT (ORM)
Diameter = 2.5 m
R ~ 67000
Range: 370 – 900 nm

CAFE @ CAHA 2.2
Diameter = 2.2 m
R ~ 62000
Range: 390 – 950 nm

The observational Strategy
- OCs older than 300 Ma
- 6 red clump stars observed on average in each cluster
- Signal to noise ratio S/R > 70 pix^{-1}
- The limit in magnitude of the survey is G = 14
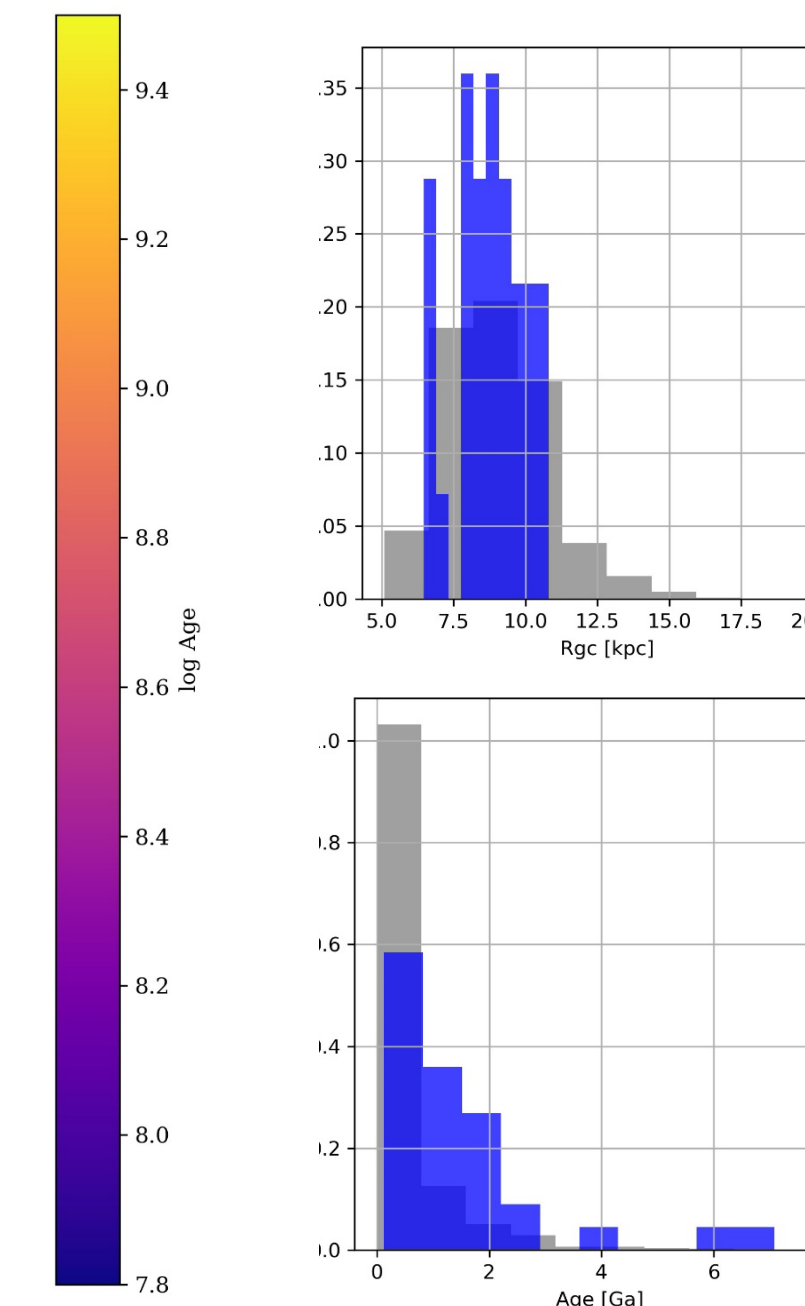- Minimum of 3 exposures per star

Survey Status
- 152 observation nights since 2013
- 33 open clusters fully analyzed up to now
- 13 clusters in process of observation and analysis
- 16 observation nights granted during the next months
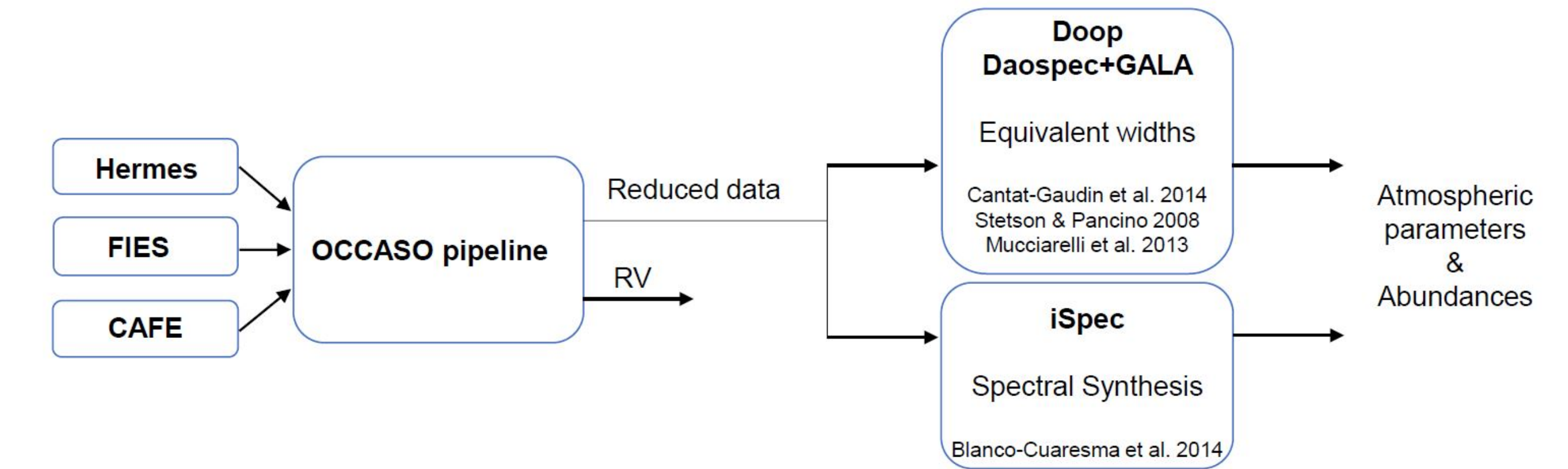
Distribution of OCCASO Clusters
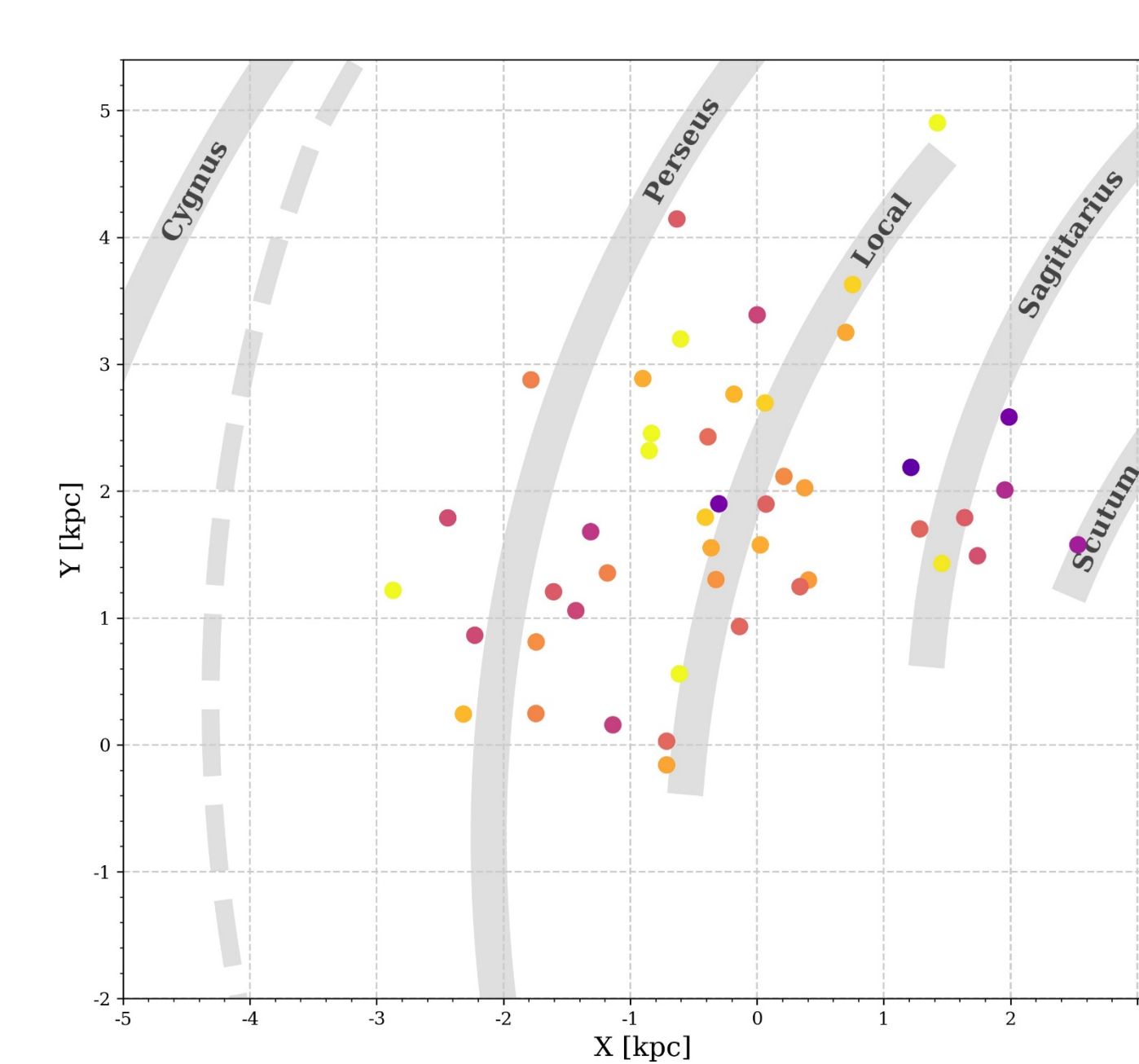
Distribution at the Galactic plane of the OCCASO observed clusters.

Histograms of Galactocentric radius, height above /below the plane (Z) and age covered by the OCCASO survey (blue), ad of the clusters in the catalogue Cantat-Gaudin et al. (2020) (gray)

Data Reduction and Analysis

More information of the data reduction and analysis procedure at: Casamiquela et al. (2016,2018,2019), Carrera et al. (2021)

NGC6755_3 SNR ~ 50 pix^{-1} Gmag=11.3
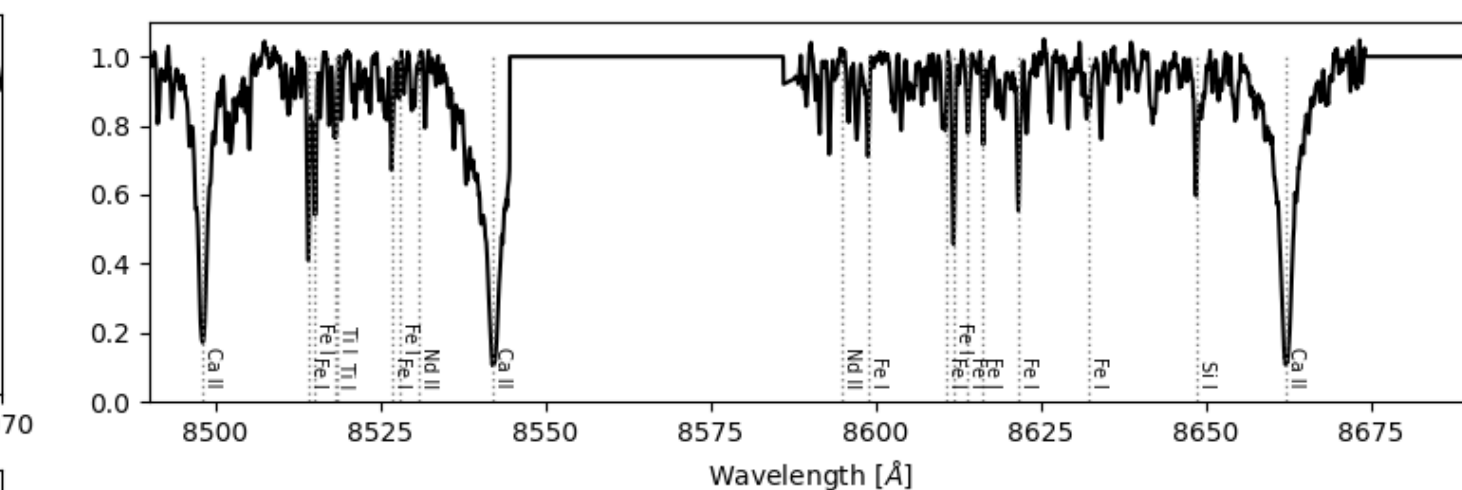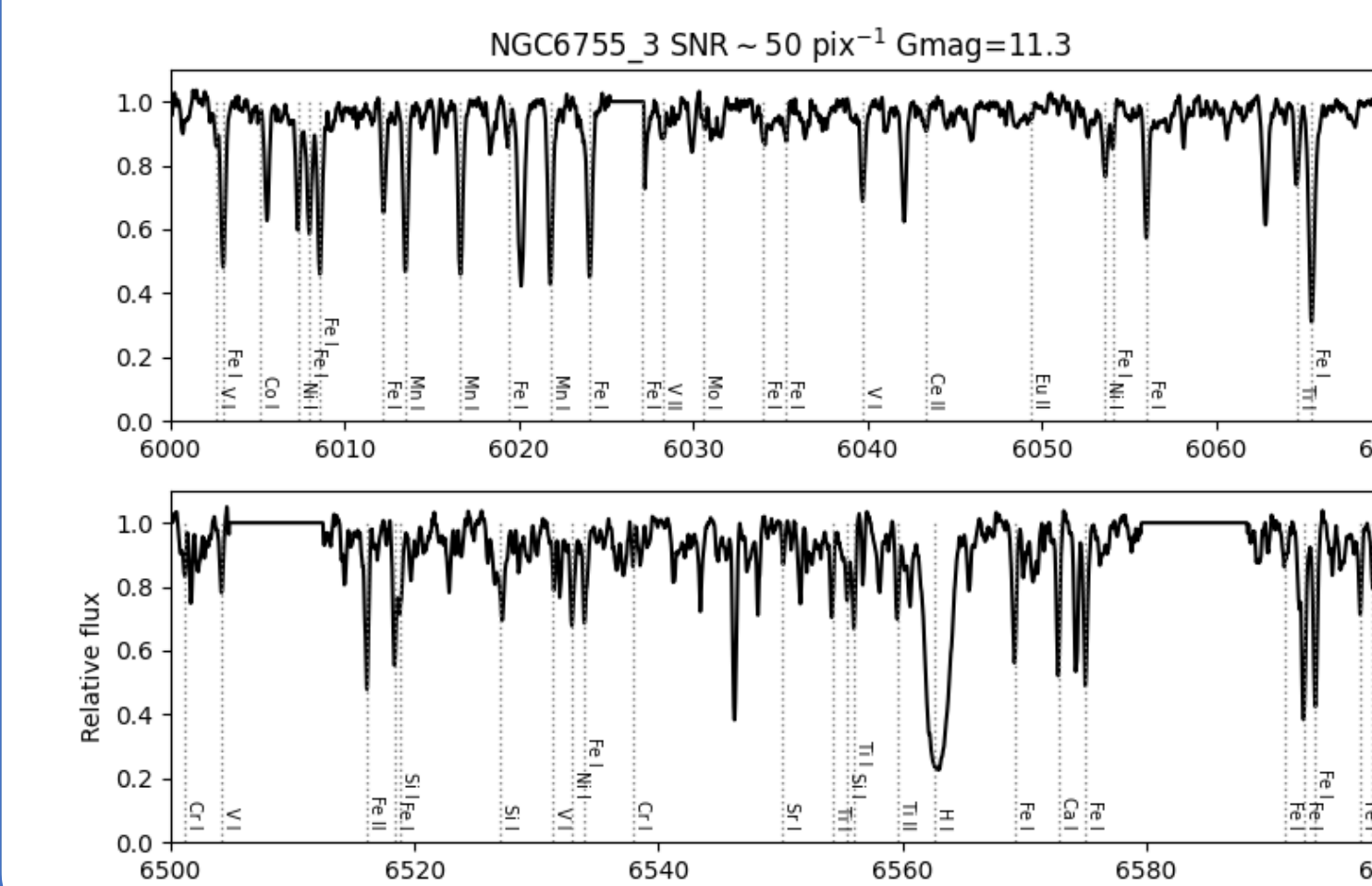
Example of one of the spectra in three windows acquired with CAFE@CAHA2.2. This spectrum is the combination of three exposures of 3600 sec

Iron Peak Abundance Trends with R$_{GC}$

a ≤ 0.8 Ga
-0.021±0.014 dex/kpc
N=13

a > 0.8 Ga
-0.083±0.018 dex/kpc
N=19
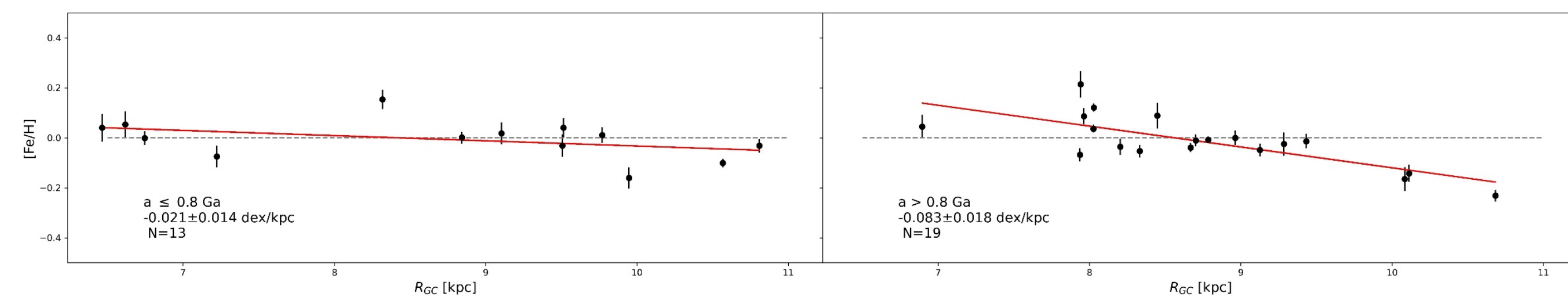
- Galactocentric radial trend of iron in two age bins divided at 800 Ma.
- Negative trend [Fe/H] vs R$_{GC}$ that changes significantly with the age bin. Qualitatively agrees with the results of Donor et al. (2020).

Fe-peak Elements
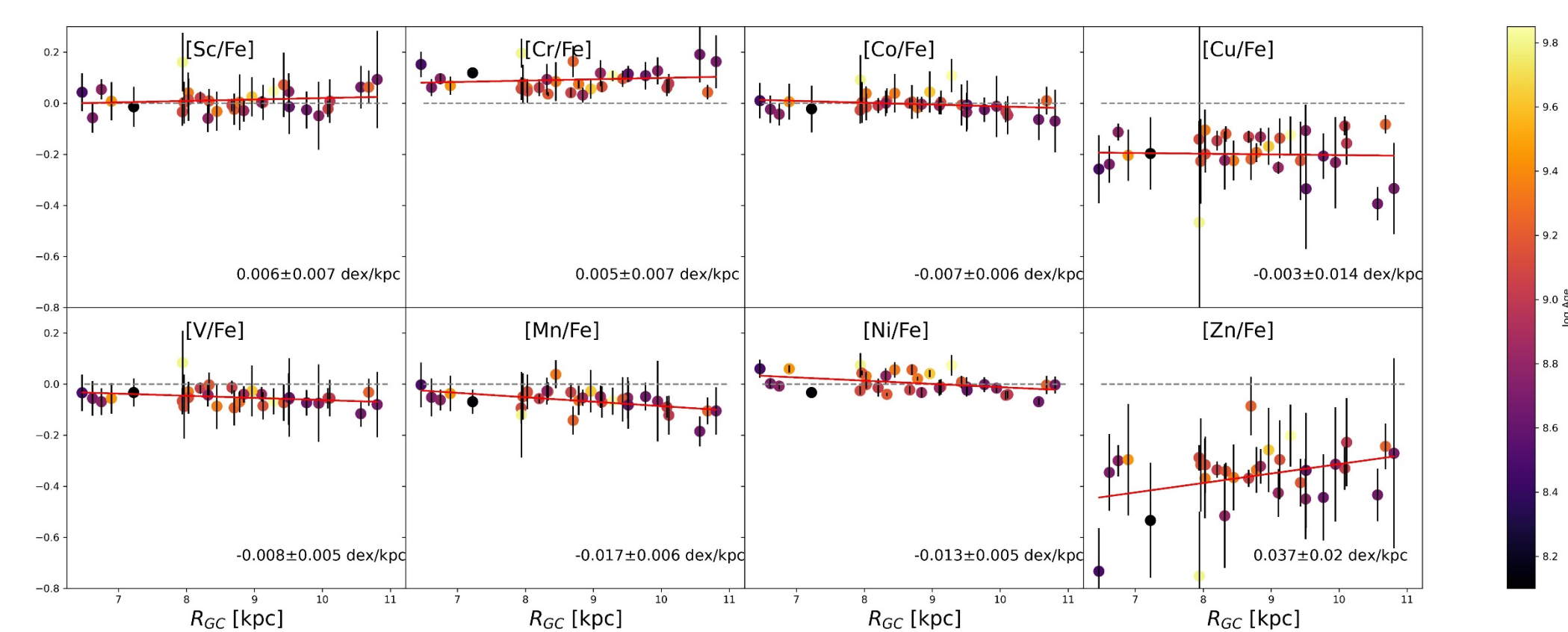
- Abundances [X/Fe] of iron peak elements as function of the Galactocentric radius colored by age.
- Sc, V, Cr, Co, Ni and Cu compatible with having a flat trend.
- Mn shows a negative trend (-0.017±0.006 dex/kpc) in agreement with Donor et al. (2020) and Spina et al. (2021).
- Zn shows an increasing trend.

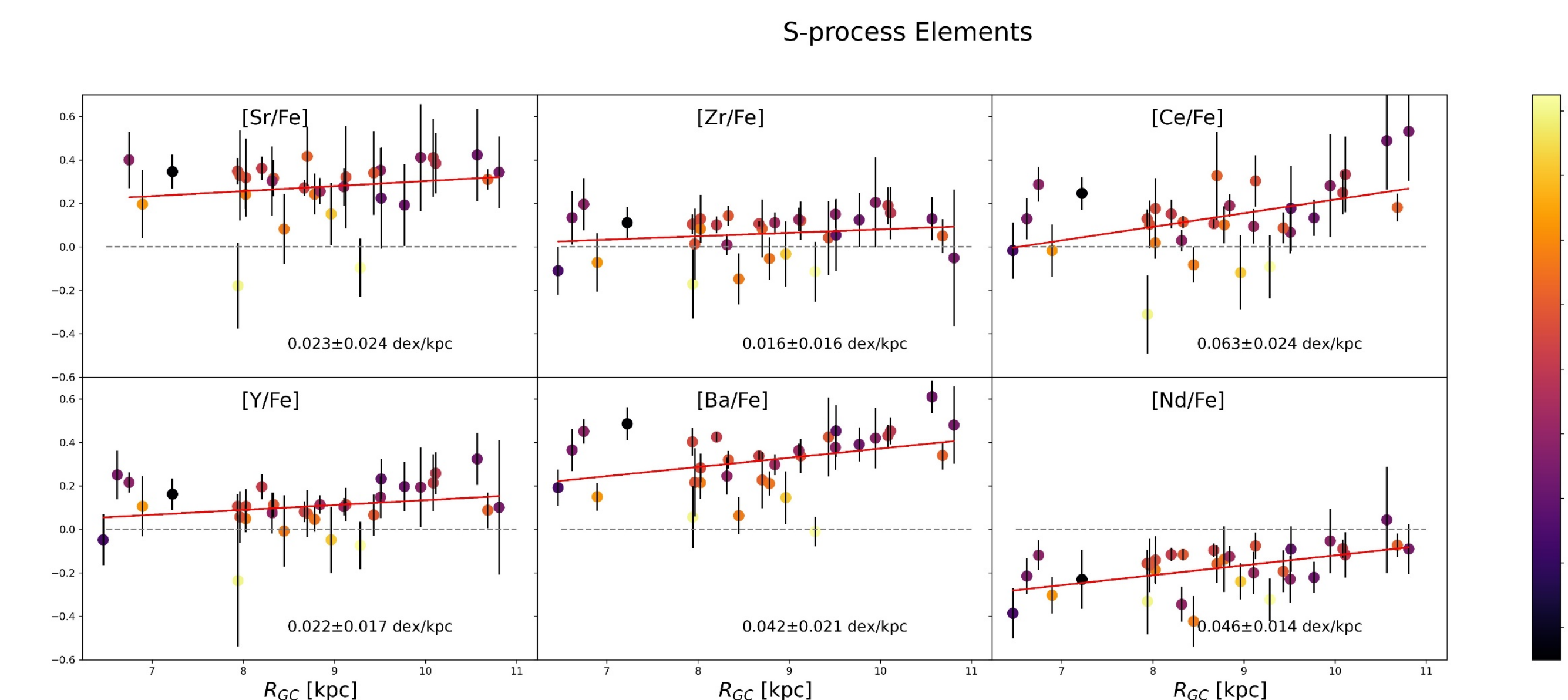## α and Odd-Z Abundance Trends With R$_{GC}$

Alpha Elements
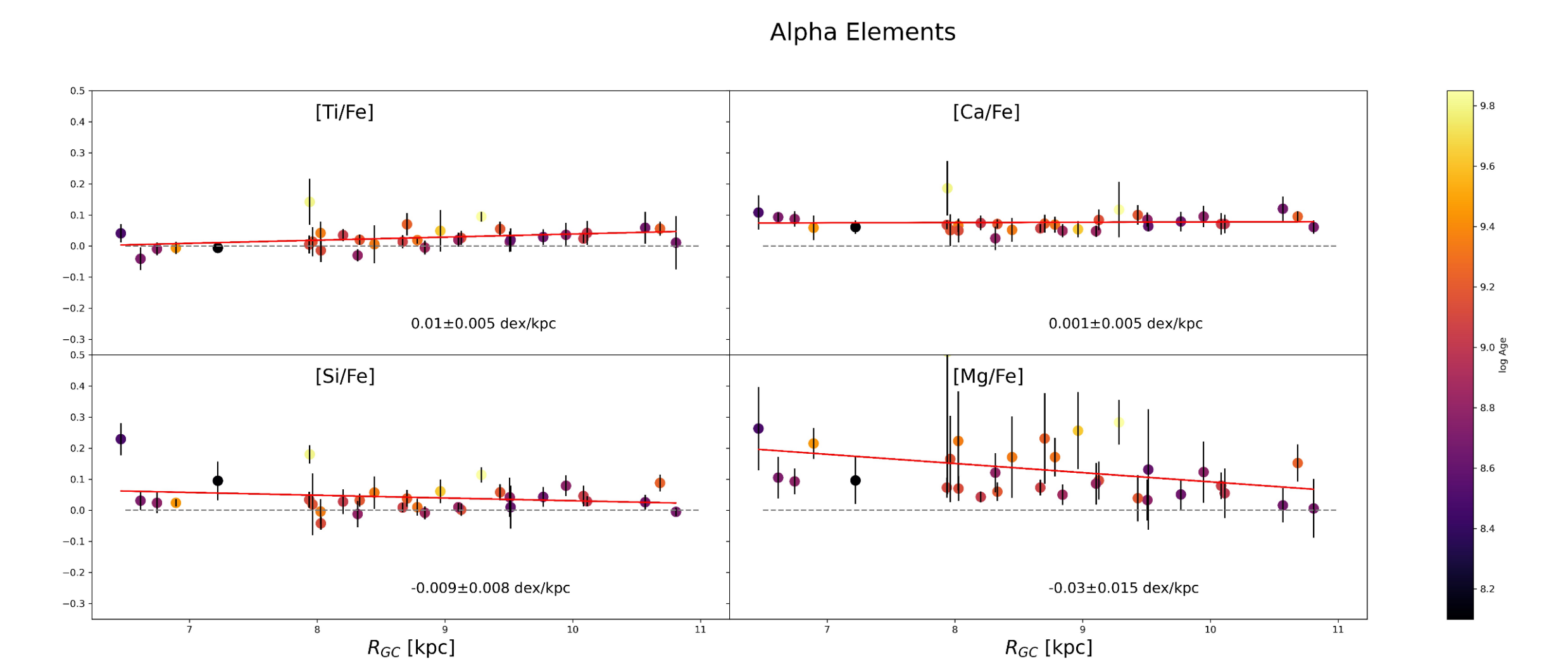
- Ti, Si and Ca are compatible with having a flat trend.
- Magnesium shows a decreasing trend in contrast with the results of Donor et al. (2020).

Odd-Z Elements
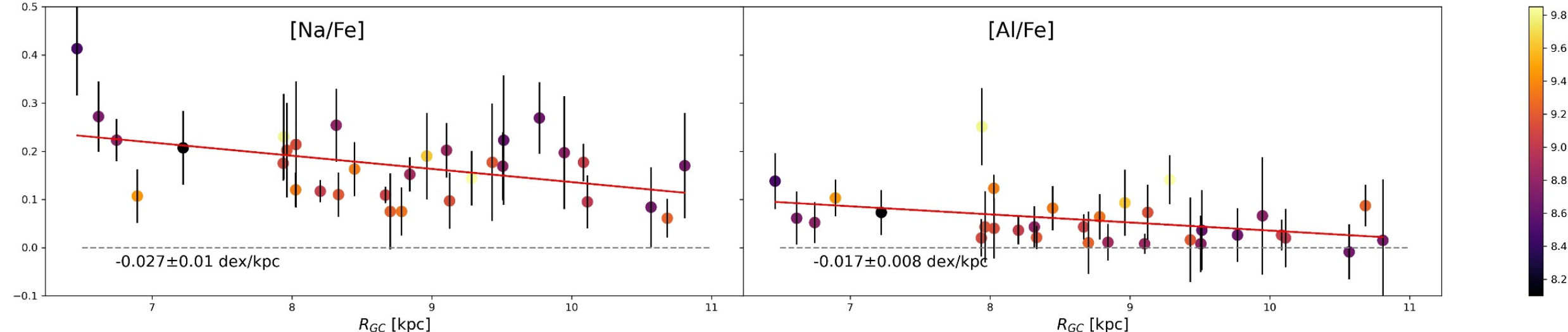
- Negative trend for the odd-Z elements Na and Al.

S-process Abundance Trends With R$_{GC}$

S-process Elements

- Sr and Zr are compatible with having a flat trend.
- Ce and Ba show a positive trend.
- Nd also has an increasing trend (0.046±0.014 dex/kpc) in agreement with Overbeek et al. (2016) showing a gradient of 0.037±0.011 dex/kpc.
- The s-process dominated elements show a large dispersion partially due to the age difference of the clusters in our sample.

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