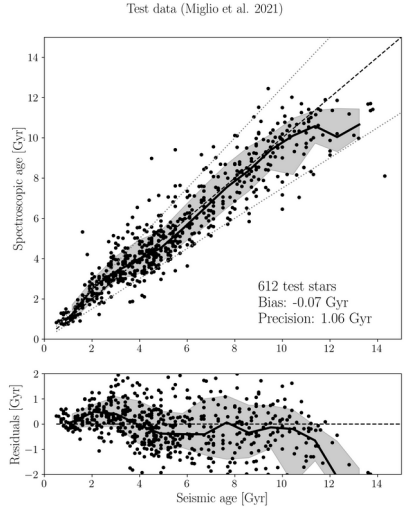
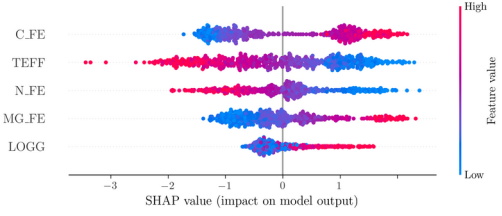
Spectroscopic age estimates for APOGEE red-giants: **Spatial and kinematic trends with age in the Galactic disc**

Idea

- We use the supervised machine learning technique XGBoost, trained on a high-quality dataset of 3060 red-giant and red-clump stars with asteroseismic ages observed by both APOGEE and Kepler:



- SHAP (SHapley Additive exPlanations) are used to understand how each feature has an impact on the predictions:



Catalogue & notebooks

github.com/fjaellet/xgboost_chem_ages

Some results

- Very clear imprint of the outer-disc flare in the age maps
- Confirmation of the recently found split in the local age-metallicity relation
- Confirmation of steepening in the age-velocity dispersion relation at around ~9 Gyr over a large extent of the Galactic disc (5 kpc <R_{Gal}<13 kpc)

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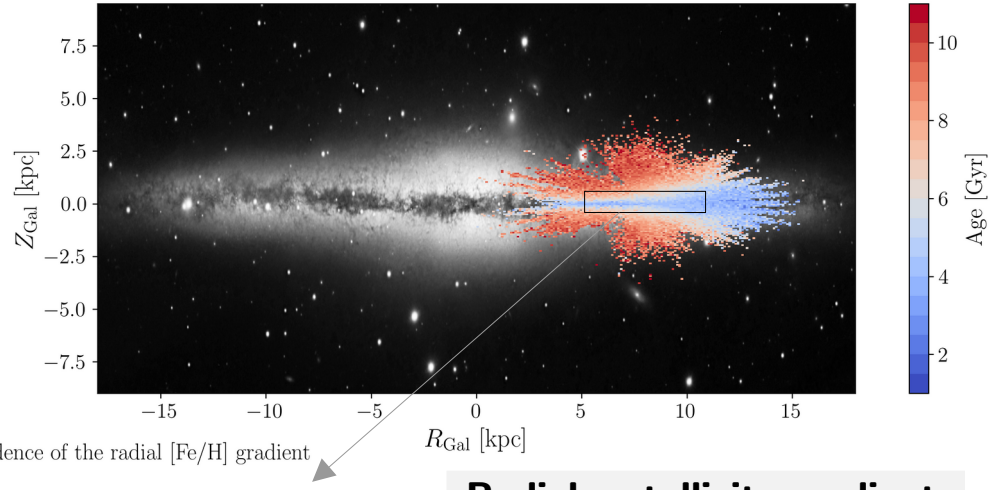
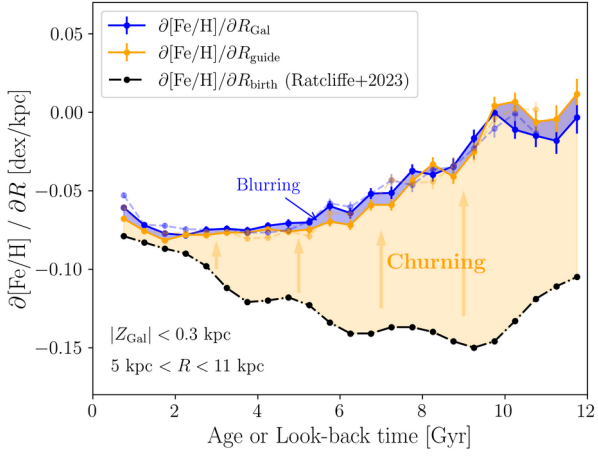


Age dependence of the radial [Fe/H] gradient



Radial metallicity gradient

- We measure the Galactic radial metallicity gradient in small age bins
- Steeper metallicity gradient for ~2−5 Gyr old populations; subsequent flattening for older populations – produced by radial migration (mostly churning)
- The dispersion about the abundance gradient as a function of age follows a power-law trend (with an exponent β≈0.15), indicating a relatively smooth radial migration history in the Galactic disc over the past 7−9 Gyr

Anders et al. 2023, A&A, in press, https://arxiv.org/abs/2304.08276