Gaia Data Release 3

Known issues y como tratarlos

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Brought to you by
the
Gaia Collaboration

Airbus Space

ESA/Gaia/DPAC

A considerable dataset

Reference frame	3 tables
Science alerts	2 tables
Cross match	33 tables
Astrophysical parameters	6 tables + 2 datalink
Performance verification	9 tables
Auxiliary	1 table
gaiadr3.gaia_source	1 table
gaiadr3.gaia_source_lite	1 table
Simulation	2 tables
Extra-galactic	4 tables
Non-single stars	4 tables
Solar system	3 tables
Spectroscopy	1 table + 3 datalink
Variability	17 tables + 1 datalink

- DR3 is huge
  - Many tables/columns/rows
  - 10 TB of data

- Is it perfect ?

What is Paradise without a snake?

Known Issues

Known issues page: https://www.cosmos.esa.int/web/gaia/dr3-known-issues

DR3 validation paper:

Gaia DR3 – Catalogue validation

C. Babusiaux[1,2], C. Fabricius[3], S. Khanna[4], T. Muraveva[5], C. Reylé[6], F. Spoto[8], A. Vallenari[9], X. Luri[3], F. Arenou[2], M.A. Álvarez[10], F. Anders[3], T. Antoja[3], E. Balbinot[4], C. Barache[11], N. Bauchet[2], D. Bossini[12], D. Busonero[13], T. Cantat-Gaudin[3,19], J. M. Carrasco[3], C. Dafonte[10], S. Diakité[7], F. Figueras[3], A. Garcia-Gutierrez[3], A. Garofalo[5], A. Helmi[4], Ó. Jiménez-Arranz[3], C. Jordi[3], P. Kervella[14], Z. Kostrzewa-Rutkowska[15,16], N. Leclerc[2], E. Licata[13], M. Manteiga[17], A. Masip[3], M. Monguió[3], P. Ramos[3,18], N. Robichon[2], A. C. Robin[6], M. Romero-Gómez[3], A. Sáez[3], R. Santoveña[10], L. Spina[9], G. Torralba Elipe[10], M. Weiler[3]

Specialized DR3 papers: https://www.cosmos.esa.int/web/gaia/dr3-papers

DR3 on-line documentation:
https://gea.esac.esa.int/archive/documentation/GDR3/index.html

KNOWN ISSUES WITH THE GAIA DR3 DATA

This page lists any issues found in Gaia Data Release 3 which could not be incorporated into the official data release, or which were discovered after the release of the data and publication of the release documentation. The Gaia DR3 contents page contains a summary of limitations that are known, and documented, at the release. Further information can be found from the data release documentation, as well as from the data release overview paper and the data release processing papers.

- QSO: QSO CANDIDATES WITH MISSING CATALOGUES NAMES
- SSO: NUMBER OF OBSERVATIONS FOR SOLAR SYSTEM OBJECTS
- ASTROPHYSICAL PARAMETERS: MISSING BOLOMETRIC CORRECTION FOR SOME SOURCES
- SMALL SET OF GSPSPEC RESULTS OUT OF VALIDITY RANGES AND WITH WRONG EXTRAPOLATION FLAG

Some of the known issues applicable to Gaia's Early Data Release 3 are also affecting the full Gaia Data Release 3. Check each known issue for its applicability to Gaia DR3.

- GAIA EDR3 KNOWN ISSUES

QSO CANDIDATES WITH MISSING CATALOGUES NAMES

The surface brightness sample published in the qso_candidates is based on an input list of sources described in Section 9.2 of the on-line documentation. This list was built based on external catalogues and the table qso_catalogue_name provides the names of the applicable catalogues for each of the sources featuring surface brightness parameters in qso_candidates. Due to an oversight during the processing, the catalogue name is missing for 494 sources. In this file, the list of affected sourceIds is provided.

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NUMBER OF OBSERVATIONS OF SOLAR SYSTEM OBJECTS

The number of observations (num_of_obs) in the sso_source table contains a wrong value in 4 cases, with the correct number being present in the sso_observation table:

- sourceId -4284051496, corresponding to number_mp (91580), has 317 num_of_obs in the sso_source table, but 310 entries in the sso_observation table;
- sourceId -4283766166, corresponding to number_mp (120113), has 74 num_of_obs in the sso_source table, but 69 entries in the sso_observation table;
- sourceId -4281797236, corresponding to number_mp (317006), has 64 num_of_obs in the sso_source table, but 63 entries in the sso_observation table;
- sourceId -4283795346, corresponding to number_mp (117195), has 76 num_of_obs in the sso_source table, but 75 entries in the sso_observation_table.

For more information see the 'Gaia Data Release 3: Catalogue Validation' paper and the Validation chapter of the Gaia data release documentation.

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ASTROPHYSICAL PARAMETERS: MISSING BOLOMETRIC CORRECTION FOR SOME SOURCES

Upon validation of the data, a minor processing bug was discovered in the FLAME software which resulted in a list of 153,474 sources that have valid FLAME parameters but for which the associated field bc_flame is set to null. The user can recover these values by using the bolometric correction function which is provided as part of the astrophysical parameter tool which is available on the Gaia DR3 software tools webpage. For more information, see Creevey et al. (2022).

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SMALL SET OF GSPSPEC RESULTS OUT OF VALIDITY RANGES AND WITH WRONG EXTRAPOLATION FLAG

The flags_gspspec chain includes a specific character named "extrapol" (c.f. Table 2 in Recio-Blanco et al. 2022) that controls the extrapolation label of the GSPspec parametrization. A bug in the implementation of this "extrapol" flag has left 251 sources with at least one extrapolated parameter a values outside the corresponding validity ranges. The list of Gaia DR3 identifiers of these sources is in the attached file.

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- Sources are generally assumed to be isolated and point-like
  - ► Not a bad approximation
  - ► This may introduce biases and spurious results
  - ► Blending and contamination may be known, but without any mitigation in place (yet)
    - e.g. BP & RP spectra and photometry
  - ► There are many duplicity/crowding indicators

- Estimated uncertainties are often a bit optimistic

- Gaia pipelines
  - ► Some are driven by purity, but then completeness is lower
  - ► Some are driven by completeness, but then purity is lower

Astrometry and photometry

- ## Astrometry
  - ▶ Identical to EDR3
    - • same issue with parallax
    - • same issue with proper motions for bright sources

- ## Photometry
  - ▶ G: small correction for 2p and 6p sources **is now included**
  - ▶ G_{BP} & G_{RP} unchanged
    - • same, strong bias for faint G_{BP}
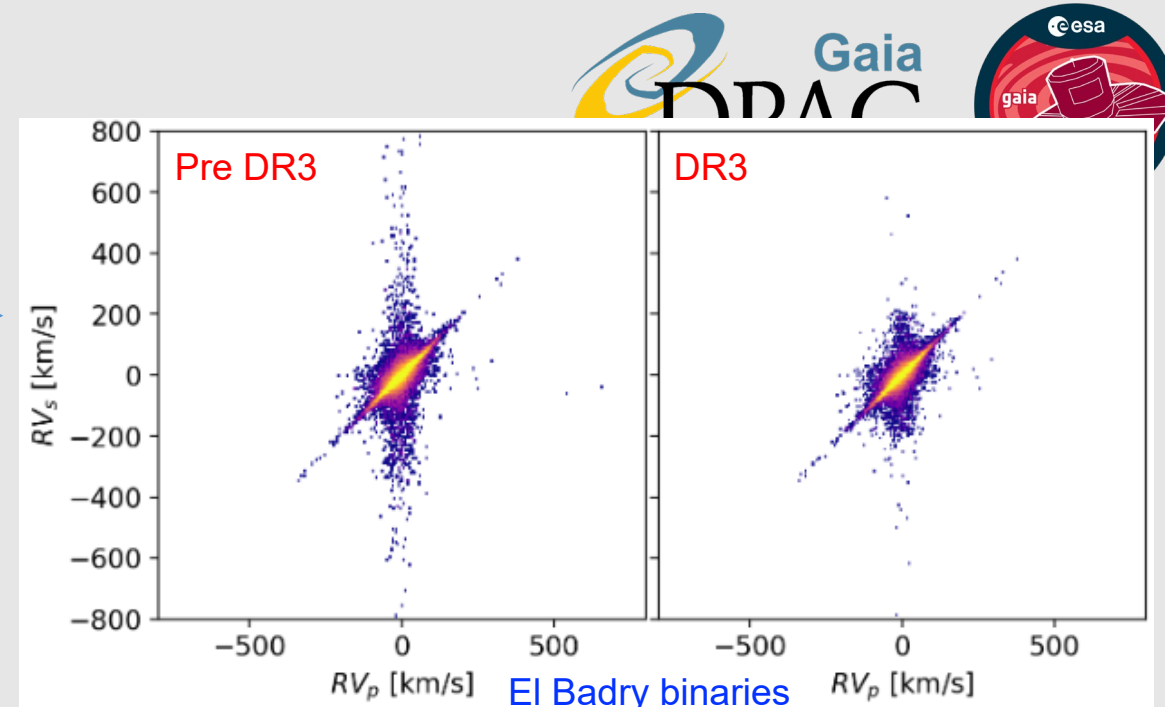   - • use $G-G_{RP}$ if possible
  - ▶ G_{RVS} added (845-872 nm)
   - • 32.2 M
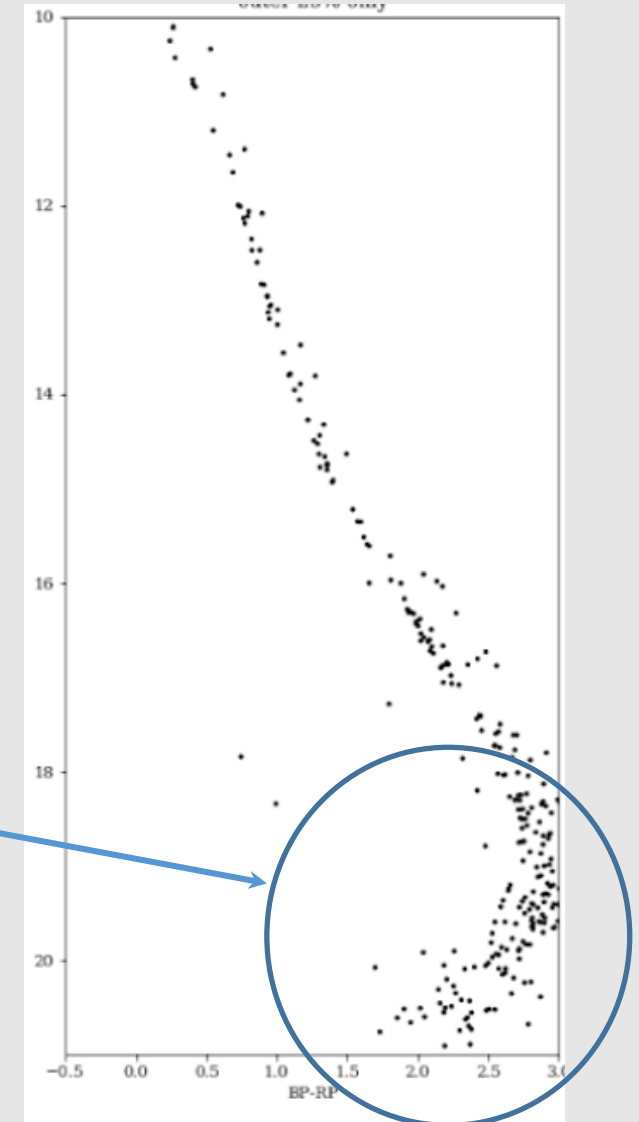
Radial velocities

☐ Now RV for 33.8 M sources
- ☐ Close neighbours can be an issue
- ☐ σ_{RV} in need of correction
  - ☐ see validation paper

    small correction to RV for Grvs > 11

mag

  see Katz et al 2022

  small correction to RV for hot stars

  see Blomme et al 2022

● V_{broad} for 3.5 M sources
- ▶ Low values are overestimated
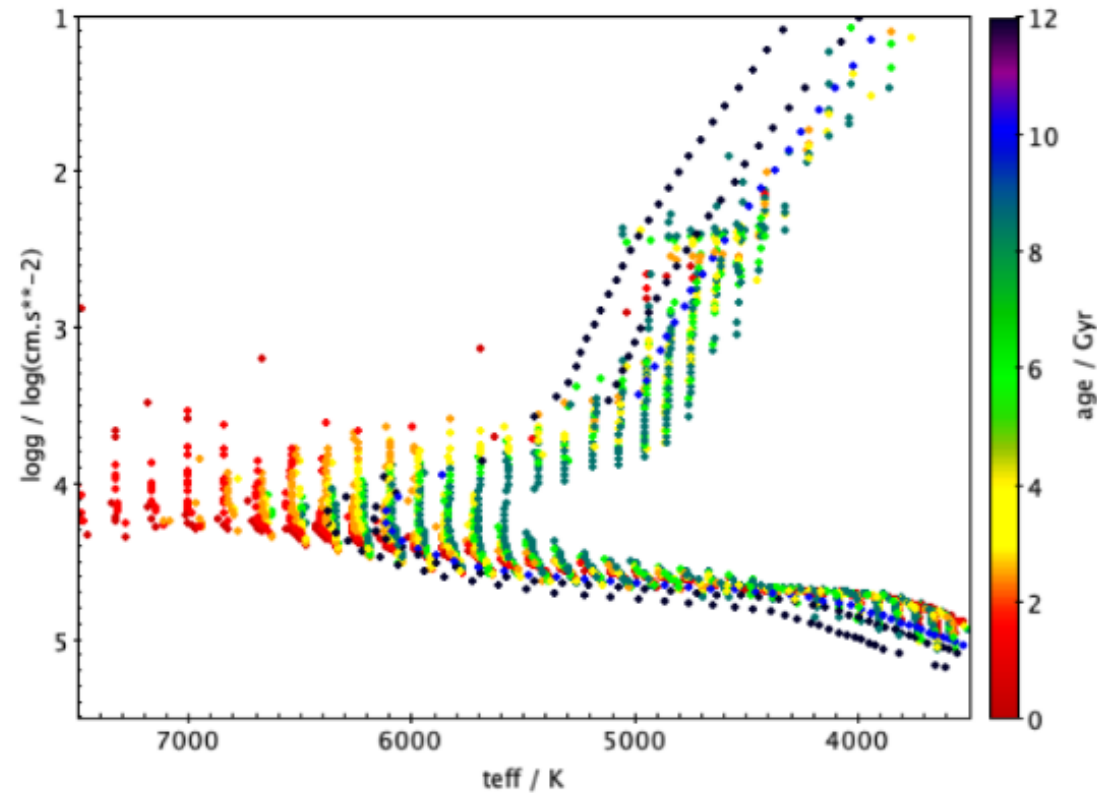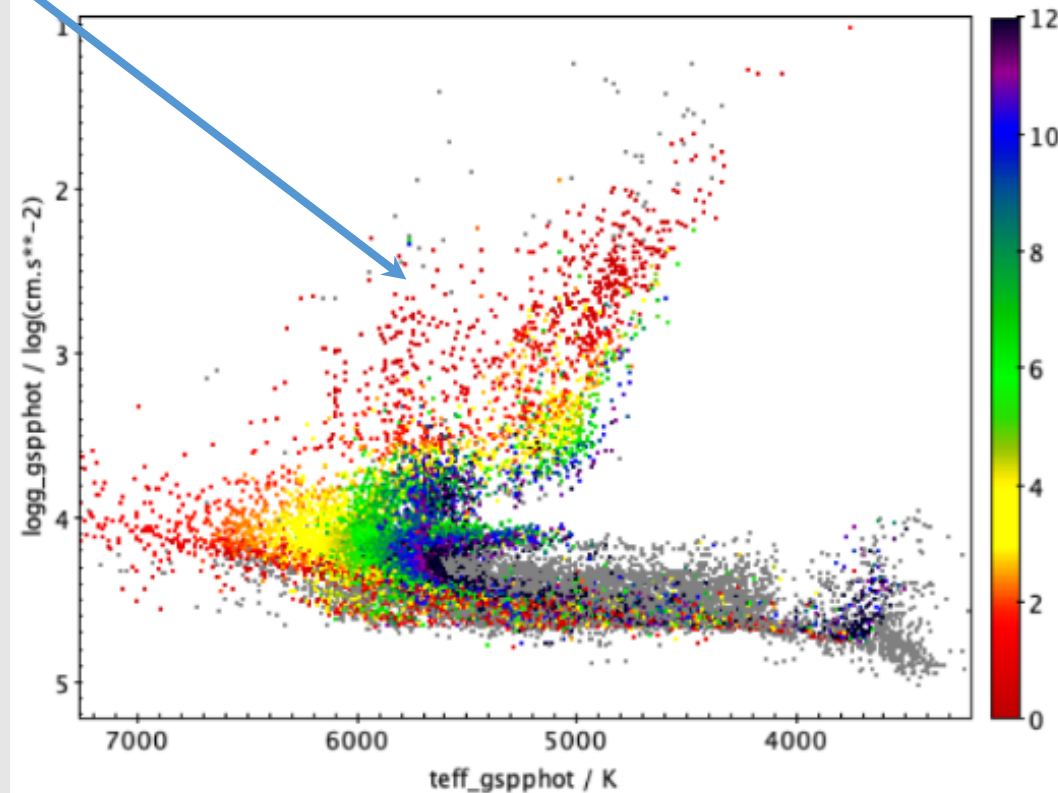- ▶ High values underestimated
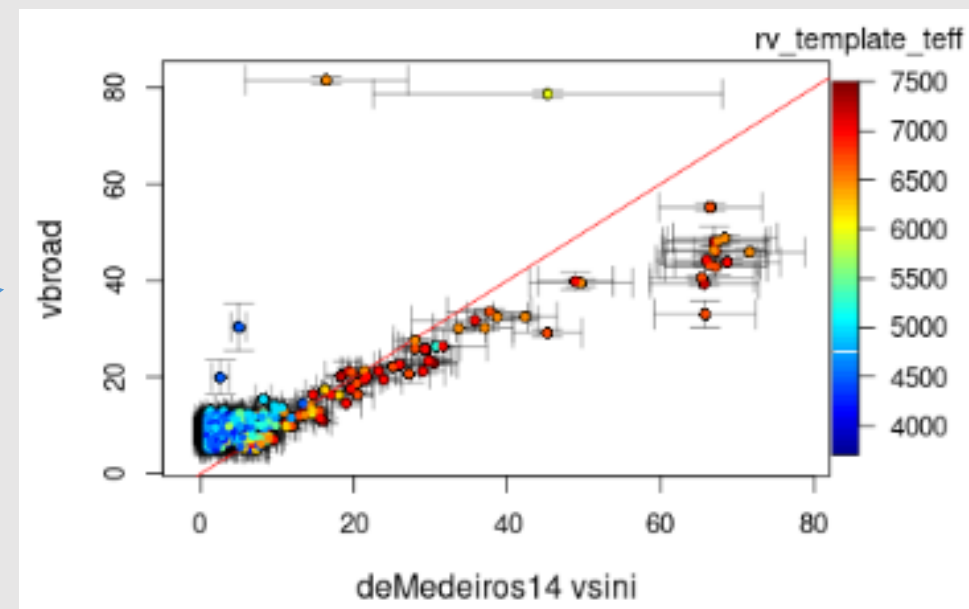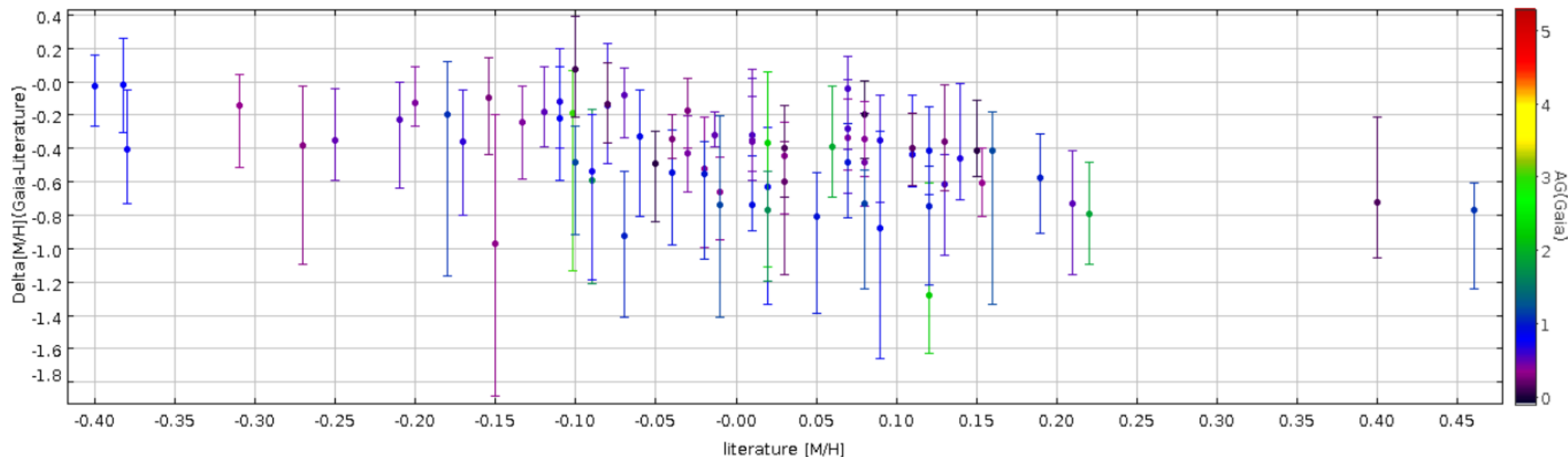
Distances beyond a few kpc are strongly underestimated
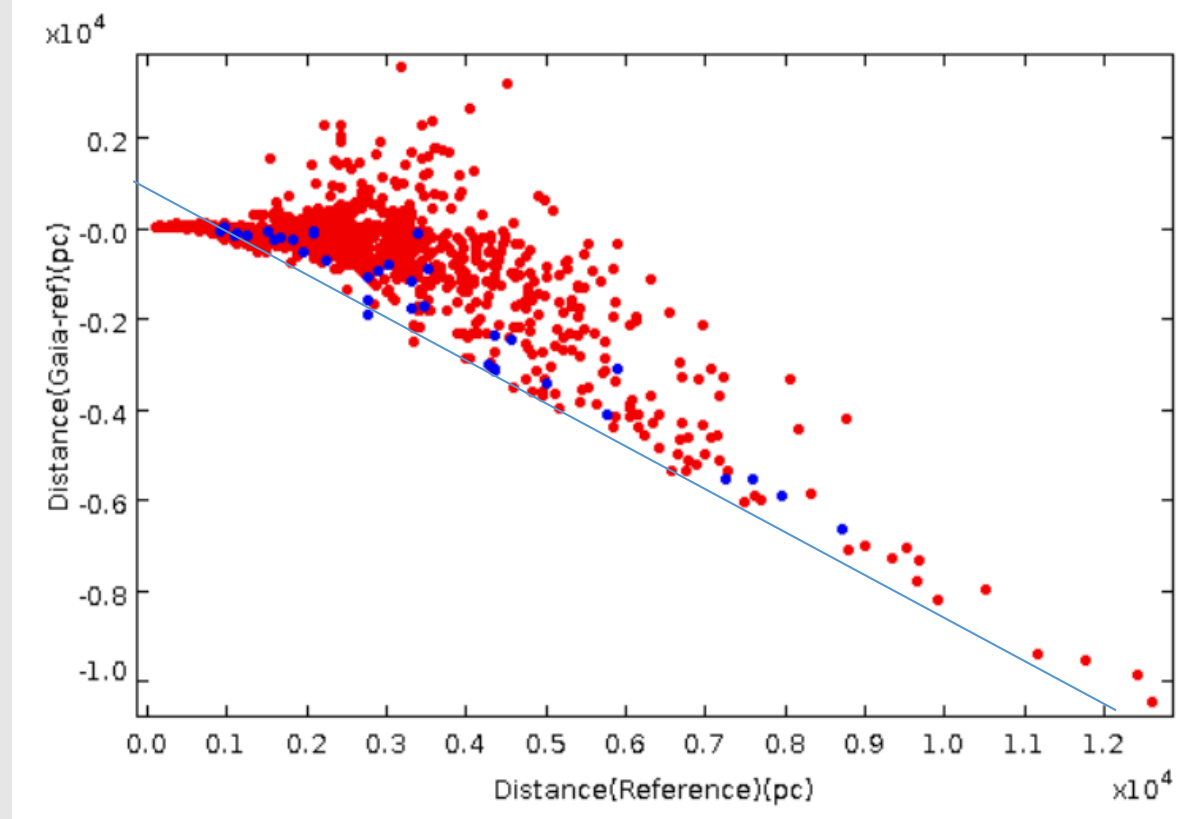
Unexpected population of young giants
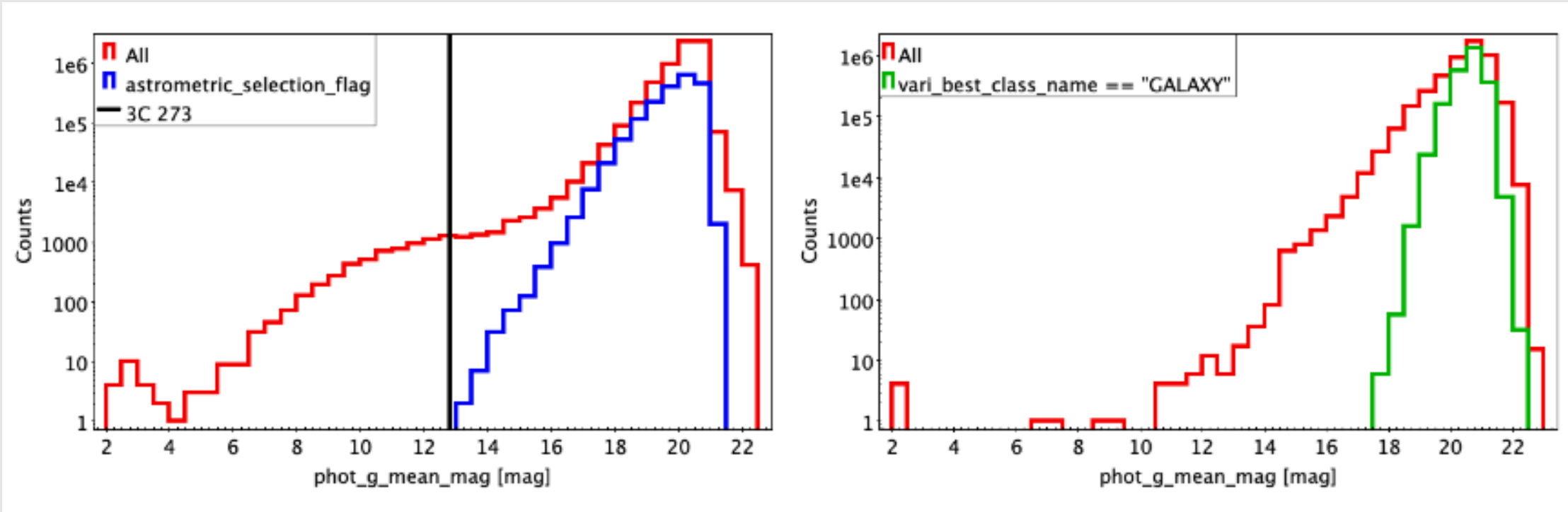

DR3

GOG20

Metallicities for open clusters appear underestimated

Bright contamination of QSO/Galaxy candidates

QSO candidates

Galaxy candidates

- Many candidates have significant proper motion and parallax
- 40% of QSO candidates lie in the LMC/SMC

Flags allow you to make much cleaner selections

¡Buen provecho!