Corrections suggested by the Editor

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Abstract

We thank Dr Tolstoy for her proposed corrections to our article.

Below we address these corrections, plus one extra modification we would like to incorporate into the article, described in Sect. C. If these changes are accepted by Dr Tolstoy (or by the referee, if the article is sent back to them), we will immediately send the tex and bbl files for language editing.

The compiled PDF with these modifications is attached along with this letter. For convenience, we generated it without images.

A Footnotes

The footnotes have been incorporated into the text, as suggested.

B Proposal IDs

As the data used in this work has already been analyzed and published in previous articles (see Table 1), all the relevant information regarding the facilities can be found in the original publications. We prefer to avoid repeating that here, unless Dr Tolstoy feels it is necessary. In that case, we could add the following to the Acknowledgments section:

This work is based on observations made at Cerro Tololo Inter-American Observatory (CTIO), which is operated by the Association of Universities for Research in Astronomy (AURA), Inc., under cooperative agreement with the National Science Foundation (NSF). This work is based on observations made at La Silla European Southern Observatory (ESO). This research draws upon data as distributed by the NOAO Science Archive. NOAO is operated by AURA, under a cooperative agreement with the NSF.

C Crowding in the central regions of massive clusters

In our previous letter we wanted to respond to the referee's comments as quick as possible, and we feel we rushed the response. We present here the explanation for our proposed modification to the article, marked in boldface (Sect. 5.2.1, and Appendix A) in the version attached along with this letter.

We apologize for the inconveniences this may cause.

In the cover letter for Revision 2, the referee correctly pointed out that the most likely reason for the mass underestimation by `ASteCA` was the crowding effect. We agreed, responding

"*Although `ASteCA` considers how other photometric effects alter the generated synthetic CMDs (limiting magnitude, faint stars incompleteness, photometric errors), it does not include the loss of stars in the central regions of a massive cluster due to photometric crowding. (...) This percentage of lost stars in the cluster region couldn't be accounted for by any of the photometric process included in `ASteCA`.*"

We introduced this effect as the responsible for the mass differences in Sect. 5.2.1 of the article, and closed that section stating

"*A modelization of this process on our synthetic CMDs is planned for future releases of the code.*"

The above statements are somewhat misleading, since `ASteCA` does in fact account for the loss of the *faintest* stars in the synthetic CMDs.

What the code can not do – as it works with already processed photometric tables, not with raw fits images – is a proper artificial stars test (as described e.g. in Aparicio & Gallart 1995). This is the only way to correctly asses the loss of sources due to crowding (and blending), and its dependence with observed magnitudes. Instead, `ASteCA` approximates the loss of faint stars using the observed luminosity function (mentioned in Perren et al. 2015). Briefly, this process involves the following steps:

1. Obtain the LF of the observed region.

2. Identify the magnitude value where the maximum count of stars occurs, mag_{max}. For smaller magnitudes (brighter stars) the data is assumed to be 100% complete.

3. Model the drop in stars count from mag_{max} towards fainter magnitudes.

4. Remove from each generated synthetic CMD a proportional number of stars beyond mag_{max}, given by the model obtained in the above step.

This algorithm makes the assumptions that: a) the loss of stars can be roughly estimated from the region's LF, and b) only the faintest stars will be affected by incompleteness. For clusters with low densities (open clusters), this approximation works rather well, but it breaks down as the observed clusters grow in mass (globular clusters). The reason is that massive clusters are heavily affected by crowding, whereas sparse clusters are not. As demonstrated in Mateo (1988), crowding in globular clusters affects the completeness of stars in the entire observed magnitude range, not just at their faintest end. This is particularly true in the densest central regions of such clusters.

We thus slightly modified Sect 5.2.1 of the article to clearly state that the (approximated) completeness correction performed by `ASteCA` will be *extended*, to accept a user defined completeness function. The latter is assumed to be obtained through a proper artificial stars test on the observed frames. A small modification was also introduced in Appendix A, regarding the effect of crowding in the synthetic MASSCLEAN validation clusters.

D Minimal changes

We added the anonymous referee to the Acknowledgments section.

References

Aparicio, A. & Gallart, C. 1995, AJ, 110, 2105

Mateo, M. 1988, ApJ, 331, 261

Perren, G. I., Vázquez, R. A., & Piatti, A. E. 2015, Astronomy & Astrophysics, 576, A6