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A STUDY OF THE RECENT CHEMICAL EVOLUTION OF THE LARGE MAGELLANIC CLOUD

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We present the results of a study of the Large Magellanic Cloud (LMC) chemical evolution during the last 2.2 Gyr. This study is based on Washington photometric observations of LMC's star clusters carried out with the Cerro Tololo Inter-American Observatory (CTIO) 4 m telescope, using the C and T_1 filters. As tracers of the LMC's chemical enrichment we used 83 star clusters, from which 40 clusters are projected onto the bar region, 23 in the inner disc and 20 in the outer disc. More than half of the total sample has not been previously studied. We determine size, reddening, deprojected distance, age and metallicity of the observed star clusters.

$E(B-V)$ color excesses of the studied clusters range between 0.03 and 0.13 mag. These are expected values since the cluster sample covers as much as $\sim 22°$ in the sky. Ages and metallicities for all clusters are estimaded using Girardi et al. (2002) theoretical isochrones computed for the Washington photometric system. A second method to derive cluster ages is based on the $\delta(T_1)$ parameter, defined as the difference in T_1 magnitude between the red giant clump and the main sequence turnoff in the Washington $(C-T_1, T_1)$ color-magnitude diagram. This method was applied to only 15 clusters of the sample. Metal abundances [Fe/H] are also inferred for 16 clusters of the sample following the Standard Giant Branch procedure of Geisler & Sarajedini (1999). The metallicities derived were corrected for age effects following the prescriptions given in Geisler et al. (2003). Ages and metallicities derived from these alternative methods show very good agreement with the values obtained from isochrone fittings. The resulting age range for the studied clusters varies from 0.01 to 2.2 Gyr, while the metallicities range between [Fe/H] = 0.0 and -1.1 dex.

We examine the age distribution of our cluster sample by performing cluster counts in different age intervals. The results of these counts, independently from the cluster positions within the LMC, show a main peak around 250 Myr and a secondary peak at $\sim$ 630 Myr. These results are consistent, in general terms, with the observed distributions by Pietrzynski & Udalski (2000) and Glatt et al. (2010), respectively.

We find that the most metal-poor clusters are spread out throughout the entire LMC disc while most metal-rich clusters are mainly located in the inner disc (i.e., deprojected distances $< 4°$). As for age distribution, the youngest clusters tend to be located in the inner disc, whereas intermediate-age clusters are mainly found at larger deprojected Galactocentric distances. To expand our sample, we searched in the literature for clusters studied by other authors in the same photometric system. We found a total of 68 LMC clusters analyzed following a procedure similar to ours, so the total combined sample (151 clusters) represents a homogenous LMC cluster sample. The trends mentioned before are maintained in the extended sample. These results appear to further support the idea of the absence of a radial metallicity gradient in the LMC for metal-poor clusters. The resulting age-metallicity relationship (AMR) takes into account the recent chemical enrichment processes. There is a clear relation between age and metallicity for these clusters. The metallicities in the outer disc are systematically subsolar, while the star cluster population is mostly intermediate-age. In the inner disc. the AMR shows a similar tendency for larger metallicities. The resulting AMR does not appear to depend on what LMC region is considered.

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REFERENCES

Geisler, D., Piatti, A.E., Bica, E., & Clariá, J.J., 2003, MNRAS, 341, 771
Geisler, D., & Sarajedini, A., 1999, AJ, 117, 308
Girardi, L., Bertelli, G., et al., 2002, A&A, 391, 195
Glatt, K., Grebel, E. K., & Koch, A., 2010, A&A, 517, 50
Pietrzynski, G., & Udalski, A., 2000, AcA, 50, 337