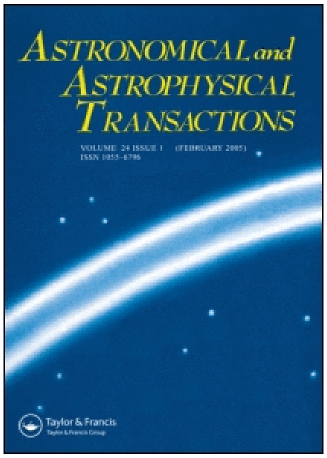

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E. Kontizas [a]; A. Dapergolas [a]; M. Kontizas [b]; B. Nordström [c]; J. Andersen [c]; N. Prantzos [d]
[a] Institute of Astronomy and Astrophysics, National Observatory of Athens, Greece
[b] Section of Astrophysics, Astronomy and Mechanics, Department of Physics, University of Athens, Athens, Greece
[c] NBIfAFG, Copenhagen University, Astronomical Obsrvatory, Copenhagen
[d] IAP, Paris, France

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AGE–METALLICITY RELATION IN THE LMC

E. KONTIZAS,[1] A. DAPERGOLAS,[1] M. KONTIZAS,[2] B. NORDSTRÖM,[3]
J. ANDERSEN,[3] and N. PRANTZOS[4]

[1]*Institute of Astronomy and Astrophysics, National Observatory of Athens, P.O. Box 20048, GR-118 10, Greece*
[2]*Section of Astrophysics, Astronomy and Mechanics, Department of Physics, University of Athens, GR-157 83 Athens, Greece*
[3]*NBIfAFG, Copenhagen University, Astronomical Obsrvatory, Juliane Maries Vej 30, DK 2100 Copenhagen*
[4]*IAP, 98bis bd Arago, F 75014 Paris, France*
Email: ekonti@astro.noa.gr, adaperg@astro.noa.gr

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The age–metallicity relation (AMR) is a very important tool for understanding the chemical evolution of a Galaxy. An observing program for the determination of AMR from a study of small open LMC clusters using Stroemgren photometry has been initiated. The advantage of using open clusters instead of dense globulars is the small central density with better statistics in going to central regions. We report on our search within 8 clusters scattered all over the LMC to cover a wide spatial distribution and metallicity. Stroemgren photometry CMDs have been used in order to find the age of their stellar content. The calibration of the y, b, v magnitudes and colours to metallicity used is the one by Richter *et al.* (1999).

Although our sample is still small, a clear trend is observed in AMR. Comparison with previous AMRs from other investigations and the theoretical models by Pagel and Tautvaisiene (1999) show that within the errors our AMR favours the model assuming burst-like modes of star formation history in LMC.

KEY WORDS Magellanic Clouds, star clusters, chemical evolution

1 OBSERVATIONS – REDUCTIONS

Three observing runs in La Silla have been granted to this project with the 1.54m Danish Telescope. We used three of the Stroemgren filters y, b, v in order to be able to reach as faint as possible and search for the oldest small clusters in the LMC periphery. However it was not possible to use the u filter and/or β ones, to profit from the main sequence stars as well, for the determination of the metallicity and increasing our accuracy. The obtained frames have been reduced in the conventional way by DAOPHOT from both IRAF and MIDAS packages.

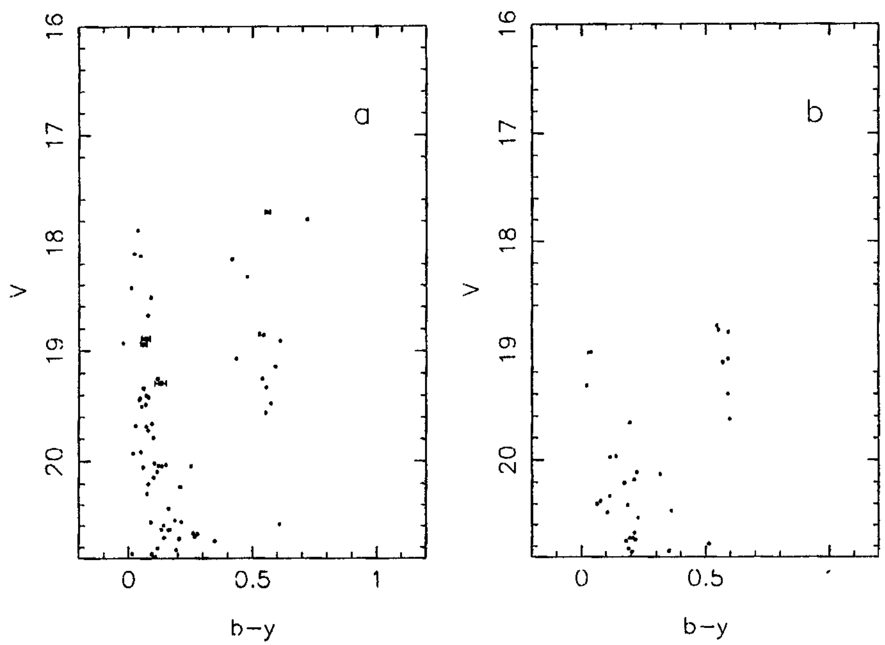

Figure 1 *Left panel a* CMD for the cluster KHMK1278 for $d = 1.5$ arcmin. *Right panel b* CMD of an equal field area of the cluster KHMK1278.

The latest correlation between [Fe/H], m_1 and b–y was used to derive metallicities for individual giant branch stars. The details of this calibration are described in Richter *et al.* (1999).

2 DISCUSSION

The present sample of clusters represent four clusters HS153, KMK32, KMK49, KMK50 located in the central region of LMC and four clusters KHMK1278, KHMK 1381, SL36 and SL620 (the KHMK clusters are named from Kontizas *et al.* (1990) whereas KMK clusters are named from Kontizas *et al.* (1988)) located in the outer region of LMC $R > 6$–7 Kpc. From a detailed study of the LMC clusters it was found that the young ones with ages a few $\times 10^8$ yr are only located in the central region of diameter 6–7 Kpc, whereas all other older ones are found all over the LMC (Kontizas *et al.*, 1990).

The CMD for the cluster KMHK1278 is shown in Figure 1*a* for a diameter of 1.5 arcmin. An equal area was chosen nearby to show the corresponding diagrams of the cluster's field, Figure 1*b*.

The m_1 (vs) b–y is shown in Figure 2 for the cluster KHMK1278. Only the stars with b–$y > 0.4$ are considered for the present calibration. The lines of constant metallicity are taken from the calibration of Hilker (1999).

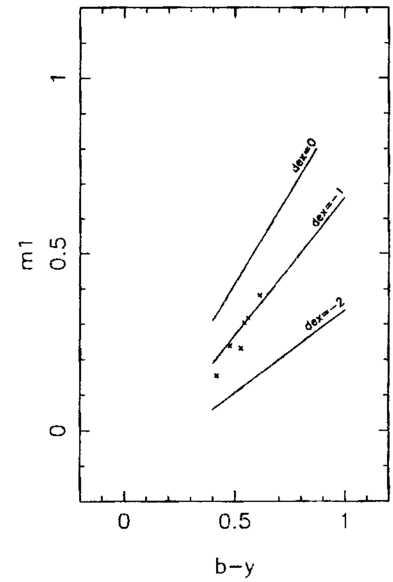

Figure 2 m_1 (vs) b–y diagram for the cluster KHMK1278 for stars b–$y > 0.4$.

The ages of the clusters have been derived from the CMDs at the very inner regions where contamination with field is less severe. The used models are Schaerer *et al.* (1993a, b), Schaller *et al.* (1992), Charbonnel *et al.* (1993).

The AMR found for the eight clusters of Figure 3 shows a clear trend with higher metallicities towards the youngest clusters.

The accuracy of our data is within the errors described by Hilker *et al.* (1995). From an investigation of populous LMC clusters using homogeneous data for ages 0.5–2.5 $\times$ 10^9 yr, Schommer (1991) has shown that there is a smooth trend at the AMR of the order of 0.1dex/ log(age) whereas our data show a trend at least ten times higher of the order 1.5dex/ log(age) for ages younger than 10^8–10^9 yr.

The bursting model of chemical evolution by Pagel and Tautvaisiene (1999) shows that the burst of SF produces a change of slope in their AMR relation from 2 Gyr to the present time. Although our sample is small, the observed high trend in our data favours a bursting model of chemical evolution for $t < 1.2$ Gyr. However the sample of clusters has to be increased, to understand better the chemical evolution of LMC.

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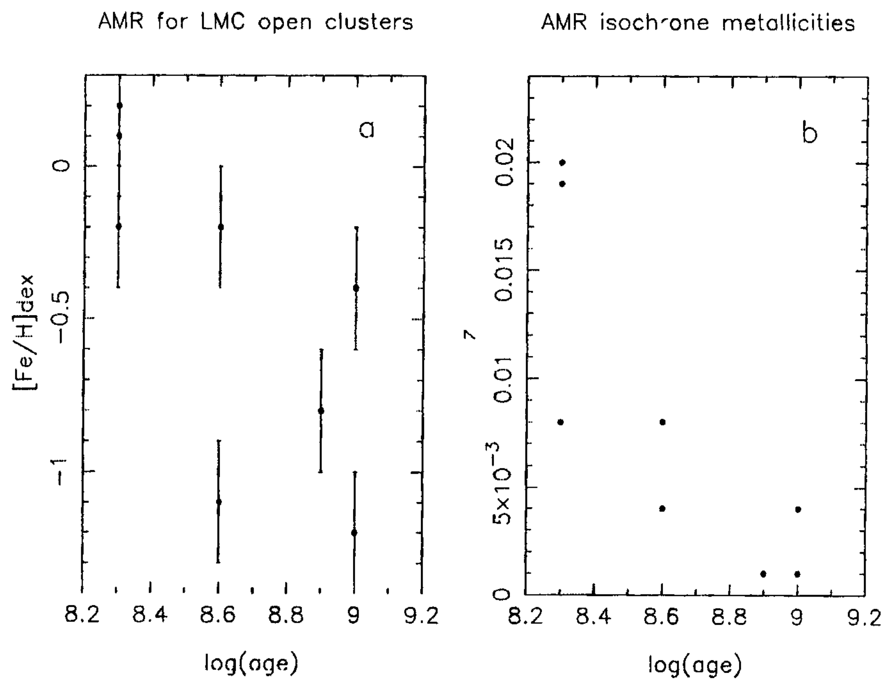

Figure 3 *Left panel a* Age metallicity relation for the LMC open clusters from Stroemgren photometry. *Right panel b* Age metallicity relation for the LMC open clusters (isochrone metallicities).

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