MASSIVE STARS IN M31 AND M33 OB ASSOCIATIONS

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SUMMARY. We observed several OB associations of M31 (OB 33, 42, 59 and 69) and of M33 (OB 4 and 137) in $UBVI$ and through interference filters centered on lines of $HeII$ and $CIII$, as well as a narrow continuum comparison filter at 4749 Å (Armandroff & Massey, 1985). The observations were made at the CFH 3.6m telescope with a RCA-CCD. The stellar photometry was obtained using DAOPHOT.

The present results concern the M31 associations. We selected the blue stars as those with $B-V < 0.2$. For those stars we find an average slope of the luminosity function of 0.51 between $V = 17$ and 22. This slope is in agreement with the average slope for the whole galaxy (Berkhuijsen and Humphreys, 1989). However, they emphasize the fact that the best OB stars selection criterion was $B - V \leq 0.1$ and $U - V \leq -0.9$. They then have found a slope of 0.74! We attempted to reproduce this slope from an Initial Mass Function (IMF) defined as $dn(M)/dlogM = M^x$ (where n is the number of stars formed per unit of time and $x < 0$) in two simple models of star formation: an instantaneous burst and an uniform rate of star formation. The calculated slope of the luminosity function varies between 0.50 and 0.25 for a slope x of the IMF varying between –3 and –2 respectively, in the Burst case, and from 0.88 and 0.62 in the case of an uniform star formation rate. The observed slope of the luminosity function thus logically favours the Constant Star Formation Rate hypothesis.

We detected Wolf-Rayet star candidates in our fields by comparing the stellar magnitudes in the three narrow filters, which also allow a separation between WN and WC stars. Retaining only the very probable candidates, we obtain the following ratios between the numbers of these stars: $N_{WC}/N_{WR} = 0.57$ and $N_{WC}/N_{WN} = 1.33$. Then, according to Maeder (1990), who has plotted the two ratios *vs.* metallicity for WR stars in galaxies with active star formation, this leads to a $Z \approx Z_{\odot}$.

References

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