A spectroscopic investigation of the O-type star population in four Cygnus OB associations. II. Determination of the fundamental parameters

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Aims. Having established the binary status of nineteen O-type stars located in four Cygnus OB associations, we now determine their fundamental parameters to constrain their properties and their evolutionary status. We also investigate their surface nitrogen abundances, which we compare with other results from the literature obtained for galactic O-type stars.

Methods. Using optical spectra collected for each object in our sample and some UV data from the archives, we apply the CMFGEN atmosphere code to determine their main properties. For the binary systems, we have disentangled the components to obtain their individual spectra and investigate them as if they were single stars.

Results. We find that the distances of several presumably single O-type stars seem poorly constrained because their luminosities are not in agreement with the "standard" luminosities of stars with similar spectral types. The ages of these O-type stars are all less than 7 Myrs. Therefore, the ages of these stars agree with those, quoted in the literature, of the four associations, except for Cyg OB8 for which the stars seem older than the association itself. However, we point out that the distance of certain stars is debatable relative to values found in the literature. The N content of these stars put in perspective with N contents of several other galactic O-type stars seems to draw the same five groups as found in the "Hunter" diagram for the O and B-type stars in the LMC even though their locations are obviously different. We determine mass-loss rates for several objects from the Hα line and UV spectra. Finally, we confirm the "mass discrepancy" especially for O stars with masses smaller than 30Msun.

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