A quantitative study of O stars in NGC2244 and the Mon OB2 association

F. Martins^1, L. Mahy^2, G. Rauw^2, D.J. Hillier^3

1- LUPM-CNRS-Montpellier University; 2- Liege University; 3- Pittsburgh University

Our goal is to determine the stellar and wind properties of seven O stars in the cluster NGC2244 and three O stars in the OB association MonOB2. These properties give us insight into the mass loss rates of O stars, allow us to check the validity of rotational mixing in massive stars, and to better understand the effects of the ionizing flux and wind mechanical energy release on the surrounding interstellar medium and its influence on triggered star formation. We collect optical and UV spectra of the target stars which are analyzed by means of atmosphere models computed with the code CMFGEN. The spectra of binary stars are disentangled and the components are studied separately. All stars have an evolutionary age less than 5 million years, with the most massive stars being among the youngest. Nitrogen surface abundances show no clear relation with projected rotational velocities. Binaries and single stars show the same range of enrichment. This is attributed to the youth and/or wide separation of the binary systems in which the components have not (yet) experienced strong interaction. A clear trend of larger enrichment in higher luminosity objects is observed, consistent with what evolutionary models with rotation predict for a population of O stars at a given age. We confirm the weakness of winds in late O dwarfs. In general, mass loss rates derived from UV lines are lower than mass loss rates obtained from Ha. The UV mass loss rates are even lower than the single line driving limit in the latest type dwarfs. These issues are discussed in the context of the structure of massive stars winds. The evolutionary and spectroscopic masses are in agreement above 25 Msun but the uncertainties are large. Below this threshold, the few late-type O stars studied here indicate that the mass discrepancy still seems to hold.

Reference: Astronomy and Astrophysics, in press
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1110.4509

Comments:

Email: fabrice.martins@univ-montp2.fr