A Massive Star Odyssey, from Main Sequence to Supernova
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A spectroscopic, photometric, and astrometric Galactic O-type star database

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Abstract. The objective of this work is to generate a data base with the spectral classification, UV-to-IR photometry, and *Hipparcos* astrometry of a large number of Galactic O-type stars. Whenever possible, a single source will be used for each type of data, in order to ensure its uniformity and to allow accurate comparisons. This data base could be used for several purposes, such as the testing of atmospheric models or a study of the extinction law and its spatial variations. We present here the current status of this work as well as our plans for the following months. We plan to upgrade the data base in the future as more O-type stars are classified using the same procedure and more data are obtained from space and ground-based projects. The data base is available at `http://www.stsci.edu/~jmaiz`.

1. Spectroscopy

Over the years, one of us (N.R.W.) has produced optical spectral classifications of a large number of Galactic O-type stars (Walborn 1972, 1973, 1981, 1982; Drissen *et al.* 1995; Walborn & Fitzpatrick 2000; Walborn & Howarth 2000; Walborn *et al.* 2002). We have collected the information on all the stars in those papers to generate the catalog for our data base after eliminating the duplicities. This star catalog has the following characteristics:
(*i*) over 350 Galactic O-type stars;
(*ii*) uniform optical spectral classification procedure which includes spectral subtypes O2 and O3.5 (Walborn *et al.* 2002 and in these Proceedings);
(*iii*) complete for $V < 8$ after including ~ 20 stars obtained from compilations by other authors (Garmany *et al.* 1982, ESA 1997). An extension to reach completeness for $V < 9$ or $V < 10$ involving a deep search in the literature is planned for the future; and
(*iv*) information about the variability and the multiplicity of the system, including both visual and spectroscopic components.

2. Photometry

For each of the stars in our catalog we plan to collect the 1 300 - 22 000 Å photometry from existent or soon-to-become-available data bases. The combination of this UV-to-near-IR photometry with the spectral classification will allow us

to study the variations of the extinction law over that wavelength range with a much larger sample than previous studies. The UV photometry will be extracted from *IUE* data using the recalibrated *IUE* Newly Extracted Spectra (INES, Rodríguez-Pascual *et al.* 1999) system. For the optical part part of the photometry, we will obtain the *UBVRI* data from Neckel *et al.* (1980) and from other similar catalogs. This *UBVRI* photometry will be compared with the *uvbyβ* data from Hauck & Mermilliod (1998), in order to establish the contribution from emission lines and other contamination sources. Finally, we will obtain the near-IR JHK_s data from the Two Micron All Sky Survey (Skrutskie *et al.* 1997).

3. Astrometry

The availabilty of *Hipparcos* astrometric data (ESA 1997) has produced a deep impact in several astronomical fields. However, it should not be forgotten that the measurement of distances from individual trigonometric parallaxes in the case where one does not know the spatial distribution of the object population (or assumes a constant value for the underlying spatial density) is an ill-posed problem, due to the existence of the Lutz-Kelker bias (Lutz & Kelker 1973). One of us (J.M-A.) has developed a method (Maíz-Apellániz 2001) to convert this situation into a well-posed problem by using an underlying spatial distribution for the O-type star population which is calculated self-consistently from the *Hipparcos* data themselves. We will use that spatial distribution to include in our data base the distances and their uncertainties for the nearest O-type stars in our sample.

References

Drissen, L., Moffat, A.F.J., Walborn, N.R., Shara, M.M. 1995, AJ 110, 2235

ESA 1997, *The Hipparcos and Tycho Catalogues*, ESA SP-1200

Garmany, C.D., Conti, P.S., Chiosi, C. 1982, ApJ 263, 777

Hauck, B., Mermilliod, M. 1998, A&AS 129, 431

Lutz, T.E., Kelker, D.H. 1973, PASP 85, 573

Maíz-Apellániz, J. 2001, AJ 121, 2737

Neckel, Th., Klare, G., Sarcander, M. 1980, A&AS 42, 251

Rodríguez-Pascual, P.M., González-Riestra, R., Schartel, N., Wamsteker, W. 1999, A&AS 139, 183

Skrutskie, M.F., Schneider, S.E., Stiening, R., *et al.* 1997, in: F. Garzon, N. Epchtein, A. Omont, W.B. Burton & P. Persi (eds.), *The Impact of Large Scale Near-IR Sky Surveys* (Dordrecht: Kluwer), p. 25

Walborn, N.R. 1972, AJ 77, 312

Walborn, N.R. 1973, AJ 78, 1067

Walborn, N.R. 1981, ApJ (Letters) 243, L37

Walborn, N.R. 1982, AJ 87, 1300

Walborn, N.R., Fitzpatrick, E.L. 2000, PASP 112, 50

Walborn, N.R., Howarth, I.D. 2000, PASP 112, 1446

Walborn, N.R., Howarth, I.D., Lennon, D.J. 2002, AJ 123, 2754