RevMexAA (Serie de Conferencias), **44**, 18–18 (2014)

CARBON AND OXYGEN ABUNDANCES FROM RECOMBINATION LINES IN LOW METALLICITY H II REGIONS

C. Esteban[1,2], J. García-Rojas[1,2], and A. Mesa-Delgado[3]

XIV Latin American Regional IAU Meeting (Florianópolis/SC, Brazil, 25-30 November 2013)
Editors: A. Mateus, J. Gregorio-Hetem & R. Cid Fernandes

We have measured C II and O II recombination lines in several H II regions of low-metallicity dwarf galaxies. These objects show lower C/O ratios than H II regions in spiral galaxies, indicating different chemical evolution histories.

We show results based on very deep spectra taken with the Ultraviolet-Visual Echelle Spectrograph (UVES) at the Very Large Telescope (VLT) of the giant H II region Hubble V –in the dwarf irregular galaxy NGC 6822– and the blue compact dwarf galaxies Mkn 1271, NGC 3125, and NGC 5408. We detect recombination lines (RLs) of C II 4267 Å and of multiplet 1 of O II about 4650 Å in the objects, allowing to determine the C^{++}/H^+ and O^{++}/H^+ ratios in them. Abundances derived from RLs are almost independent on the uncertainties in electron temperature. We find that H II regions in spiral and dwarf galaxies occupy different *loci* in the C/O vs. O/H diagram (see Figure 1), indicating different chemical evolution histories. We also find that C/O ratios determined from RLs are similar to those obtained from the intensity of UV collisionally excited lines (CELs) of C^{++} and O^{++} of the same objects. Using an extended sample including all the low-metallicity H II regions for which C/O ratios have been determined from UV CELs (e.g. Garnett et al. 1995, 1997, 1999), we obtain that most metal-poor objects show C/O ratios consistent with those measured for stars of the Galactic halo (e.g. Fabbian et al. 2009). This result implies that the bulk of C is produced by massive stars in the most metal-poor dwarf galaxies. On the other hand, the objects included in this paper –which belong to dwarf galaxies and show Log (O/H) between −4 and −3.3– show some C production by low and intermediate mass stars and a C/O vs. O/H behavior consistent to that of stars of the Galactic thick disk (e.g. Bensby & Feltzing 2006). In contrast, H II regions in spiral galaxies show C/O and O/H similar to those of stars of the Galactic thin disk. This last result supports the mostly regarded scenario for the formation of the Galactic thick disc based on the merging between the Milky Way with another dwarf galaxy.

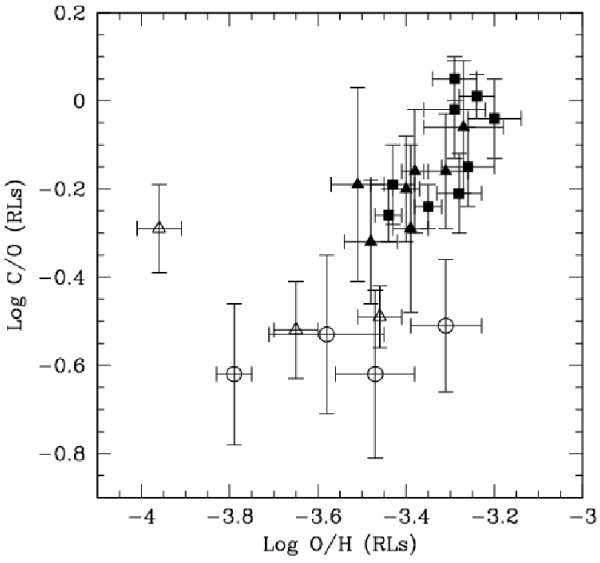

Fig. 1. C/O vs. O/H determined from RLs for H II regions in the Milky Way (filled squares: García-Rojas & Esteban 2007, Esteban et al. 2013), in external spiral galaxies (filled triangles: Esteban et al. 2002, 2009), in dwarf irregular galaxies (empty triangles: Peimbert 2003, Esteban et al. 2009, this work), and in blue compact dwarf galaxies (empty circles: López-Sánchez et al. 2007, this work).

Financial support for this work has been provided by AYA2011-22614.

REFERENCES

Bensby, T. & Feltzing, S. 2006, MNRAS, 367, 1181
Esteban, C., et al. 2002, ApJ, 581, 241
Esteban, C., et al. 2009, ApJ, 700, 654
Esteban, C., et al. 2013, MNRAS, 433, 382
Fabbian et al. 2009, A&A, 500, 1143
García-Rojas, J. & Esteban, C. 2007, ApJ, 670, 457
Garnett, D. R., et al. 1995, ApJ 443, 64
Garnett, D. R., et al. 1997, ApJ 481, 174
Garnett, D. R., et al. 1999, ApJ 513, 168
López-Sánchez, A. R., et al. 2007, ApJ, 656, 168
Peimbert, A. 2003, ApJ, 584, 735

[1]Instituto de Astrofísica de Canarias, E-38200 La Laguna, Tenerife, Spain (cel@iac.es).
[2]Departamento de Astrofísica, Universidad de La Laguna, La Laguna, Tenerife, Spain.
[3]Instituto de Astrofísica, Facultad de Física, Pontificia Universidad Católica de Chile, Santiago, Chile.