New Views of the Magellanic Clouds
IAU Symposium, Vol. 190, 1999
Y.-H. Chu, N.B. Suntzeff, J.E. Hesser, and D.A. Bohlender, eds.

Chemical Abundances and Physical Parameters of H II Regions in the Magellanic Clouds

R.E. Carlos Reyes[1]

Laboratório Nacional de Astrofísica, CNPq, Caixa Postal 21, CEP 37500-000, Itajubá, MG, Brazil

Seminario Permanente de Astronomía y Ciencias Espaciales, FCF, UNM San Marcos, Lima, Perú

Abstract.

I present the results of the photoionization modeling of eleven H II regions in the Magellanic Clouds (MCs). A comparison of their abundances with other systems are also presented.

1. Introduction

The chemical abundances and physical parameters of H II regions are important parameters to determine in order to understand how stars and galaxies evolve. The Magellanic Clouds offer us a unique opportunity to pursue such studies in low metalicity galaxies. In this contribution I present the results of the photoionization modeling with the code CLOUDY of five H II regions in the SMC and six in the LMC.

Optical data were collected from the literature, complemented by our own observations (Carlos Reyes et al. 1999a). UV spectra from the new IUE data bank were also used.

2. Discussion

A preliminary discussion of chemical abundances of H II regions in the MCs is presented in Carlos Reyes et al. (1999b). In Fig. 1 I show ϵ(C+N) versus [Fe/H] for K supergiants, versus [O/H] for B stars, or versus [Z_*] (geometric average of Ne/H, S/H and Ar/H) for H II regions for the data reported in Table 1. The solid line indicating [(C+N)/Fe]=[Fe/H] represents the behaviour of dwarf stars in our Galaxy. The H II region abundances in the Galaxy and the LMC are consistent with that of these young objects, whereas the H II regions in the SMC show a strong defficiency of C+N relative to K supergiants and B stars.

The physical parameters determined as the ionized mass varied in log from 1.8 to 4.5 $M_\odot$, the luminosities varied from 6.0 to 8.5 $L_\odot$, the ionization temperature varied from 4.62 to 4.72 for LMC and 4.7 for SMC (only two H II regions

[1]Visiting Astronomer and Fellowship support by CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico), under contract 381314/97-9.

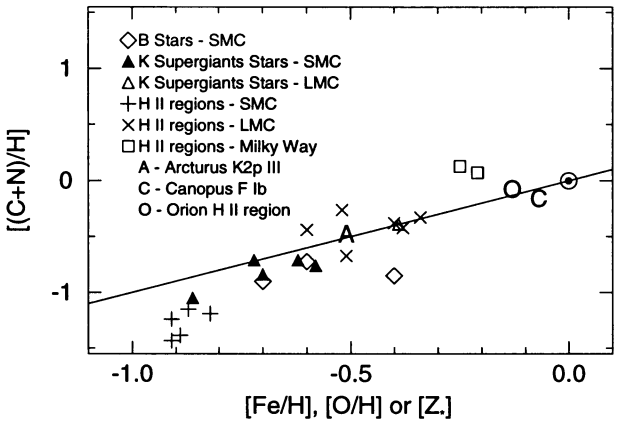

Figure 1. [(C+N)/H] versus [Fe/H] (or versus [O/H] for B stars, or $[Z_*]$ for H II regions).

in the SMC has a higher value of 4.8) and the filling factor from -4 to -1. Most of the H II regions are optically thin. Only 4 are optically thick.

Table 1. Average chemical abundances.

	ϵ(He)	ϵ(C)	ϵ(N)	ϵ(O)	ϵ(Ne)	ϵ(S)	ϵ(Ar)	C/O	N/O	$\epsilon(Z_*)$
LMC:										
H II[a]	10.93	8.03	7.37	8.33	7.73	6.82	5.97	-0.30	-0.96	6.84
K SG stars[b]	—	7.95	7.97	8.23	—	—	—	-0.28	-0.26	—
SMC:										
H II[a]	10.91	7.39	6.55	7.96	7.17	6.32	5.72	-0.57	-1.41	6.40
B Stars[b]	—	7.65	7.12	8.32	—	—	—	-0.67	-1.20	—
K SG stars[b]	—	7.57	7.52	8.03	—	—	—	-0.46	-0.51	—

[a]This work

[b]Hill et al. (1997). For H II regions of the Galaxy (Peimbert 1993; Esteban et al. 1998).

Acknowledgments. I am grateful to Dr. G. J. Ferland for kindly providing the code CLOUDY.

References

Carlos Reyes, R.E., et al. 1999a, in preparation

Carlos Reyes, R.E., et al. 1999b, in *Science with Gemini Workshop*, Florianópolis, SC, Brazil, in press

Hill, V., Barbuy, B., & Spite, M. 1997, A&A, 323, 461 and references therein

Esteban, C., et al. 1998, MNRAS, 295, 401

Peimbert, M. 1993, RevMexAA, 27, 9

Dennis Zaritsky reports on his photometric survey of the Clouds.

https://doi.org/10.1017/S0074180900118054 Published online by Cambridge University Press