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RADIAL ABUNDANCE GRADIENTS AS OBSERVATIONAL CONSTRAINTS OF GALACTIC EVOLUTION: PLANETARY NEBULAE AND OTHER OBJECTS

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We have estimated the magnitude and time variation of the radial abundance gradients using planetary nebulae, open clusters, cepheids and other young objects. We concluded that the gradients have flattened out in the last 8 Gyr, with important consequences for models of the chemical evolution of the Galaxy.

1. INTRODUCTION

Abundance gradients and their variations are among the main constraints of chemical evolution models for the Galaxy. The time evolution of the gradients, in particular, is essential to distinguish between models involving different physical processes and time scales (see for example Maciel and Costa 2003). In the present work, we compare the results obtained from planetary nebulae with recent determinations of abundance gradients from open clusters, cepheid variable stars and other young objects.

2. THE DATA

The time variation of the O/H and S/H radial gradients have been estimated by Maciel et al. (2003, 2005) from galactic planetary nebulae. From the observed abundances, the [Fe/H] ratio has been estimated. Adopting an age-metallicity relation, the progenitor ages have been determined.

Open clusters are favourite objects in the study of [Fe/H] gradients. We have taken into account recent results by Friel et al. (2002) and Chen et al. (2003) and re-derived the [Fe/H] gradients and their variations.

Cepheid variables show several advantages in the determination of radial abundance gradients. We have included these objects on the basis of a recent series of papers by S. Andrievsky and collaborators (see for example Andrievsky et al. 2004). Finally, HII regions and stars in OB associations have also been considered.

3. RESULTS AND DISCUSSION

A comparison of the gradients from PN, open cluster stars and cepheids shows that their time variations are similar, in the sense that the gradients seem to be flattening out with time. The youngest open clusters tend to be concentrated in the inner regions of the disk, which makes their gradient artificially flatter. For this reason, the results of the cepheids are especially important, as they have better distances and ages. From these stars, it is clear that the gradients are lower for the younger objects. We have estimated the errors involved in the determination of the gradients and, on the basis of several statistical tests, we concluded that the existence of systematic abundance variations is more likely than a simple statistical dispersion around a mean value. A rough estimate of the flattening rate of the gradients would be 0.005 to 0.010 dex kpc^{-1} Gyr^{-1}.

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REFERENCES

Andrievsky, S.M., et al. 2004, A&A, 413, 159
Chen, L., Hou, J.L., & Wang, J.J. 2003, AJ, 125, 1397
Friel, E.D., et al. 2002, AJ, 124, 2693
Maciel, W.J., & Costa, R.D.D. 2003, IAU Symp. 209, ed. S. Kwok, M. Dopita, R. Sutherland, ASP, 353
Maciel, W.J., Costa, R.D.D., & Uchida, M.M.M. 2003, A&A, 397, 667
Maciel, W.J., Lago, L.G., & Costa, R.D.D. 2005, A&A, 433, 127

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