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Evolution of Abundance Gradients along the Galactic Disk

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Abstract. A detailed investigation of the abundance gradients and their evolution along the Galactic disk has recently appeared (Hou, J. L., Prantzos, N., & Boissier, S. 2000, A&A, in press; astro-ph/0007164). A chemical evolution model of S. Boissier & N. Pranzos (1999, MNRAS, 307, 857) was quite successful in reproducing the main observational constraints both in the solar neighborhood and the entire Milky Way disk. Studied elements include $He, C, N, O, Ne, Mg, Al, Si, S, Ar$ and Fe. We use metallicity dependent yields for massive stars with and without mass loss. We find that most observed abundance profiles are correctly reproduced by massive star yields, but C and N require supplementary sources. We argue that massive, mass losing stars can totally account for the abundance profile of C, while intermediate mass stars are the main source of N. We also find that the adopted "inside-out" formation scheme for the Milky Way disk produces abundance profiles steeper in the past. Using current data on planetary nebulae of type I, II, and III, on N, Ne, S, Ar as observational constraints for gradient evolution, we find that it is difficult to conclude whether the gradient steepens or flattens with time. However, for a given interval of Galactic age, our model predicts that the corresponding abundance scatter is smaller in the inner disk than in the outer regions.