STELLAR ABUNDANCES IN THE OUTER GALACTIC DISK

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Current evolutionary models of the disk of the Milky Way incorporate radial inflows of (metal-poor) gas that affect the subsequent evolution of the inner disk. Therefore, knowledge of the metallicity of stars and/or gas as a function of radius and time is necessary for a complete understanding of disk evolution. Present data on stellar abundances (determined mostly from iron or iron-peak elements) for the outer disk are shown in Table 1. Results from different approaches have been converging and now give two important results: at $R_{GC} \sim 15$ kpc, the stellar disk is metal poor by about 0.6 dex relative to the solar neighborhood, and the data are consistent with a constant gradient of -0.07 kpc^{-1} from the solar neighborhood out to 15 kpc, where the data are becoming very sparse. Interestingly, the gradient of [O/Fe] measured with HII regions is the same. Because Cepheids have proven to be useful probes of abundances at large distances, efforts are underway to find additional distant Cepheids. The last line in the table indicates that stellar abundances in the Small Magellanic Cloud (with ages <5 Gyr) are remarkably similar to those in the outer disk, as had been tentatively suggested in many earlier studies.

TABLE 1. Mean Stellar Abundances

R_{GC}	Cepheids[1,2,3]			Open Clusters[4,5,6,7]			Supergiants[8,9,10,11,12]		
(kpc)	[Fe/H]	±	N	[Fe/H]	±	N	[Fe/H]	±	N
Solar Neighborhood:									
8.5	0.11			−0.04			0.13		
Outer Galactic Disk:									
12-13	−0.24	0.13	5	−0.50	0.10	5	...		
13-14	−0.37	0.12	8	−0.8	0.2	1	...		
14-16	−0.43	0.10	7	...			...		
>16	−0.88	0.23	2	−0.68	0.23	1	...		
Small Magellanic Cloud:									
	−0.54	0.15	45	−0.73	0.15	5	−0.7	0.1	11

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