The Effects of Age on Red Giant Metallicities Derived From the Near-Infrared Ca II Triplet

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abstract We have obtained spectra with resolution $\sim$2.5 Å in the region $\approx$ 7500–9500 Å for 116 red giants in 5 Galactic globular clusters and 6 old open clusters (5 with published metallicities, and 1 previously unmeasured). The signal-to-noise ranges from $20 \leq S/N \leq 85$. We measure the equivalent widths of the infrared Ca II triplet absorption lines in each star and compare to cluster metallicities taken from the literature. With globular cluster abundances on the Carretta & Gratton scale, and open cluster abundances taken from the compilation of Friel and collaborators, we find a linear relation between [Fe/H] and Ca II line strength spanning the range $-2 [Fe/H] - 0.2$ and $2.5 (\text{age/Gyr})$. The reference abundance scales appear to be consistent with each other at the $\sim 0.1$ dex level. Alternate choices for metallicity scales can introduce curvature into the relation between [Fe/H] and Ca II equivalent width. No evidence for an age effect on the metallicity calibration is observed. Using this calibration, we find the metallicity of the massive, old, open cluster Trumpler 5 to be [Fe/H] = $-0.56 \pm 0.11$. This is the first spectroscopic abundance measurement for Trumpler 5, and is lower by $\approx 0.3$ dex than estimates based on the cluster colour-magnitude diagram. Considering the 10 clusters of known metallicity shifted to a common distance and reddening, we find that the additional error introduced by the variation of horizontal branch/red clump magnitude with metallicity and age is of order $\pm 0.05$ dex, which can be neglected in comparison to the intrinsic scatter in the method. The results are discussed in the context of abundance determinations for red giants in Local Group galaxies.