class, temperature and metal abundance for each star. Definitive membership status is available for virtually the entire sample and mean metal abundances for an average of twelve member giants per cluster are determined to an accuracy of 0.2 dex. For the five clusters in common with the recent spectroscopic study by Friel & Janes (1992, A&A, in press), agreement is generally good, although our metallicities are ~ 0.1 dex lower, on average. Two of the other four clusters, NGC 2324 and NGC 2660, are found to be surprisingly metal-poor, with [Fe/H] ~ −1. A third cluster, NGC 3960, has a galactocentric distance of only 8 kpc but a metallicity of ~ −0.7. Such clusters indicate substantial scatter actually exists in the tight relation found by Friel & Janes between the metallicity of an open cluster and its current galactocentric distance. The outer disk clusters have a metallicity at a given age that is much more like that of their LMC counterparts than that of solar neighborhood disk field stars or clusters. These latter two populations appear to have distinct age-metallicity distributions, with the solar neighborhood open clusters more metal-poor by ~0.15 dex than local disk field stars of the same age, except for the oldest clusters. An offset in metallicity scales is the most likely explanation for this effect. This paper will appear in the November issue of the Astronomical Journal.

ABUNDANCES FROM HIGH DISPERSION SPECTRA OF METAL-POOR GLOBULAR CLUSTER GIANTS

Doug Geisler

Cerro Tololo Inter-American Observatory, Chile

Dante Minniti

Steward Observatory, University of Arizona, U.S.A.

Ruth Peterson

Lick Observatory, U.S.A.

and

Juan J. Clariá

Observatorio Astronómico de Córdoba, Argentina

We have determined abundances for a variety of important elements, including O, Na, Mg, Si, Ti, and Fe, for 1 – 3 giants in each of the extremely metal-poor globular clusters M68, M30, M55, M15 and NGC 6397, and in the moderately metal-poor clusters NGC 4833, NGC 6144, and NGC 6752. The data are derived from high resolution, high signal/noise ratio echelle spectra obtained with the CTIO 4-m. The low end of the metallicity scale for globular clusters is now well established. The α elements are enhanced with respect to Fe, in agreement with other cluster and halo field star analyses. However, about 1/4 of the cluster giants are not enhanced in O. Most of these stars show Hα wings in emission. The new accurate chemical compositions enable us to improve on age estimates derived from main-sequence photometry. The relatively low O and Fe abundances we derive indicate that the ages cannot be reduced below ~ 15 Gyr.

PHOTOELECTRIC PHOTOMETRY OF BLUE STRAGGLERS IN SOUTHERN OPEN CLUSTERS

Emilio Lapasset and Javier Ahumada

Observatorio Astronómico

Universidad Nacional de Córdoba, Argentina

Forty eight blue stragglers in intermediate to old-age open clusters have been studied by means of *UBV* photoelectric photometry. One of them in NGC 2354 has been discovered to be variable; its light curve shows the typical features of a close binary. The period is 0.6388 days and the amplitude of the principal minimum is 0.36 mag. We present a preliminary analysis of the light curve by means of the Wilson-Devinney code, which defines a near-contact configuration. Among the remaining observed blue stragglers seven are classified as possible variables, and forty as non-variables.

TiO BANDS IN EARLY TYPE GALAXIES

A. Milone and B. Barbuy

Instituto Astronômico e Geofísico

Universidade de São Paulo, Brazil

We have calculated TiO and total spectra, in steps of 0.02 A, using the code by Barbuy (1989, Ap&SS, 157, 111) in the red and near-infrared regions. The employed model atmospheres are interpolated in the grids of models by Bell et al. (1976, A&AS, 23, 37) and by B. Gustafsson (p.c.). The photospheric parameters used are: T_{eff} = 4 000, 4 500, 5 000, 5 500 K; log g = 0.0, 1.0, 2.0, 3.0, 4.0, 4.5, 5.0; and [M/H] = −3.0, −2.0, −1.0, 0.0, +0.5 dex.

The intensity of TiO bands (α, γ and γ prime Systems), at $\lambda\lambda$614.5 – 627.5 nm, are dependent on metallicity and effective temperature, and become stronger in cool metal-rich stars. There is no dependence on gravity. The absorption of C_2 (Swan Systems) is very weak in these spectral regions, and that of CN (Red Systems) presents similar behaviour to TiO.

We have computed a grid of synthetic spectra at $\lambda\lambda$614.0 – 648.0 nm and $\lambda\lambda$705.0 – 728.0 nm for 10