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The atmospheric parameters and spectral interpolator for the MILES stars*

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ABSTRACT

Context. Empirical libraries of stellar spectra are used to classify stars and synthetize stellar populations. MILES is a medium spectral-resolution library in the optical domain covering a wide range of temperatures, surface gravities and metallicities.
Aims. We redetermine the atmospheric parameters of these stars in order to improve the homogeneity and accuracy. We build an interpolating function that returns a spectrum as a function of the three atmospheric parameters, and finally we characterize the precision of the wavelength calibration and stability of the spectral resolution.
Methods. We used the ULySS program with the ELODIE library as a reference and compared the results with those in the literature.
Results. We obtain precisions of 60 K, 0.13, and 0.05 dex, respectively, for $T_{\rm eff}$, $\log g$, and [Fe/H] for the FGK stars. For the M stars, the mean errors are 38 K, 0.26, and 0.12 dex and 3.5%, 0.17, and 0.13 dex for the OBA. We construct an interpolator that we test against the MILES stars themselves. We test it also by measuring the atmospheric parameters of the CFLIB stars with MILES as reference and find it to be more reliable than the ELODIE interpolator for the evolved hot stars, like those of the blue horizontal branch in particular.

Key words. stars: fundamental parameters – galaxies: stellar content – stars: abundances

1. Introduction

MILES (Sánchez-Blázquez et al. 2006) is a medium-resolution library of observed stellar spectra in the optical domain. It is comparable to CFLIB (Valdes et al. 2004) and ELODIE (Prugniel & Soubiran 2001), and is of a particular interest for its accurate flux calibration. The three libraries contain *normal* stars with a wide range of characteristics, from spectral types O to M, all luminosity classes and a wide distribution of metallicities ($-2.5 <$ [Fe/H] < 1) dex.

The empirical libraries have important applications in different fields. They are used as references to classify stars and determine atmospheric parameters (see Wu et al. 2011, and references therein). They are also important ingredients to model stellar populations, which are used to study the history of galaxies (Prugniel et al. 2007a). The most important characteristics of a library are (i) the wavelength range; (ii) the spectral resolution; and (iii) the distribution of the stars in the parameter space whose axes are the effective temperature, $T_{\rm eff}$, the logarithm of the surface gravity, $\log g$, and the metallicity, [Fe/H]. Other properties, such as the precision and uniformity of the wavelength calibration and spectral resolution or the accuracy of the flux calibration, are also to be considered.

The ELODIE library has been upgraded three times after its publication (Prugniel & Soubiran 2001, 2004; Prugniel et al. 2007b). The last version, ELODIE 3.2 is preliminary described in Wu et al. (2011). It counts 1962 spectra of 1388 stars observed with the eponym echelle spectrograph (Baranne et al. 1996) at the spectral resolution $\Delta\lambda \approx 0.13$ Å ($R = \lambda/\Delta\lambda \approx 42\,000$) in the wavelength range 3900 to 6800 Å. CFLIB, also known as the "Indo-US" library, has 1273 stars at a resolution[1] $\Delta\lambda \approx 1.4$ Å ($3000 \lessapprox R \lessapprox 6000$) in the range 3460 to 9464 Å. The atmospheric parameters of CFLIB were homogeneously determined by Wu et al. (2011). MILES contains 985 stars at a resolution[2] $\Delta\lambda \approx 2.56$ Å in the range 3536 to 7410 Å. The atmospheric parameters of these stars were compiled from the literature or derived from photometric calibrations by Cenarro et al. (2007). The [Mg/Fe] relative abundances were recently determined by de Castro Milone et al. (2011).

The goals of this article are to (i) redetermine the atmospheric parameters of the stars of MILES homogeneously using ELODIE as reference; (ii) characterize the resolution and accuracy of the wavelength calibration; and (iii) build an

* FITS files are only and Table 1 also available in electronic form at the CDS via anonymous ftp to cdsarc.u-strasbg.fr (130.79.128.5) or via http://cdsarc.u-strasbg.fr/viz-bin/qcat?J/A+A/531/A165

[1] Valdes et al. (2004) mention $\Delta\lambda \approx 1.2$ Å, but Beifiori et al. (2011) and Wu et al. (2011) derive 1.4 Å.
[2] The value $\Delta\lambda = 2.3$ Å (Sánchez-Blázquez et al. 2006) is underestimated, see Beifiori et al. (2011) and Sect. 3.1.

interpolator. The last is a function, based on an interpolation over all the stars of the library, that returns a spectrum for a given set of atmospheric parameters, $T_{\rm eff}$, log g, and [Fe/H].

In Sect. 2, we describe the steps of the data analysis. In Sect. 3, we present the results and assess their reliability, and Sect. 4 gives the conclusions.

2. Analysis

In this section, we give the details of our analysis. First, we describe the different steps and then present the determination of the atmospheric parameters and line-spread function and the computation of the interpolator in detail.

2.1. Strategy

To determine the atmospheric parameters, we compared the observed MILES spectra with templates built from the ELODIE library. The χ^2 minimization, performed with the ULySS program[3] (Koleva et al. 2009), was done as described in Wu et al. (2011). The underlying model is

$$\mathrm{Obs}(\lambda) = P_n(\lambda) \times \mathrm{G}(\mathrm{v}_{\rm res}, \sigma) \otimes \mathrm{TGM}(T_{\rm eff}, g, [\mathrm{Fe/H}], \lambda), \quad (1)$$

where Obs(λ) is the observed spectrum sampled in log λ, $P_n(\lambda)$ a series of Legendre polynomials of degree n, and $G(v_{\rm res}, \sigma)$ a Gaussian broadening function parameterized by the residual velocity $v_{\rm res}$, and the dispersion σ. The TGM function models a stellar spectrum for given atmospheric parameters. It interpolates the ELODIE 3.2 library described in Sect. 2.2. The program minimizes the squared difference between the observations and the model. The free parameters are the three of TGM, the two of G, and the n coefficients of P_n.

A single minimization provides the atmospheric parameters and the broadening. The advantage of this simultaneity is to reduce the effects of the degeneracy between the broadening and the atmospheric parameters (see Wu et al. 2011).

The function G encompasses the effects of both the finite spectral resolution and the physical broadening of the observation and model. The physical broadening is essentially due to rotation and turbulence. The spectral resolution is represented by the so-called line-spread function (LSF), and in first approximation we can write

$$G = \mathrm{LSF}_{\rm rel} \otimes \Phi \quad (2)$$

where Φ is the relative physical broadening between the observation and the model (i.e. mismatch of rotation and turbulence) and $\mathrm{LSF}_{\rm rel}$ the relative LSF. The absolute LSF of the observed spectrum is $\mathrm{LSF} = \mathrm{LSF}_{\rm mod} \otimes \mathrm{LSF}_{\rm rel}$, where $\mathrm{LSF}_{\rm mod}$ is the LSF of the model. The approximations are that (i) neither Φ nor $\mathrm{LSF}_{\rm rel}$ are strictly Gaussians; and (ii) the LSF generally depends on the wavelength, so we cannot rigorously write convolutions. The Gaussian approximation is certainly acceptable in the present context of moderate spectral resolution because: (i) the physical broadening can often be neglected or can otherwise be assumed Gaussian; and (ii) the MILES spectra were acquired with a relatively narrow slit, thus the top-hat signature of the slit is dominated by the intrinsic broadening due to the disperser.

The variation in the LSF with the wavelength only has minor consequences on the atmospheric parameters (see Wu et al. 2011), but we explain below how we determine it and inject it in TGM to get the most accurate parameters.

In Eq. (1), the role of the multiplicative polynomial, $P_n(\lambda)$, is to absorb the mismatch of the shape of the continuum, caused by uncertainties in the flux calibration. It does not bias the measured atmospheric parameters, because it is included in the fitted model rather than determined in a preliminary *normalization*. In principle, a moderate degree, $n \approx 10$, is sufficient, but a higher degree suppresses the "waves" in the residuals and helps the interpretation of the misfits (the residuals are smaller, and it is easier to detect poorly fitted lines). High values of n, up to 100 or more, do not affect the parameters (Wu et al. 2011). The optimal choice of n depends on the resolution, wavelength range, and accuracy of the wavelength calibration. We determined it following the precepts of Koleva et al. (2009). We chose stars of various spectral types and tested different values in order to locate the plateau where the atmospheric parameters are not sensitive to n. We adopted $n = 40$.

The choice of ELODIE as reference limits the wavelength range where the spectra can be analysed. In particular, the blue end, below the H & K lines, is unfortunately not used. An alternative would have been to use a theoretical library, like the one of Coelho et al. (2005). We tried this solution, but we found that the misfits are significantly larger than with ELODIE (see Sect. 3.1), so we decided to maintain our initial choice.

To handle the wavelength dependence of the LSF, the analysis proceeds in three steps.

Determination of the LSF. We determine the wavelength-dependent LSF of each spectrum of stars in common between the MILES and ELODIE libraries. We use the ULY_LSF command, as described in Sect. 2.3.

Determination of the atmospheric parameters. We inject the wavelength-dependent relative LSF into the models so that the result has the same resolution characteristics as the observations, and determine the atmospheric parameters calling ULYSS.

Construction of the spectral interpolator. Finally, using these atmospheric parameters, we compute an interpolator. For each wavelength element, a polynomial in log $T_{\rm eff}$, log g, and [Fe/H] is adjusted on all the library stars, to be used as an interpolating function. This process is introduced in Sect. 2.5.

2.2. ELODIE 3.2: library and interpolator

ELODIE 3.2 is based on the same set of stars as ELODIE 3.1 (Prugniel et al. 2007b) and benefited from several improvements concerning various details of the data reduction, in particular a better correction of the diffuse light. We note also that a systematic error of 0.0333 Å (i.e. approximately 2 km s^{-1}) on the wavelengths of the previous version has been corrected (it came from a bug in the computation of the world coordinate system after a rebinning; ELODIE 3.1 was red-shifted).

The ELODIE interpolator approximates each spectral bin with polynomials in $T_{\rm eff}$, log g, and [Fe/H]. Three different sets of polynomials are defined for the OBA, FGK and M type temperature ranges, and are linearly interpolated in overlapping regions. This interpolator has been noticeably upgraded in the last version, taking the stellar rotation into account and adding some theoretical spectra to extend its range of validity to scarcely populated regions of the parameter space. The ELODIE 3.2 interpolator is publicly available at `http://ulyss.univ-lyon1.fr/models.html`, and additional details

[3] `http://ulyss.univ-lyon1.fr`

are given in Wu et al. (2011). A similar interpolator is described in Sect. 2.5 for MILES, with the only difference that the rotation terms are omitted.

2.3. Accurate line-spread function

The LSF describes the instrumental broadening, and it may vary with the wavelength. We determined the wavelength-dependent broadening by fitting the spectra of the 303 MILES stars belonging also to ELODIE. (Since ELODIE contains repeated observations of the same stars, this corresponds to 404 comparisons.) These fits were performed with the function ULY_LSF in a series of 400 Å intervals separated by 300 Å, hence overlapping by 100 Å on both ends. This procedure gives nine sampling points over the ELODIE range.

The change in broadening with wavelength is a consequence of the characteristics of the disperser and design of the spectrograph, but the shift in these functions with respect to the rest-frame wavelengths should ideally be null. However, the finite precision of the wavelength calibration and uncertain knowledge of the heliocentric velocity of the stars result in residual shifts that may be wavelength dependent. Flexures in the spectrographs or temperature drifts may cause these effects. Their magnitudes are expected to be small fractions of pixels. Sánchez-Blázquez et al. (2006) estimate the precision of their calibration to about 6 km s^{-1}. These residuals are likely to cancel each other out when we average the LSF for all the stars.

We estimated the mean instrumental velocity dispersion and residual shift in each spectral chunk as a clipped average of the individual ones using the IDL procedure BIWEIGHT_MEAN that does a bisquare weighting (a median estimation gives identical results).

2.3.1. Absolute LSF

Our analysis provides the relative LSF between MILES and ELODIE. Since the characterization of the LSF has an intrinsic interest, we give the absolute LSF obtained after deconvolving by the LSF of ELODIE.

The *FWHM* resolution of the ELODIE spectrograph, measured on the thorium lines of calibrating spectra varies from 7.0 km s^{-1} in the blue to 7.4 in the red (Baranne et al. 1996) or, respectively, 0.09 and 0.17 Å. This corresponds to a mean resolving power of $R = 42\,000$. The low-resolution (i.e. $R \approx 10\,000$) version of ELODIE 3.2, used in this paper, was produced by convolving the full-resolution spectra with a Gaussian of $FWHM =$ 0.556 Å. Therefore, the final resolution varies from 0.564 to 0.581 Å along the wavelength range, for an average of 0.573 Å.

To check this value, we analysed the LSF of the ELODIE interpolated spectra that have the atmospheric parameters of the MILES stars, using Coelho et al. (2005) as reference. We found a relative broadening of 0.584 ± 0.006 Å, independently of the wavelength. The difference from the value above is definitely compatible with the residual rotational broadening of the interpolated spectra, and we adopted the mean value derived above.

The Gaussian width of the absolute LSF of MILES is therefore the quadratic sum of the width of the LSF relative to ELODIE with the width of the absolute LSF of ELODIE.

2.3.2. Biased LSF

If the effective spectral resolution was the same for all the spectra of MILES, we could simply inject the LSF into the model and adjust only the atmospheric parameters (i.e., omit the convolution in Eq. (1)). However, because of the rotational broadening and dispersion of the instrumental broadening, the effective resolution varies, and we still need to fit the atmospheric parameters *and* the broadening.

In practice, the model must have a higher spectral resolution than the observation, because it is convolved with G during the analysis (Eq. (1)). If we injected the relative LSF in the model, the result would be broader than the best resolved library spectra. To avoid this difficulty we bias the LSF by subtracting quadratically 40 km s^{-1} (at any wavelengths) from the width of the mean relative LSF. The resolution of this biased LSF is higher than any spectrum of the library, and it has the correct wavelength dependence.

2.4. Determination of the atmospheric parameters

We fitted the spectra using the ELODIE 3.2 interpolator, injecting the biased LSF previously derived, and assuming a uniform broadening, as described in Eq. (1). In order to avoid trapping in local minimal, we used a grid of initial guesses sampling all the parameter space. The nodes of this grid are

$$T_{\rm eff} \in \{3500, 4000, 5600, 7000, 10\,000, 18\,000, 30\,000\}\ {\rm K};$$

$$\log g \in \{1.8, 3.8\}\ {\rm cm\,s^{-2}};$$

$$[{\rm Fe/H}] \in \{-1.7, -0.3, 0.5\}.$$

For the stars belonging to clusters, we adopted and fixed the metallicity to the value given in Cenarro et al. (2007).

The spectra were rebinned into an array of logarithmically spaced wavelengths, each pixel corresponding to 30 km s^{-1}. This choice oversamples the original spectrum by a factor two in the blue and by 20% in the red. We performed the fit in the region 4200–6800 Å, excluding the blue end of the spectra, where the signal-to-noise ratio is lower.

Because the noise estimation in the MILES spectra is not available, we assumed a constant noise, resulting in a uniform weighting of each wavelength bin. We estimated an upper limit to the internal errors on the derived parameters by assuming $\chi^2 = 1$.

This first minimization localizes the region of the solution, and we refine our measurements by again running ULYSS with the /CLEAN option to identify and discard the spikes in the signal. They result from the imperfect subtraction of sky lines and removal of spikes due to hits of cosmic rays. This process also discards the stellar emission lines. The second set of derived parameters is very close to the first one, because the MILES spectra had already been corrected for most of the observational artifacts.

Finally, the resulting parameters were compared with Cenarro et al. (2007), and the significant outliers were examined by checking the quality of the fit and searching the literature for accurate measurements from high-resolution spectroscopy.

2.5. MILES library interpolator

The goal is to build an interpolator that is similar to the one of the ELODIE library. It may then be used to (i) analyse stellar spectra, for example with ULySS; or (ii) create stellar population models, for example with PEGASE.HR (Le Borgne et al. 2004). The general idea is to approximate each wavelength bin with a polynomial function of $T_{\rm eff}$, $\log g$ and [Fe/H]. This process resembles the *fitting functions* (Worthey et al. 1994) that are used to predict the equivalent width of some features or spectrophotometric indices, given some atmospheric parameters. It is extended to model each spectral point.

This is a *global* interpolation, in the sense that each polynomial is valid for a wide range of parameters. An alternative would be to use a *local* interpolation, like averaging the nearest spectra to a given point in the parameter space. A good example of local interpolation is Vazdekis et al. (2003). Both methods have their own advantages and inconveniences. The global interpolation is less sensitive to the stochasticity of the distribution of the stars, but may not respond accurately in the regions where the spectrum changes rapidly. It is also continuous and derivable everywhere, which are required for using it as a function for a non-linear fit, as in ULySS. In both cases it is possible to control the quality of the interpolation by comparing each star to the interpolated spectrum that matches its parameters.

For the present work, we use the same polynomial developments as for ELODIE 3.2, because this will permit using it directly as a model for a TGM component in ULySS. The first version of this interpolator is described in Prugniel & Soubiran (2001), and we recall below the principles and present the difference introduced in ELODIE 3.2.

2.5.1. $T_{\rm eff}$ regimes

The library contains all types of stars from O to M, and the temperature is the main parameter controlling the shape of the spectra. Modelling all the stars with a single set of polynomials would necessitate including a large number of terms. The result would accordingly be very unstable. It would present oscillations and violently diverge near the edges of the parameter space. For this reason, we defined three temperature ranges, matching the OBA, FGK, and M spectral types, where independent sets of polynomials are adjusted. These three regimes have comfortable overlaps, allowing us to connect them smoothly by a linear interpolation. The limits are

OBA regime: $T_{\rm eff} > 7000$ K;

FGK regime: $4000 < T_{\rm eff} < 9000$ K;

M regime: $T_{\rm eff} < 4550$ K.

The M regime encompasses the cool K-type stars.

2.5.2. Polynomial developments

The developments are the same as for ELODIE.3.2, but truncated to exclude the rotation terms introduced to suppress a bias due to a degeneracy between the stellar rotation and the temperature (see Wu et al. 2011). Because of the lower spectral resolution of MILES, the stellar rotation is mixed with the variation in the resolution from star to star, and the introduction of these terms did not appear relevant.

The terms were chosen iteratively, adding at each step the one leading to the largest reduction of the residuals between the observations and the interpolated spectra. The following developments were used:

$$\begin{aligned}
\mathrm{TGM}(T_{\rm eff}, g, [\mathrm{Fe/H}], \lambda) = {} & a_0(\lambda) + a_1(\lambda) \times \log T_{\rm eff} \\
& + a_2(\lambda) \times [\mathrm{Fe/H}] \\
& + a_3(\lambda) \times \log g + a_4(\lambda) \times (\log T_{\rm eff})^2 \\
& + a_5(\lambda) \times (\log T_{\rm eff})^3 + a_6(\lambda) \times (\log T_{\rm eff})^4 \\
& + a_7(\lambda) \times \log T_{\rm eff} \times [\mathrm{Fe/H}] + a_8(\lambda) \times \log T_{\rm eff} \times \log g \\
& + a_9(\lambda) \times (\log T_{\rm eff})^2 \times \log g \\
& + a_{10}(\lambda) \times (\log T_{\rm eff})^2 \times [\mathrm{Fe/H}] \\
& + a_{11}(\lambda) \times (\log g)^2 + a_{12}(\lambda) \times ([\mathrm{Fe/H}])^2 \\
& + a_{13}(\lambda) \times (\log T_{\rm eff})^5 + a_{14}(\lambda) \times \log T_{\rm eff} \times (\log g)^2 \\
& + a_{15}(\lambda) \times (\log g)^3 + a_{16}(\lambda) \times ([\mathrm{Fe/H}])^2 \\
& + a_{17}(\lambda) \times \log T_{\rm eff} \times ([\mathrm{Fe/H}])^2 \\
& + a_{18}(\lambda) \times \log g \times [\mathrm{Fe/H}] \\
& + a_{19}(\lambda) \times (\log g)^2 \times [\mathrm{Fe/H}] \\
& + a_{20}(\lambda) \times \log g \times ([\mathrm{Fe/H}])^2 \\
& + a_{21}(\lambda) \times T_{\rm eff} + a_{22}(\lambda) \times (T_{\rm eff})^2, \qquad (3)
\end{aligned}$$

where TGM is a flux-calibrated interpolated spectrum. Unlike for ELODIE, we did not compute a continuum-normalized interpolator, as it is not needed here. The 23 terms were used for both the FGK and M regimes, but the development was truncated to the first 19 for the OBA one.

2.5.3. Support for extrapolation

One of the limitations of using empirical libraries is that they do not cover the full range of atmospheric parameters. In particular, to study the stellar populations of galaxies, we would need, for example, young stars of low metallicity, which are obviously missing in a library of Galactic stars. For this reason, it is important that the interpolator preserves its quality at the edges of the parameter space, where only rare stars are present. This is a difficulty for any type of interpolating function.

A solution could have been to supplement the library with theoretical spectra in the margins of the parameter space. However, this would introduce discontinuities because the flux scale of theoretical spectra is not fully consistent with the empirical library. To improve this situation, Prugniel et al. (2007a) introduced a semi-empirical solution where theoretical spectra are used *differentially* to extend the coverage of the parameter space. This was used to add an [Mg/Fe] dimension to the space, and to model spectra with non-solar abundances, as Galactic globular clusters (Prugniel et al. 2007a; Koleva et al. 2008). The same principle was adopted in ELODIE 3.2 to extend the range of the 3-dimensional parameter space (without the [Mg/Fe] dimension which is not taken into consideration neither in ELODIE 3.2 nor in the present paper).

We computed the differential effect of changing a parameter between a point belonging to the empirical library, and another one located outside of the range of the library. This differential spectrum was built using a theoretical library. Finally, we produced a semi-empirical spectrum, summing the differential one to one generated with the initial version of then interpolator (computed without the semi-empirical extrapolation supports) at the reference location.

We used the Martins et al. (2005) library to add semi-empirical spectra at the following locations: (i) $T_{\rm eff} = 40\,000$ K,

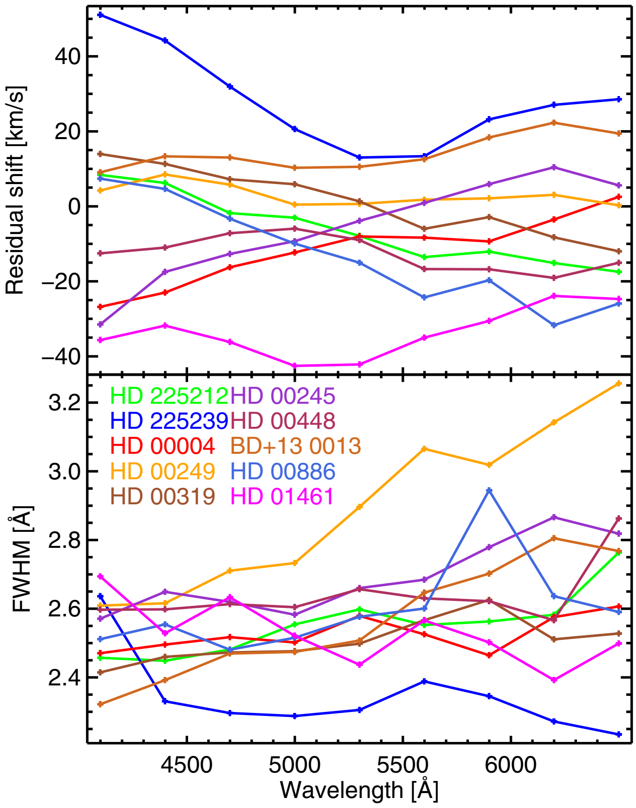

Fig. 1. Line-spread function for 10 stars of the MILES library chosen arbitrarily (actually 10 of the first 12), using the interpolated ELODIE spectra for reference. The *top panel* shows the residual shift of the spectra, illustrating the precision of the wavelength calibration and of the rest-frame reduction. The *bottom panel* presents the *FWHM* resolution. The mean formal error on each LSF point is 0.5 km s^{-1} on the residual shift and 0.025 Å on the *FWHM* resolution.

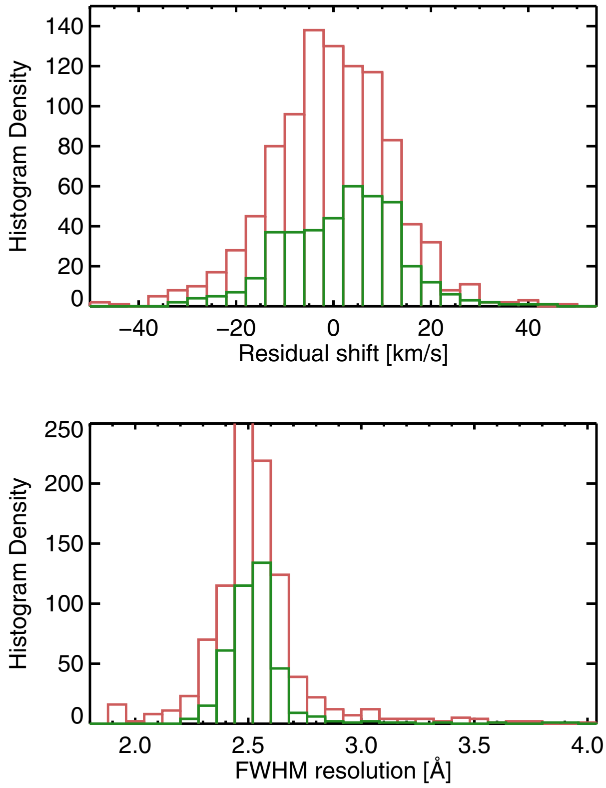

Fig. 2. Histograms of the broadening and residual shift of the line-spread function of the MILES library at 5300 Å. The green histograms are for the 404 direct comparisons with spectra of the ELODIE library. The red ones are the comparisons with the ELODIE interpolator. The top panel is the distribution of the residual shifts, in km s^{-1}, and the bottom ones the distribution of the *FWHM* Gaussian broadening.

log g = 4 and 4.75, and [Fe/H] = −1, 0 and +0.3 dex, using as reference $T_{\rm eff}$ = 20 000 K, log g = 3.5, [Fe/H] = 0; (ii) $T_{\rm eff}$ = 55 000 K, log g = 3.5 and 4.75, and [Fe/H] = −1, and +0.3 dex, using as reference $T_{\rm eff}$ = 30 000 K, log g = 3.5, [Fe/H] = 0; (iii) $T_{\rm eff}$ = 20 000 K, log g = 3, and 5 and [Fe/H] = −1, using as reference $T_{\rm eff}$ = 20 000 K, log g = 3.5, [Fe/H] = 0. We also used the Coelho et al. (2005) library to add some low-metallicity cool dwarfs at the locations $T_{\rm eff}$ = 3500 K, log g = 4.5 and 5.0, [Fe/H] = −1.5, –2.0 and −2.5 using as reference $T_{\rm eff}$ = 3500 K, log g = 4.5, [Fe/H] = −0.5.

We affected low weights to these spectra, so they do not affect the region populated with observed stars: each extrapolation-support spectrum has 1/20th of the weight of an observed star. We computed a final version of the interpolator using the semi-empirical spectra. The interpolated spectra in the extrapolated regions are probably not very accurate, but they do not diverge and are sufficient for many applications.

3. Results

In this section, we present the results of the previous procedure. We discuss the determination of the LSF, the measurements of the atmospheric parameters, and finally the computation and validation of the interpolator.

3.1. Line-spread function and wavelength calibration

The broadening was determined individually by comparing MILES and ELODIE spectra for all the stars in common. To increase the statistics, we also did the analysis for all the MILES stars by comparing them with the ELODIE interpolated spectrum corresponding to their atmospheric parameters. This second set of LSFs includes both the instrumental and physical broadening of the individual stars.

Figure 1 presents the individual LSF (using the ELODIE interpolated spectra as reference) for some stars chosen arbitrarily (the firsts of the list). From this small subset alone, it is apparent that the broadening is variable. Some spectra have a lower effective resolution, possibly due to stellar rotation, and some have a higher resolution, maybe because of a better focusing of the spectrograph. It also appears that the rest-frame reduction is not always accurate, with deviation reaching a few 10 km s^{-1}. This may be due to (i) uncertain knowledge of the heliocentric velocities; (ii) imperfect wavelength calibration; or (iii) stellar duplicity. We note also that the residual shift often changes with the wavelength by 10 to 30 km s^{-1} over the ELODIE range. This results from an uncertainty in the dispersion relation. The effect is slightly stronger than the precision estimated in Sánchez-Blázquez et al. (2006). The values of the broadening and residual shift at 5300 Å are given for each star in Table 1.

The histograms of the broadening and residual shifts are presented in Fig. 2. The Gaussian broadening at 5300 Å spans the range $30 < \sigma_{\rm ins} < 92$ km s^{-1}, (i.e. $1.3 < FWHM < 3.8$ Å), and the histogram is skewed toward the large dispersions. This is likely due to the effect of the rotation. The mean broadening at the same wavelength is 60.5 km s^{-1}, for the direct comparison, with the rms dispersion of 2.4 km s^{-1} (i.e. respectively 2.52 and 0.10 Å for the *FWHM*). The mean broadening is similar (60.9 km s^{-1}) and the spread slightly wider (3.6 km s^{-1}), when interpolated spectra are used. The consistency between the two determinations shows that the physical broadening only makes a minor contribution.

As expected, the residual shifts essentially cancel out in the mean LSF. The mean shift is 2 km s^{-1} (identical for the two analysis), in the sense that MILES is red-shifted. The internal rms spread of these residual shifts is 12 km s^{-1} or $FWHM = 0.50$ Å at 5300 Å. If MILES is used to compute population models, this is combined with the instrumental broadening. In other words, the resolution of an interpolated MILES spectrum, or of a population model, will be $FWHM_{\rm inter} = \sqrt{2.52^2 + 0.50^2} = 2.57$ Å (assuming that the effect is uniform over all the parameter space).

The mean absolute difference of the residual velocity between the last and first segments of the LSF (i.e. between 6500 and 4100 Å) is 15 km s^{-1}. This reflects the accuracy of the dispersion relation used for the wavelength calibration. As explained in Sánchez-Blázquez et al. (2006), to save observing time, arc spectra were not acquired for each individual spectrum, but only for some spectra representative of each spectral type and luminosity class. It was assumed that the linear dispersion and higher order terms of the dispersion relation were constant, and a global shift was determined by cross-correlating each spectrum to a well-calibrated one. Our present test indicates that the stability of the spectrograph was slightly over-estimated, and the variation in the linear term of the dispersion relation will further degrade the LSF for population models.

The variation in the LSF with wavelength, as presented in Fig. 3, is consistent for the two sets of templates. The resolution changes from 2.45 Å at 4000 Å to 2.63 Å at 6500 Å, with an average value of 2.56 Å. This is broader than the estimation in Sánchez-Blázquez et al. (2006). In this paper, the authors find $FWHM = 2.3$ Å by comparison with CFLIB, for which they assumed a resolution of 1 Å. In fact, the resolution of CFLIB is instead ≈1.4 Å (Wu et al. 2011; Beifiori et al. 2011), and correcting this error brought the two values to agreement. Beifiori et al. (2011) also measured the resolution of MILES with a similar method and find 2.55 Å, independent of the wavelength. This is consistent with our result.

It is also interesting to characterize the LSF over the whole MILES wavelength range. We therefore repeated the analysis using the Coelho et al. (2005) library. We found consistent results in the ELODIE range, but with a wider spread, certainly due to lower quality fits. The residuals are typically three times larger than those obtained when we compared to ELODIE. A consequence is that the trend of the LSF with the wavelength is smeared out, leaving a uniform $FWHM = 2.59 \pm 0.08$ Å. We similarly analysed the MILES spectra of the five closest analogues of the Sun against the high-resolution spectrum from Kurucz et al. (1984). The results are also consistent with those obtained with ELODIE, but with a large spread resulting from the small statistics. Therefore we cannot constrain the resolution outside of the wavelength range of ELODIE with the same accuracy.

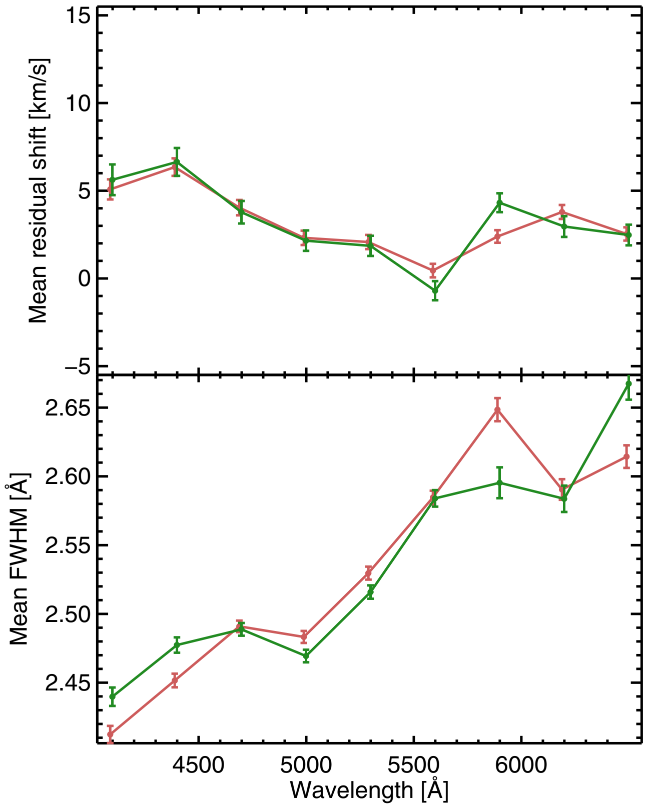

Fig. 3. Mean line-spread function of the MILES library, using for reference (i) the interpolated ELODIE spectra (red line and symbols); and (ii) the ELODIE spectra of stars in common (green). The *top panel* gives the mean residual shift over all the library, and the *bottom panel* the mean *FWHM* wavelength resolution. The bars indicate the errors on the mean value (i.e. dispersion/$\sqrt{n-1}$). The abscissa of the red symbols are shifted by a small quantity to avoid superposition.

3.2. Atmospheric parameters

We measured the atmospheric parameters for the 985 spectra as indicated in Sect. 2.4. As is known from Wu et al. (2011), the automatic determination is highly reliable for the FGK stars, but lacks faithfulness in some regions of the parameter space. Namely, this concerns the hot evolved stars and the cool stars ($T_{\rm eff} < 3600$ K). Therefore, for the stars found in these regimes, we searched the literature for recent determinations based on high-resolution spectroscopy. We also examined the very low-metallicity stars, and those for which our derived parameters depart significantly from those listed in Cenarro et al. (2007). Whenever we found values we judged were more credible than ours, we adopted them.

For 77 stars (8% of the library), we adopted parameters compiled and averaged from the literature. For four of them HD 18191, 17491, 54810, and 113285, we adopted either the metallicity or the gravity from the internal inversion of the MILES interpolator (see. Sect. 3.3). For six stars (one A-type star with emission line HD 199478, and five cool stars, $T_{\rm eff} <$ 3000 K, G 156-031 and 171-010, HD 113285, 126327, and 207076), we could not find any reliable source for at least one of the atmospheric parameters.

The most metal-poor star of the library, HD 237846, belongs to a stream discovered by Helmi et al. (1999). We adopted [Fe/H] = −3.15 from recent measurements (Zhang et al. 2009; Ishigaki et al. 2010; Roederer et al. 2010), while Cenarro et al. (2007)

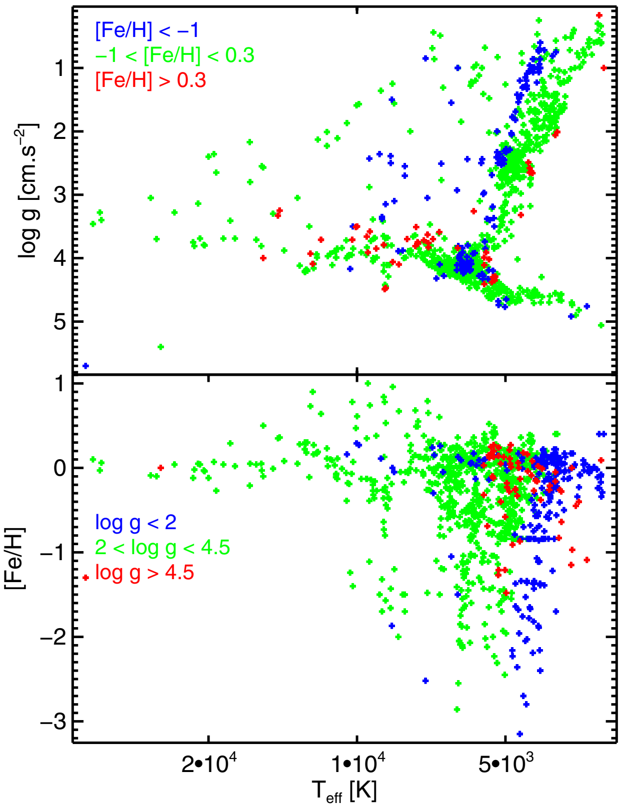

Fig. 4. Distribution in the log($T_{\rm eff}$) – log g and log($T_{\rm eff}$) – [Fe/H] planes of the adopted atmospheric parameters for the 985 MILES stars. In the *top panel*, the colour of the symbols distinguishes different metallicity classes. In the bottom panel, it distinguishes different classes of surface gravity.

catalogued [Fe/H] = −2.59. The inversion with ELODIE returned [Fe/H] = −2.52. The fitted metallicity values for the low metallicity stars ([Fe/H] < −1.70) were often biased toward higher values by ~0.15 dex. For 13 of these 46 metal-deficient stars, we adopted parameters from the recent literature

The adopted parameters are listed in Table 1, also available in the Vizier database. Figure 4 shows the distribution of the stars in the $T_{\rm eff}$ vs. log g and $T_{\rm eff}$ vs. [Fe/H] diagrams. We compared, in Fig. 5, our parameters to those from Cenarro et al. (2007). We also compared our results with ELODIE 3.2 and CFLIB (Wu et al. 2011) for the stars in common. The corresponding statistics, computed with the IDL command BIWEIGHT_MEAN, to discard the outliers, are shown in Table 2. The three lines are for the OBA ($T_{\rm eff}$ > 8000 K), FGK (4000 < $T_{\rm eff}$ ≤ 8000 K), and M ($T_{\rm eff}$ ≤ 4000 K) stars, respectively.

The mean deviations with Cenarro et al. are larger than those obtained by Wu et al. (2011) for the CFLIB library, for example, the dispersion is 120 K for the FGK stars, while Wu et al. report dispersions of ~70 K when comparing to homogeneous measurements based on high-resolution spectroscopy, and ~100 K when comparing to the compilation of Valdes et al. (2004). For the two other parameters, the dispersion is consistent with the comparison between CFLIB and the Valdes et al. (2004) compilation. The comparisons with the ELODIE 3.2 and CFLIB parameters obtained with the same method, are typical of comparisons between accurate spectroscopic measurements.

There is a statistically significant bias on $T_{\rm eff}$ of the FGK stars (47 K) between our measurements and Cenarro et al. (2007). Although this is within the uncertainties of the present calibrations, such a bias has consequences when the library is used in models of stellar populations. As pointed out on some occasions (Prugniel et al. 2007a; Percival & Salaris 2009), it is sufficient to alter the age derived for old globular clusters by several Gyr.

We compared our measurements with González Hernández & Bonifacio (2009), who used the infrared flux method to measure $T_{\rm eff}$ for FGK stars using 2MASS photometry. After clipping nine outliers out of the 232 stars in common, we found that these values are on average 28 K warmer than ours, with a dispersion of 141 K. Vazdekis et al. (2010) compared the compilation of Cenarro et al. (2007) to González Hernández & Bonifacio (2009) and found a bias of 59 K of the same sign. Our measurements are in better agreement with González Hernández & Bonifacio (2009) than the original MILES compilation, but the different values of the bias are within the accuracy for determing the temperature scale and are only marginally significant.

We used the statistics of the comparison with Cenarro et al. to estimate the external error. We used the ratios of the differences between the two series to the formal errors to rescale the errors, conservatively assuming that the mean precisions of each series are equivalent. This rescaling factor depends on the temperature. It changes from 5 for the G stars to about 20 for both the hottest and the coolest stars. These factors are the same for the three parameters, and the same order of magnitude as those used in Wu et al. (2011). The external errors are significantly larger than the formal error for several reasons, including the internal degeneracies between the atmospheric parameters. They are reported in Table 1.

For the FGK stars, the mean errors are 60 K, 0.13, and 0.05 dex respectively, for $T_{\rm eff}$, log g, and [Fe/H]. For the M stars, they are 38 K, 0.26, and 0.12 dex, and for the OBA 3.5%, 0.17, and 0.13 dex. The figures are similar to the precision reported by Wu et al. (2011), implying that there is no degradation in the performance of the method because of the lower spectral resolution.

3.3. Interpolator

We adjusted an interpolator to all the stars in MILES, using the atmospheric parameters of Table 1. For the 27 stars presenting a mean residual velocity shift greater than 30 km s^{-1}, we shifted the spectra by an integer number of pixels to reduce the effect. We did not correct all the spectra for the wavelength-dependent shifts derived in Sect. 3.1 to avoid a rebinning by fractions of pixel. We affected a weight to each star depending on its location in the parameter space, in order to compensate for the uneven distribution of the stars. The low-metallicity stars, and the coolest and hottest ones were over-weighted because there are relatively few of them. We did not weight with the signal-to-noise of the spectra because this information is not available.

We checked the residuals between the observed and interpolated spectra to identify and correct outliers. Finally, we assessed the validity of this interpolator performing two tests: (i) we compared the original and interpolated spectra; and (ii) we used the interpolator to measure the atmospheric parameters of MILES and CFLIB with ULySS.

3.3.1. Detection and treatments of the outliers

We started with all the stars, and we examined the residuals between the observed and interpolated spectra. There are a priori

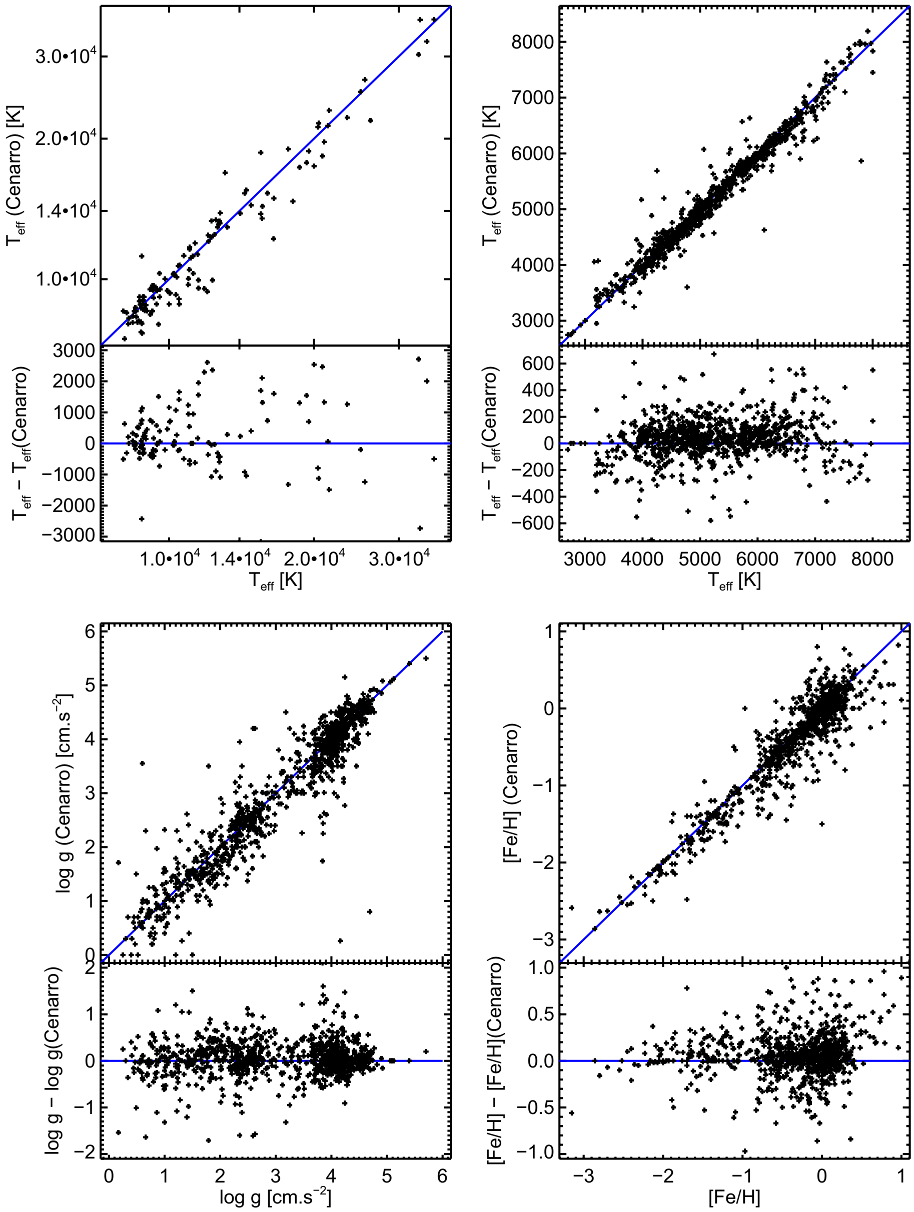

Fig. 5. Comparison of the measured atmospheric parameters with the Cenarro et al. (2007) compilation. The abscissae are the parameters measured in the present paper.

Table 2. Comparison of the atmospheric parameters with other studies.

Comparison		N^a	$T_{\rm eff}$		$\log g$ (cm s^{-2})		[Fe/H] (dex)	
			Δ	σ	Δ	σ	Δ	σ
Cenarro	OBA	121	2.1%	7.9%	0.080	0.384	0.101	0.408
	FGK	773	46 K	120 K	0.038	0.284	0.045	0.133
	M	91	–49 K	165 K	0.039	0.317	0.012	0.283
ELODIE	OBA	48	–3.2%	4.7%	0.026	0.218	0.009	0.069
	FGK	332	12 K	60 K	0.008	0.079	0.038	0.055
	M	23	–3 K	16 K	-0.022	0.200	0.034	0.061
CFLIB	OBA	42	–2.2%	6.0%	-0.016	0.268	0.025	0.110
	FGK	309	2 K	43 K	-0.025	0.069	0.021	0.030
	M	16	16 K	9 K	0.051	0.173	0.028	0.061

Notes. For each parameter, the Δ column gives the mean difference "this work" – "reference", and σ the dispersion between the two series.
[a] Number of compared spectra .

different causes for these residuals: (i) although "normal" stars were targeted, some peculiarities affect some of them (binarity, rotation, chromospheric emission, atypical abundances, etc.); (ii) the atmospheric parameters derived in Sect. 3.2 have uncertainties (or errors); and (iii) the MILES spectra have uncertainties.

The most prominent outliers correspond to spectra whose shape disagree with the interpolator. This is probably not because of errors in the atmospheric parameters, as the spectral features are generally well fitted, but rather because of errors in the flux calibration or in the correction for Galactic extinction. We

Table 3. Comparison between the atmospheric parameters from this paper[a] and Wu et al. (2011)[b] with those derived using the present MILES interpolator.

Comparison		N^c	$T_{\rm eff}$		$\log g$ (cm s^{-2})		[Fe/H] (dex)	
			Δ	σ	Δ	σ	Δ	σ
	OBA	130	1.2%	4.5%	–0.002	0.202	0.016	0.118
MILES[a]	FGK	770	–3.0 K	68.7 K	–0.024	0.108	0.005	0.074
	K5-M	85	–7.7 K	31.5 K	0.011	0.177	0.039	0.082
	M	26	2.1 K	35.4 K	0.092	0.219	0.045	0.102
	BHB	25	2.7%	9.1%	–0.095	0.541	–0.092	0.331
	OBA	231	–1.7%	6.3%	–0.027	0.214	0.012	0.157
CFLIB[b]	FGK	960	–20.9 K	75.4 K	–0.072	0.104	0.014	0.063
	K5-M	74	6.4 K	33.6 K	0.069	0.219	0.089	0.086
	M	24	31.8 K	34.1 K	0.163[d]	0.142	0.179	0.119
	BHB	28	–6.9%	11.0%	–0.243	0.623	–0.707	0.688

Notes. The Δ columns give the mean difference "MILES interpolator" – "reference", and σ the dispersion between the two series. [(c)] Number of compared spectra.

nevertheless searched the literature for indications of peculiarities that may explain the discrepancies, and whenever we found some plausible reason we excluded the star from the computation of the interpolator. We observe that the spectra with wrong continuum shape are often located at low Galactic latitude or in obscured regions. The most deviant example is HD 18391, a Cepheid variable whose extinction was corrected by assuming $E(B-V) = 0.205$ mag. Our spectroscopic fit indicates a considerably higher extinction, consistently with Turner et al. (2009) who derived $E(B-V) \approx 1$ mag. Another example where the extinction was under-corrected by ~0.7 mag is HD 219978. Although the main outliers correspond to underestimated extinctions, there are cases of over-estimation, like HD 76813.

We suppose that the main source of discrepancy is the correction of the Galactic extinction, but we cannot safely separate this possibility from an error on the flux calibration. Nevertheless, we assumed that for those discrepant cases, the error is due to the extinction correction and we applied an additional correction using a Galactic extinction curve (Schild 1977). Whenever this correction was unsatisfactory (maybe because the source of error is the flux-calibration), we flagged the spectrum reduce its weight or to be excluded. We corrected the extinction for 55 field stars.

All this process was made iteratively, treating the most prominent outliers and recomputing another version of the interpolator. Finally, the mean residuals between the interpolated and observed spectra is 4%, a value comparable to what is obtained for the ELODIE interpolator. A large fraction of these residuals still come from mismatches of the shape of the continuum.

3.3.2. Tests of the interpolator

Wu et al. (2011) have shown that the ELODIE interpolator is not reliable for the hot evolved stars nor for the very cool stars. It is not known if the reason resides in the limited sampling of the parameter space in these regions or from more fundamental characteristics of the interpolator. In order to check this, we used the new interpolator to measure the atmospheric parameters of MILES and CFLIB. The first one is an internal test, where each MILES spectrum is compared to the interpolator based on the whole library. The statistics of the comparisons between these new sets of parameters and the adopted ones are summarized in Table 3. They were computed with the IDL command BIWEIGHT_MEAN, to discard the outliers. The different lines are for the OBA ($T_{\rm eff} > 8000$ K), FGK ($4000 < T_{\rm eff} \le 8000$ K), K5-M ($T_{\rm eff} \le 4000$ K), M ($T_{\rm eff} \le 3500$ K), and BHB (blue horizontal-branch; $T_{\rm eff} > 7000$ K and [Fe/H] < -0.7 dex). The M stars for which Wu et al. (2011) give [Fe/H]$= -1$ were rejected from the statistics on $\log g$ and [Fe/H].

For the coolest stars ($T_{\rm eff} \le 3500$ K), the metallicities measured with the ELODIE interpolator were biased toward low values. This effect is absent with the MILES interpolator. For the hot evolved stars ($T_{\rm eff} > 7000$ K and [Fe/H] < -0.7 dex), the biases are also considerably reduced compared to those obtained with the ELODIE interpolator.

Figure 6 presents the fits with the MILES interpolator of the MILES spectra of three stars of different spectral types. The residuals are of the order of 1% of the flux, and the multiplicative polynomials are flat and close to unity, reflecting the good quality of the flux calibration of MILES.

These tests show that the MILES interpolator is reliable to measure the atmospheric parameters over their whole range. The lower resolution of MILES does not affect these determinations. The FITS file containing the coefficients of the interpolator is available in Vizier. It can be directly used in ULySS to fit stellar spectra. The interpolated spectra can also be computed online in a Virtual Observatory compliant format (Prugniel et al. 2008).

3.4. Discussion on the flux-calibration

The presumably good flux-calibration of MILES is its most attractive characteristic. It was assessed by comparison with accurate broad-band photometry. To test the photometric precision of the interpolator, we fitted the residuals between the observed and interpolated spectra with a straight line and expressed the result as a $B-V$ colour. For the whole library, we find $\Delta(B-V) = 0.005$ mag and $\sigma(B-V) = 0.039$ mag for the bias and dispersion, respectively. This residual colour is small by construction, since the interpolator was built with the observed spectra, but the small dispersion reflects the good spectrophotometric precision. The photometric precision on the individual spectra were determined by Sánchez-Blázquez et al. (2006) to be $\sigma(B-V) = 0.013 \sim 0.025$ mag, by comparing synthetic $B-V$ colours with different sets of standards. (The two numbers corresponds to different standards.) Our present values are not as precise, likely because they also include the errors on the Galactic extinction corrections and on the atmospheric parameters, and the cosmic variance introduced by characteristics of individual stars that are not considered in the interpolator.

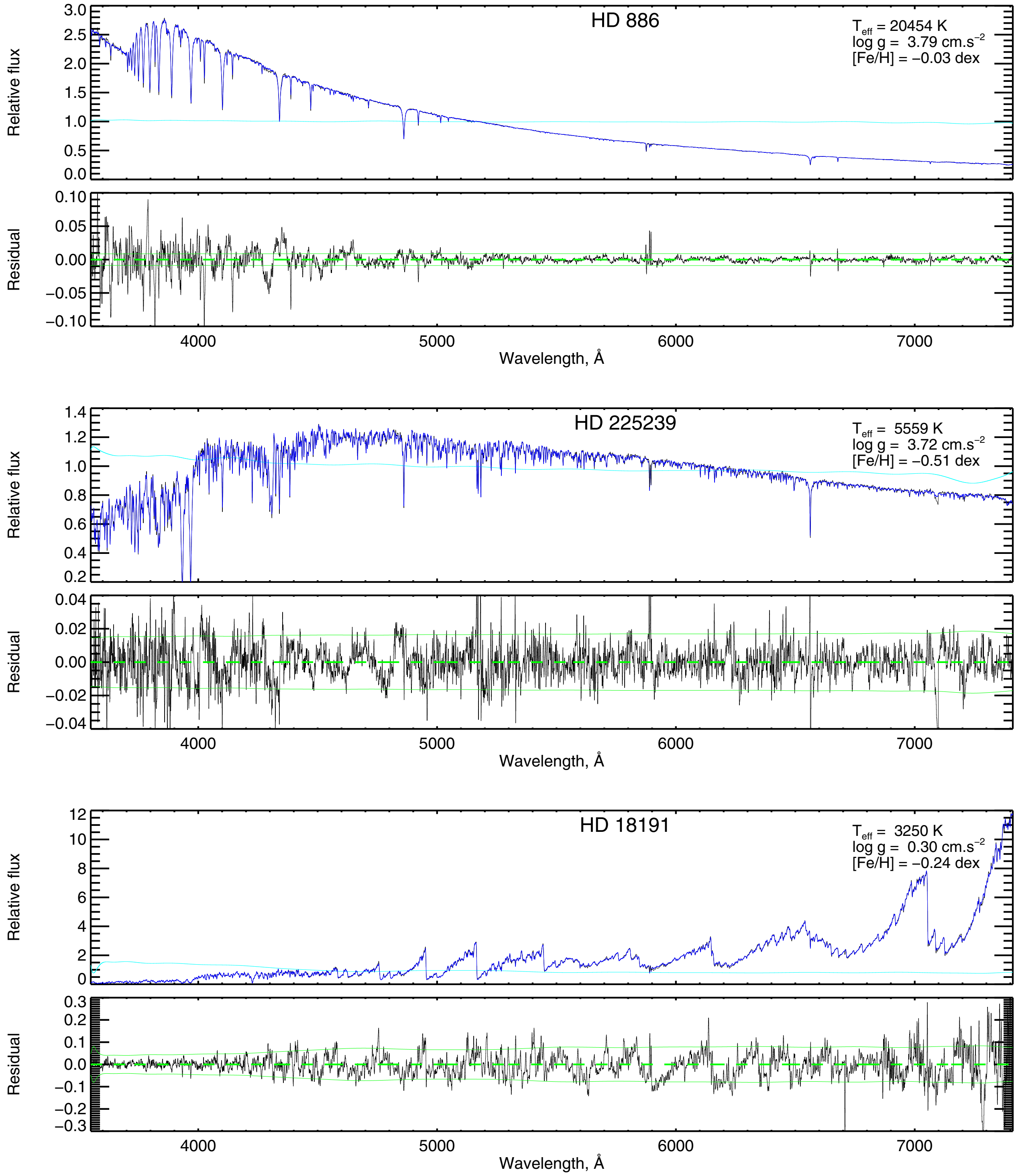

Fig. 6. Fits of MILES spectra with the MILES interpolator for three representative stars. For each star, the *top panel* represents the flux distribution, normalized to an average of one, and the *bottom* ones the residuals between the observation and the best-fitted interpolated spectrum (observation−model). The fit was performed with ULySS. The continuous green lines are the $\pm 1\sigma$ errors, assuming a constant error spectrum and $\chi^2 = 1$. The clear blue lines are the multiplicative polynomials.

We can also assess the photometric accuracy of the ELODIE library. This has always been a question, because its flux-calibration results from a complex and indirect process. To test it, we made series of interpolated ELODIE spectra following the main and giant sequences, and we computed the photometric precision as above. We found that the differences between the interpolated ELODIE and MILES spectra are $\sigma(B-V) \approx 0.02$ mag, which is consistent with the estimations made in (Prugniel & Soubiran 2004; Prugniel et al. 2007b).

4. Summary and conclusion

We derived the atmospheric parameters of the stars of the MILES library. We estimated the external precision for the FGK stars to be 60 K, 0.13, and 0.05 dex for $T_{\rm eff}$, $\log g$, and [Fe/H], respectively. For the M stars, the mean errors are 38 K, 0.26, and 0.12 dex, and for the OBA 3.5%, 0.17, and 0.13 dex. These precisions are comparable to those obtained with the same method for the CFLIB library, whose resolution is significantly higher. This shows that there is no significant degradation due to the resolution.

We characterized the LSF and we found that the residual shift of the rest-frame reduction has a dispersion of 12 $\rm km\,s^{-1}$, with an average of 2 $\rm km\,s^{-1}$ (MILES is slightly red-shifted). The mean *FWHM* dispersion of the library is 2.56 Å, changing from 2.45 to 2.63 Å from the blue to the red.

We computed an interpolator for the library. This is a function returning a spectrum for given $T_{\rm eff}$, $\log g$ and [Fe/H]. To check its reliability, we used it to derive the atmospheric parameters of MILES itself and CFLIB. The results are in good agreement with those derived with the ELODIE interpolator in the present paper and in Wu et al. (2011). For some regimes where the ELODIE interpolator has shown deficiencies (hot evolved stars and cool stars), the MILES interpolator gives better performances.

In a companion paper, we will use this interpolator to prepare stellar population models using PEGASE.HR.

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Table 1. Adopted atmospheric parameters for the 985 MILES stars.

Name	Miles[a]	$T_{\rm eff}$ (K)	Error	log(g) (cm s^{-2})	Error	[Fe/H] (dex)	Error	cz[b]	σ[c]	References
HD 224930	0001	5411	36	4.19	0.07	–0.78	0.04	–5	59	0
HD 225212	0002	4179	68	0.85	0.19	0.18	0.08	21	53	0
HD 225239	0003	5559	44	3.72	0.09	–0.51	0.05	–18	59	0
HD 00004	0004	6779	66	3.87	0.07	0.21	0.04	1	65	0
HD 00249	0005	4766	53	2.91	0.13	–0.27	0.06	0	58	0
HD 00319	0006	8641	150	4.29	0.09	–0.35	0.10	–18	55	0
HD 00400	0007	6190	51	4.15	0.08	–0.22	0.04	–14	63	0
HD 00245	0008	5749	39	4.13	0.07	–0.57	0.04	–14	62	0
HD 00448	0009	4800	50	2.63	0.12	0.04	0.05	9	59	0
BD+13 0013	0010	5000		3.00		–0.75				29
HD 00886	0011	20454	819	3.79	0.14	–0.03	0.08	–15	47	0
HD 01326B	0012	3679	30	4.92	0.11	–1.15	0.19	–33	57	0
HD 01461	0013	5666	42	4.21	0.08	0.19	0.04	2	62	0
HD 01918	0014	4888	55	2.44	0.14	–0.40	0.06	–6	59	0
HD 02628	0015	7335	69	3.95	0.06	–0.09	0.05	–17	49	0
HD 02665	0016	4986	77	2.28	0.21	–1.96	0.08	–19	60	0
HD 02796	0017	4837	95	1.78	0.24	–2.23	0.10	–2	63	0
HD 02857	0018	8000		2.70		–1.50				1,4
HD 03008	0019	4289	60	0.72	0.13	–1.87	0.06	–8	57	0
HD 03369	0020	16005	596	3.71	0.28	0.04	0.17	–46	152	0
HD 03360	0021	20375	730	3.80	0.11	–0.04	0.07	–11	44	0
HD 03567	0022	6094	50	4.18	0.07	–1.14	0.06	–4	63	0
HD 03546	0023	4945	69	2.36	0.17	–0.66	0.08	9	57	0
HD 03574	0024	4048	28	1.13	0.14	0.10	0.05	1	55	0
HD 03651	0025	5211	46	4.48	0.08	0.21	0.04	10	59	0
HD 03795	0026	5345	41	3.72	0.09	–0.63	0.04	–3	58	0
HD 03883	0027	7616	125	3.81	0.11	0.68	0.06	–10	56	0
HD 04307	0028	5773	38	3.97	0.08	–0.24	0.04	–3	62	0
HD 04395	0029	5444	51	3.43	0.11	–0.27	0.05	1	53	0
HD 04539	0030	25000		5.40		0.00				39,2
HD 04628	0031	4964	59	4.65	0.10	–0.23	0.06	2	62	0
HD 04656	0032	3956	38	1.85	0.25	–0.09	0.08	–1	54	0
HD 04744	0033	4638	61	2.35	0.18	–0.64	0.07	–7	58	0
HD 04906	0034	5157	51	3.58	0.12	–0.66	0.05	–6	58	0
HD 05268	0035	4904	83	2.35	0.21	–0.57	0.10	10	57	0
HD 05384	0036	3964	34	1.95	0.21	0.16	0.06	4	59	0
HD 05395	0037	4870	61	2.43	0.15	–0.40	0.07	–1	59	0
HD 05780	0038	3943	46	1.75	0.33	–0.56	0.14	–5	57	0
HD 05916	0039	4954	59	2.31	0.15	–0.75	0.07	3	56	0
HD 06186	0040	4865	51	2.36	0.13	–0.35	0.06	8	58	0
HD 06203	0041	4565	58	2.28	0.16	–0.32	0.06	4	58	0
HD 06268	0042	4735	113	1.42	0.26	–2.36	0.11	4	58	0
HD 06229	0043	5181	57	2.50	0.15	–1.14	0.07	3	60	0
HD 06474	0044	6781	214	0.49	0.13	0.26	0.09	–16	55	0
HD 06497	0045	4448	66	2.75	0.18	0.04	0.08	8	53	0
HD 06582	0046	5323	35	4.33	0.07	–0.79	0.04	–14	61	0
HD 06805	0047	4563	82	2.61	0.21	0.12	0.08	12	62	0
HD 05848	0048	4499	48	2.27	0.13	0.14	0.05	8	60	0
HD 06834	0049	6482	52	4.22	0.06	–0.58	0.05	18	62	0
HD 06755	0050	5097	60	2.53	0.16	–1.58	0.07	–7	59	0
HD 06833	0051	4596	63	1.90	0.17	–0.70	0.08	–12	59	0
HD 07106	0052	4701	43	2.58	0.10	0.01	0.05	10	60	0
HD 07351	0053	3548	49	0.83	0.54	–0.23	0.23	0	59	0
HD 07374	0054	12247	388	4.16	0.12	0.16	0.14	6	50	0
HD 07595	0055	4349	75	1.72	0.24	–0.57	0.11	1	61	0
HD 07672	0056	4939	66	2.78	0.16	–0.42	0.07	–9	60	0
HD 08724	0057	4772	80	1.69	0.21	–1.64	0.10	–2	60	0
HD 08829	0058	7129	67	4.10	0.06	–0.17	0.05	9	54	0
HD 09138	0059	4078	42	1.94	0.21	–0.40	0.09	–9	55	0
HD 09356	0060	6800	83	4.24	0.06	–0.80	0.07	29	56	0
HD 09562	0061	5766	45	3.89	0.09	0.14	0.04	11	61	0
HD 09408	0062	4814	115	2.46	0.28	–0.31	0.13	33	57	0
HD 09826	0063	6139	36	4.06	0.06	0.11	0.03	1	60	0
HD 09919	0064	6860		4.00		–0.35				2,3,24
HD 10380	0065	4170	49	1.91	0.21	–0.16	0.08	6	59	0
HD 10307	0066	5875	40	4.28	0.07	0.06	0.03	5	60	0
HD 10700	0067	5348	45	4.39	0.09	–0.46	0.05	3	58	0
BD+72 0094	0068	6131	49	4.09	0.06	–1.68	0.07	11	70	0
HD 10780	0069	5406	44	4.63	0.08	0.15	0.04	–9	59	0
HD 10975	0070	4872	63	2.46	0.15	–0.22	0.07	4	57	0
HD 11257	0071	7103	75	4.08	0.06	–0.27	0.06	–4	53	0
HD 11397	0072	5526	53	4.24	0.10	–0.58	0.05	5	57	0
HD 11964	0073	5272	55	3.85	0.11	0.05	0.05	7	59	0

Table 1. continued.

Name	Miles[a]	$T_{\rm eff}$ (K)	Error	log(g) (cm s^{-2})	Error	[Fe/H] (dex)	Error	cz[b]	σ[c]	References
HD 12014	0074	4371	108	0.66	0.16	0.04	0.10	20	58	0
HD 12438	0075	4937	86	2.35	0.21	–0.73	0.10	1	61	0
HD 13043	0076	5823	43	4.11	0.08	0.06	0.03	–11	62	0
BD+29 0366	0077	5666	31	4.25	0.06	–0.95	0.04	4	59	0
HD 13267	0078	15500		2.57		–0.10				3,10
HD 13555	0079	6515	54	4.07	0.07	–0.16	0.04	–11	60	0
HD 13520	0080	4043	30	1.66	0.17	–0.16	0.06	–5	57	0
BD-01 0306	0081	5723	43	4.28	0.08	–0.89	0.05	25	62	0
HD 13783	0082	5516	42	4.37	0.08	–0.49	0.04	–3	60	0
HD 14221	0083	6619	52	4.07	0.06	–0.17	0.04	13	60	0
HD 14802	0084	5777	70	3.89	0.14	–0.07	0.06	10	61	0
HD 14829	0085	8750		3.15		–1.57				2,27
HD 14938	0086	6275	62	4.22	0.09	–0.25	0.05	–3	64	0
HD 15596	0087	4859	80	2.77	0.21	–0.63	0.09	2	60	0
HD 15798	0088	6527	59	4.07	0.07	–0.12	0.04	–2	59	0
HD 16031	0089	6039	53	4.09	0.07	–1.63	0.07	–16	70	0
HD 16234	0090	6225	42	4.18	0.06	–0.19	0.04	14	63	0
HD 16232	0091	6314	55	4.29	0.07	0.11	0.04	0	62	0
HD 16673	0092	6260	44	4.30	0.06	0.00	0.03	–19	63	0
HD 16784	0093	5782	48	4.08	0.09	–0.68	0.05	0	59	0
BD+46 0610	0094	5889	44	4.13	0.08	–0.86	0.05	–1	59	0
G 004-036	0095	6073	55	4.20	0.08	–1.66	0.08	2	70	0
HD 16901	0096	5729	45	0.95	0.07	0.03	0.04	–5	57	0
HD 17081	0097	12722	490	4.20	0.13	0.28	0.16	7	58	0
HD 17361	0098	4662	52	2.61	0.13	0.06	0.05	16	59	0
HD 17491	0099	3200		0.60		–0.08				2,0b
HD 17382	0100	5339	37	4.64	0.06	0.17	0.04	–6	59	0
HD 17548	0101	6013	49	4.20	0.08	–0.53	0.05	3	59	0
HD 17378	0102	8477	96	1.25	0.06	0.00	0.09	3	58	0
HD 18191	0103	3250		0.30		–0.24				2,0b
HD 18391	0104	5750		1.20		–0.13				2,20,35,36
HD 18907	0105	5069	47	3.43	0.11	–0.65	0.05	–9	61	0
HD 19445	0106	5900		4.20		–2.07				0,46
HD 19510	0107	6108		3.91		–2.13				1
HD 19373	0108	5947	47	4.15	0.08	0.11	0.04	16	58	0
HD 19994	0109	6051	41	4.02	0.07	0.16	0.03	10	60	0
HD 20041	0110	11509	385	2.01	0.10	0.23	0.16	0	65	0
HD 20512	0111	5267	44	3.81	0.09	–0.13	0.04	3	60	0
HD 20619	0112	5710	41	4.47	0.07	–0.18	0.04	2	59	0
HD 20630	0113	5733	36	4.45	0.06	0.12	0.03	–3	58	0
HD 20893	0114	4383	45	2.29	0.14	0.14	0.05	0	59	0
BD+43 0699	0115	4732	55	4.68	0.10	–0.33	0.06	12	61	0
HD 21017	0116	4443	45	2.74	0.12	0.12	0.05	8	58	0
HD 21197	0117	4363	43	4.50	0.09	0.14	0.05	10	61	0
HD 21581	0118	5031	80	2.45	0.21	–1.51	0.09	21	59	0
BD+66 0268	0119	5300		4.20		–2.00				0,52,53,54
HD 22049	0120	5115	41	4.72	0.07	0.05	0.04	0	61	0
HD 22484	0121	5987	46	4.07	0.08	–0.05	0.04	10	60	0
HD 21910	0122	4822	77	2.44	0.19	–0.42	0.09	–6	61	0
HD 22879	0123	5870	46	4.23	0.08	–0.80	0.05	7	60	0
HD 23249	0124	5020	55	3.73	0.11	0.08	0.05	6	57	0
HD 23261	0125	5165	53	4.56	0.09	0.24	0.05	–21	60	0
HD 23194	0126	8031	105	4.00	0.08	–0.17	0.07	8	52	0
HD 23439A	0127	5181	38	4.47	0.08	–0.90	0.05	–15	58	0
HD 23439B	0128	4838	49	4.61	0.09	–0.91	0.07	–1	59	0
HD 23607	0129	7586	94	3.97	0.07	–0.03	0.06	1	54	0
HD 23841	0130	4341	60	2.10	0.20	–0.53	0.09	–2	58	0
HD 23924	0131	7776	116	3.94	0.09	0.07	0.07	5	56	0
HD 24616	0132	5014	56	3.16	0.14	–0.71	0.06	24	61	0
HD 24341	0133	5405	43	3.71	0.09	–0.62	0.05	0	57	0
HD 24421	0134	6168	47	4.20	0.07	–0.29	0.04	4	62	0
HD 24451	0135	4427	42	4.63	0.08	–0.09	0.05	–1	62	0
HD 25329	0136	4982	47	4.65	0.09	–1.48	0.08	1	61	0
HD 25532	0137	5600		2.50		–1.35				0,4
HD 25673	0138	5112	49	4.54	0.09	–0.40	0.06	12	61	0
HD 26297	0139	4479	72	1.05	0.18	–1.78	0.09	–5	60	0
HD 281679	0140	8542		2.50		–1.43				2
HD 26322	0141	7008	53	3.94	0.05	0.13	0.04	12	57	0
BD+06 0648	0142	4522	82	1.09	0.20	–2.03	0.10	–1	61	0
HD 284248	0143	6113	47	4.14	0.06	–1.55	0.06	5	73	0
BD-06 0855	0144	5442	46	4.60	0.08	–0.69	0.06	1	60	0
HD 26965	0145	5114	46	4.41	0.08	–0.26	0.05	–12	61	0
HD 285690	0146	4907	55	4.63	0.09	0.21	0.05	13	62	0
HD 27126	0147	5425	51	4.14	0.10	–0.38	0.05	–13	62	0

Table 1. continued.

Name	Miles[a]	$T_{\rm eff}$ (K)	Error	log(g) (cm s^{-2})	Error	[Fe/H] (dex)	Error	cz[b]	σ[c]	References
HD 27295	0148	11034	364	3.99	0.13	–0.11	0.14	2	47	0
HD 27371	0149	4995	45	2.76	0.11	0.15	0.05	13	58	0
HD 27771	0150	5285	44	4.59	0.08	0.27	0.04	–9	58	0
HD 27819	0151	7871	98	3.89	0.08	–0.06	0.06	11	51	0
HD 28305	0152	4964	63	2.72	0.15	0.20	0.06	11	56	0
HD 285773	0153	5348	41	4.56	0.07	0.25	0.04	–7	58	0
HD 28946	0154	5314	44	4.55	0.08	–0.10	0.04	1	61	0
HD 28978	0155	8864	183	3.42	0.20	–0.26	0.11	–5	44	0
HD 29065	0156	4062	48	1.76	0.26	–0.22	0.09	–2	59	0
HD 29139	0157	3870	21	1.66	0.16	–0.04	0.05	–11	59	0
BD+50 1021	0158	5081	48	4.48	0.09	–0.65	0.06	–7	63	0
BD+45 0983	0159	5155	65	4.45	0.12	–0.22	0.07	–12	61	0
HD 30743	0160	6484	56	4.16	0.07	–0.34	0.05	13	60	0
HD 30504	0161	4056	31	1.79	0.17	–0.33	0.07	3	57	0
HD 30649	0162	5791	40	4.21	0.07	–0.48	0.04	9	59	0
HD 31128	0163	5949	51	4.18	0.07	–1.45	0.06	30	62	0
HD 30959	0164	3465	27	0.76	0.29	–0.03	0.12	1	57	0
HD 30834	0165	4219	44	1.59	0.16	–0.24	0.06	5	58	0
HD 31295	0166	8822		4.11		–0.73				16,34
HD 31767	0167	4370	53	1.49	0.14	0.01	0.06	9	60	0
HD 32147	0168	4602	61	4.53	0.10	0.18	0.06	2	62	0
HD 32655	0169	7114	79	3.47	0.10	0.23	0.05	6	53	0
HD 33256	0170	6477	54	4.15	0.06	–0.27	0.04	19	61	0
HD 33276	0171	7223	71	3.80	0.07	0.22	0.05	–4	61	0
HD 293857	0172	5628	57	4.38	0.09	0.10	0.05	–6	58	0
HD 33608	0173	6461	64	4.03	0.09	0.21	0.04	3	61	0
HD 34538	0174	4870	54	2.96	0.13	–0.36	0.06	–10	60	0
MS 0515.4-0710	0175	5241	54	4.45	0.09	0.12	0.05	–12	57	0
HD 34411	0176	5842	43	4.16	0.08	0.08	0.03	7	57	0
HD 35155	0177	3575	69	0.77	0.72	–0.34	0.35	4	61	0
HD 35179	0178	4926	72	2.28	0.18	–0.62	0.09	–13	62	0
HD 35369	0179	4915	71	2.49	0.17	–0.24	0.08	6	60	0
HD 35296	0180	6171	63	4.31	0.09	0.01	0.05	–6	61	0
HD 35620	0181	4198	41	1.92	0.17	0.15	0.06	–5	59	0
HD 36003	0182	4345	42	4.59	0.08	–0.15	0.05	–4	61	0
HD 36395	0183	3670		4.70		0.00				0,37,23,38
HD 37160	0184	4810	54	2.74	0.14	–0.57	0.06	5	57	0
HD 37792	0185	6509	52	4.17	0.06	–0.54	0.05	9	62	0
HD 37536	0186	3780	40	0.52	0.19	0.13	0.09	–3	54	0
HD 37828	0187	4523	70	1.33	0.19	–1.36	0.09	7	57	0
HD 37394	0188	5279	39	4.60	0.07	0.20	0.04	–13	56	0
HD 37984	0189	4484	57	2.21	0.16	–0.41	0.07	–9	58	0
HD 38392	0190	4869	61	4.66	0.10	0.01	0.06	7	62	0
HD 38393	0191	6316	42	4.23	0.06	–0.09	0.03	4	59	0
HD 38007	0192	5705	31	3.98	0.06	–0.31	0.03	6	60	0
HD 38545	0193	8673	171	3.68	0.20	–0.48	0.13	9	104	0
HD 38751	0194	4853	47	2.74	0.11	0.18	0.05	0	60	0
HD 38656	0195	4943	60	2.55	0.14	–0.15	0.07	–2	60	0
HD 39364	0196	4706	56	2.44	0.16	–0.65	0.06	–3	59	0
HD 39853	0197	3883	27	1.60	0.23	–0.41	0.09	11	60	0
HD 39833	0198	5869	40	4.39	0.07	0.18	0.03	0	58	0
HD 39801	0199	3633	42	0.40	0.26	0.01	0.13	2	60	0
HD 39970	0200	12006	437	2.13	0.11	0.19	0.17	–7	76	0
HD 40657	0201	4300	53	1.83	0.18	–0.57	0.08	–3	59	0
HD 250792	0202	5554	42	4.33	0.07	–1.01	0.05	3	60	0
HD 41312	0203	4085	42	1.82	0.21	–0.60	0.09	–6	57	0
HD 41117	0204	20000		2.40		–0.12				0,0b,2,10,21
HD 251611	0205	5382	53	3.40	0.13	–1.44	0.06	–8	62	0
HD 41692	0206	14800		3.30		–0.01				1,7,25
HD 41636	0207	4711	55	2.48	0.14	–0.26	0.06	0	59	0
HD 42182	0208	5041	77	4.63	0.13	0.13	0.08	–23	63	0
HD 41597	0209	4632	57	2.01	0.15	–0.50	0.07	6	58	0
HD 42474	0210	3702	39	0.72	0.31	–0.12	0.14	–22	57	0
HD 42543	0211	3684	38	0.52	0.24	0.17	0.11	–1	60	0
HD 43042	0212	6480	57	4.18	0.07	0.06	0.04	–15	61	0
HD 43318	0213	6330	45	4.04	0.07	–0.07	0.03	8	60	0
BD+37 1458	0214	5450		3.38		–2.12				0,46
HD 43380	0215	4563	52	2.53	0.13	0.01	0.05	11	58	0
HD 44007	0216	4987	82	2.33	0.22	–1.53	0.09	0	59	0
HD 43378	0217	9284	256	4.05	0.09	–0.27	0.10	15	44	0
HD 43947	0218	5983	57	4.28	0.10	–0.27	0.05	–13	61	0
HD 44030	0219	4054	42	1.81	0.22	–0.36	0.09	–4	59	0
HD 44889	0220	4022	37	1.44	0.22	–0.16	0.07	–7	58	0
HD 44691	0221	7777	104	3.88	0.09	0.27	0.06	–20	60	0

Table 1. continued.

Name	Miles[a]	T_{eff} (K)	Error	log(g) (cm s^{-2})	Error	[Fe/H] (dex)	Error	cz[b]	σ[c]	References
HD 45282	0222	5309	48	3.19	0.12	–1.42	0.05	–3	59	0
HD 45829	0223	4637	95	0.77	0.10	0.08	0.08	17	58	0
HD 46341	0224	5835	44	4.28	0.07	–0.66	0.05	4	58	0
HD 47205	0225	4784	45	3.22	0.10	0.21	0.04	3	57	0
HD 46703	0226	6250		1.00		–1.50				12
HD 47914	0227	3970	41	2.04	0.24	0.10	0.08	–10	60	0
HD 48329	0228	4625	71	0.92	0.09	0.12	0.07	17	60	0
HD 48433	0229	4510	64	2.10	0.17	–0.16	0.07	8	57	0
BD+15 1305	0230	4901	69	4.66	0.12	0.11	0.07	21	61	0
HD 48565	0231	6030	55	3.94	0.09	–0.63	0.05	0	61	0
HD 48682	0232	6088	44	4.28	0.07	0.11	0.03	–5	60	0
HD 49161	0233	4191	40	1.91	0.17	0.22	0.05	0	54	0
HD 49331	0234	3650		0.45		0.17				0,32
HD 49933	0235	6647	52	4.19	0.05	–0.45	0.05	–13	61	0
HD 50778	0236	4035	49	1.86	0.28	–0.29	0.11	7	58	0
HD 50420	0237	7319	64	3.75	0.06	0.11	0.04	8	56	0
HD 51440	0238	4317	60	1.68	0.19	–0.56	0.09	9	58	0
HD 52005	0239	4116	45	0.78	0.14	0.13	0.06	–2	58	0
HD 52973	0240	5657	35	1.12	0.07	0.09	0.03	8	62	0
HD 53927	0241	4911	55	4.71	0.09	–0.28	0.06	–10	65	0
HD 54605	0242	7035	110	0.69	0.13	0.24	0.11	–14	58	0
BD+37 1665	0243	5128	52	3.50	0.12	–0.65	0.05	–5	61	0
HD 54810	0244	4757	45	2.61	0.11	–0.30	0.05	0	58	0
HD 54719	0245	4437	47	2.17	0.13	0.17	0.05	–5	58	0
HD 55496	0246	4858	112	2.05	0.31	–1.48	0.13	5	58	0
HD 55693	0247	5773	58	4.16	0.11	0.25	0.05	–1	55	0
HD 55575	0248	5811	47	4.19	0.08	–0.38	0.05	–7	61	0
HD 56274	0249	5769	44	4.40	0.07	–0.53	0.05	–2	63	0
HD 56577	0250	3944	46	0.72	0.16	0.14	0.07	4	56	0
HD 57060	0251	33215	2674	3.28	0.16	–0.03	0.20	10	115	0
HD 57061	0252	34303	1828	3.46	0.11	0.10	0.13	36	72	0
HD 57264	0253	4642	50	2.49	0.13	–0.34	0.05	11	56	0
HD 58207	0254	4825	48	2.57	0.12	–0.11	0.05	12	57	0
HD 58551	0255	6306	41	4.27	0.05	–0.42	0.04	–10	62	0
HD 59612	0256	8409	139	1.56	0.09	–0.05	0.11	16	61	0
HD 59374	0257	5873	43	4.21	0.07	–0.82	0.05	–12	62	0
BD+24 1676	0258	6230		3.81		–2.55				2,48,49
HD 59984	0259	5973	42	4.07	0.07	–0.68	0.05	18	62	0
HD 59881	0260	7623	86	3.64	0.09	0.15	0.05	21	55	0
HD 60219	0261	6743	88	2.77	0.16	0.21	0.06	0	58	0
HD 60179	0262	9550	264	3.83	0.14	–0.13	0.10	12	44	0
LHS 1930	0263	5420	48	4.33	0.09	–1.11	0.06	–17	59	0
HD 60522	0264	3846	22	1.69	0.18	0.04	0.06	–4	56	0
HD 61064	0265	6646	76	3.69	0.10	0.27	0.04	4	55	0
BD-01 1792	0266	5131	61	3.38	0.14	–0.81	0.06	–3	58	0
HD 61606	0267	4890	47	4.67	0.08	0.05	0.05	4	64	0
HD 61772	0268	4118	49	1.41	0.22	0.05	0.07	–4	60	0
HD 61603	0269	3983	33	1.41	0.20	0.22	0.05	–3	58	0
HD 61935	0270	4838	40	2.61	0.10	–0.03	0.04	–5	59	0
HD 61913	0271	3478	18	0.71	0.18	0.09	0.07	–3	58	0
BD+00 2058A	0272	6096	62	4.17	0.08	–1.22	0.07	–11	65	0
HD 62345	0273	5029	47	2.61	0.12	–0.01	0.05	–7	58	0
HD 62301	0274	5933	37	4.12	0.06	–0.62	0.04	14	60	0
HD 62721	0275	3939	22	1.94	0.15	–0.25	0.06	–12	56	0
HD 63302	0276	4310	100	0.47	0.15	0.07	0.10	21	58	0
HD 63352	0277	4175	49	1.82	0.20	–0.44	0.08	2	57	0
BD-18 2065	0278	4915	114	2.36	0.29	–0.68	0.13	21	63	0
HD 64332	0279	3399	44	0.61	0.40	–0.04	0.18	–2	54	0
HD 64090	0280	5405	29	4.19	0.06	–1.65	0.04	0	60	0
HD 63791	0281	4866	72	2.03	0.20	–1.55	0.08	–1	60	0
HD 64606	0282	5302	38	4.42	0.07	–0.76	0.04	3	62	0
HD 64488	0283	8837	192	3.65	0.22	–0.36	0.12	13	69	0
HD 65228	0284	5861	47	1.24	0.09	0.06	0.05	–7	56	0
HD 65583	0285	5281	33	4.33	0.07	–0.65	0.04	–12	57	0
HD 65714	0286	4983	50	2.50	0.12	0.18	0.05	12	58	0
HD 65953	0287	4014	29	1.81	0.17	–0.21	0.06	0	56	0
HD 65900	0288	9235	272	3.69	0.21	–0.16	0.12	–11	44	0
HD 66141	0289	4312	49	2.11	0.16	–0.36	0.07	4	55	0
HD 66573	0290	5680	35	4.26	0.06	–0.58	0.04	–7	58	0
HD 67523	0291	6810	121	3.59	0.14	0.60	0.05	3	51	0
HD 67228	0292	5732	36	3.84	0.07	0.12	0.03	–13	58	0
BD+80 0245	0293	5509	45	3.74	0.11	–1.85	0.06	–6	64	0
HD 68284	0294	5945	38	3.97	0.07	–0.52	0.04	0	58	0
HD 69267	0295	4087	44	1.45	0.21	–0.07	0.07	7	56	0

Table 1. continued.

Name	Miles[a]	$T_{\rm eff}$ (K)	Error	log(*g*) (cm s^{-2})	Error	[Fe/H] (dex)	Error	cz[b]	σ[c]	References
HD 69611	0296	5773	37	4.09	0.07	–0.58	0.04	1	59	0
HD 69830	0297	5412	41	4.49	0.07	0.04	0.04	–5	60	0
HD 233511	0298	6005	52	4.13	0.07	–1.52	0.07	8	63	0
HD 69897	0299	6328	37	4.18	0.05	–0.23	0.03	–5	59	0
HD 70272	0300	3946	20	1.50	0.13	0.03	0.04	–3	57	0
HD 71030	0301	6541	47	4.03	0.05	–0.15	0.03	15	60	0
HD 72184	0302	4654	47	2.98	0.11	0.20	0.05	11	56	0
HD 72324	0303	4881	44	2.43	0.11	0.00	0.05	13	57	0
HD 72660	0304	9290	278	3.39	0.25	–0.20	0.15	–9	49	0
HD 73471	0305	4551	55	2.21	0.13	0.13	0.06	15	57	0
HD 72905	0306	5919	44	4.47	0.07	0.01	0.04	–1	59	0
HD 73898	0307	4912	101	2.30	0.25	–0.56	0.12	2	63	0
HD 73665	0308	5024	45	2.70	0.11	0.21	0.05	–2	57	0
HD 73394	0309	4552	83	1.29	0.22	–1.53	0.10	–7	57	0
HD 74000	0310	6178	44	4.03	0.06	–1.85	0.07	–15	69	0
HD 73593	0311	4842	58	2.88	0.14	–0.16	0.06	7	57	0
HD 74011	0312	5795	31	4.08	0.06	–0.56	0.03	–3	58	0
HD 74395	0313	5546	34	1.41	0.08	0.09	0.04	17	60	0
BD+25 1981	0314	6668	60	4.28	0.05	–1.20	0.08	–7	80	0
HD 74442	0315	4722	48	2.57	0.12	0.00	0.05	–5	58	0
HD 74377	0316	4674	54	4.47	0.10	–0.37	0.06	2	60	0
HD 74721	0317	8900		3.38		–1.32				1,4
BD-12 2669	0318	6800		4.10		–1.50				0b,50,51
HD 74462	0319	4773	75	1.82	0.20	–1.37	0.09	–7	58	0
HD 75318	0320	5432	38	4.48	0.07	–0.13	0.04	–8	59	0
HD 75691	0321	4330	54	2.21	0.18	–0.05	0.07	–17	61	0
HD 75732	0322	5260	38	4.35	0.07	0.43	0.03	0	58	0
HD 76151	0323	5748	38	4.42	0.07	0.15	0.03	2	58	0
HD 76292	0324	6958	69	3.88	0.07	0.16	0.04	13	57	0
HD 76932	0325	5908	42	4.09	0.07	–0.82	0.05	0	58	0
HD 76780	0326	5704	35	4.28	0.07	0.18	0.03	3	56	0
BD-05 2678	0327	5492	57	3.85	0.11	–2.02	0.07	26	64	0
HD 76910	0328	6397	48	4.23	0.05	–0.51	0.04	–18	67	0
BD-03 2525	0329	5869	56	4.09	0.08	–1.60	0.07	–1	69	0
HD 76813	0330	5065	39	2.63	0.09	–0.06	0.04	10	55	0
HD 77338	0331	5300	55	4.30	0.10	0.36	0.05	0	58	0
HD 77236	0332	4387	80	1.83	0.26	–0.75	0.12	–1	60	0
HD 78541	0333	3931	31	1.41	0.22	–0.22	0.08	1	56	0
HD 78234	0334	6976	57	4.04	0.05	–0.06	0.04	12	62	0
HD 78558	0335	5651	41	4.06	0.08	–0.45	0.04	7	58	0
HD 78209	0336	7519	98	3.77	0.08	0.55	0.05	10	58	0
HD 78737	0337	6550	56	4.19	0.06	–0.46	0.05	–32	63	0
HD 78732	0338	4939	54	2.27	0.13	–0.07	0.06	15	57	0
HD 79211	0339	3849	27	4.67	0.09	–0.64	0.11	–2	59	0
HD 79452	0340	4982	66	2.31	0.17	–0.79	0.08	–2	59	0
HD 79765	0341	7146	53	4.11	0.04	–0.26	0.04	–12	56	0
HD 79633	0342	7223	73	4.06	0.06	–0.26	0.06	–15	55	0
HD 80390	0343	3205	42	0.61	0.41	–0.17	0.25	0	60	0
HD 81009	0344	8829	249	3.79	0.29	0.84	0.12	–12	67	0
HD 81029	0345	6714	56	4.14	0.06	–0.08	0.04	9	58	0
HD 81192	0346	4790	58	2.56	0.16	–0.72	0.06	–7	57	0
HD 81797	0347	4171	52	1.56	0.20	0.08	0.07	2	60	0
BD+09 2190	0348	6270		4.11		–2.86				0,2
HD 82074	0349	5090	61	3.21	0.14	–0.43	0.06	–33	61	0
HD 82590	0350	6669	81	4.22	0.06	–0.81	0.07	–17	58	0
HD 82734	0351	4946	56	2.60	0.13	0.22	0.06	–5	59	0
HD 82210	0352	5445	41	3.64	0.09	–0.10	0.04	–3	60	0
HD 82885	0353	5520	39	4.41	0.07	0.40	0.03	9	56	0
HD 83212	0354	4466	64	0.96	0.15	–1.65	0.08	–1	58	0
HD 81817	0355	4198	43	1.35	0.15	0.21	0.06	18	56	0
HD 83425	0356	4189	56	2.09	0.22	–0.30	0.09	–11	58	0
HD 83618	0357	4275	40	1.96	0.14	–0.07	0.05	–2	58	0
HD 83632	0358	4171	61	1.32	0.23	–0.75	0.10	–2	57	0
HD 233666	0359	5161	59	2.42	0.16	–1.62	0.07	0	58	0
HD 83506	0360	4920	53	2.39	0.13	0.14	0.06	19	58	0
HD 84441	0361	5398	31	2.02	0.08	–0.06	0.04	8	59	0
HD 84737	0362	5872	40	4.05	0.08	0.12	0.03	13	58	0
HD 84937	0363	6211	41	4.00	0.06	–2.05	0.07	–19	72	0
HD 85235	0364	8769	150	3.69	0.16	–0.23	0.08	–10	55	0
HD 237846	0365	4675		1.20		–3.15				40,41,42
HD 85503	0366	4466	54	2.65	0.15	0.31	0.06	0	58	0
HD 85773	0367	4250		0.60		–2.40				2,40,41
HD 86986	0368	8000		2.55		–1.70				1,4
HD 87141	0369	6359	40	3.90	0.06	0.09	0.03	10	59	0

Table 1. continued.

Name	Miles[a]	$T_{\rm eff}$ (K)	Error	log(g) (cm s^{-2})	Error	[Fe/H] (dex)	Error	cz[b]	σ[c]	References
HD 87140	0370	5092	68	2.48	0.18	–1.70	0.08	4	56	0
HD 87737	0371	10958	288	2.11	0.08	0.11	0.14	–14	67	0
HD 87822	0372	6573	48	4.06	0.06	0.10	0.03	14	58	0
HD 88230	0373	3960		4.55		–0.05				0,37
HD 88446	0374	5848	57	3.89	0.11	–0.51	0.06	–19	60	0
HD 88725	0375	5647	37	4.24	0.07	–0.64	0.04	–7	57	0
HD 88609	0376	4535		1.20		–2.80				2,46
HD 88737	0377	6106	45	3.89	0.08	0.20	0.03	–2	58	0
HD 88986	0378	5766	41	4.04	0.08	0.04	0.03	–3	65	0
HD 89010	0379	5642	34	3.80	0.07	0.00	0.03	8	58	0
HD 89254	0380	7166	88	3.83	0.08	0.31	0.05	19	60	0
HD 89449	0381	6467	53	4.11	0.07	0.11	0.03	12	59	0
HD 89484	0382	4426	48	1.84	0.14	–0.38	0.06	8	59	0
HD 89707	0383	5937	35	4.25	0.06	–0.47	0.04	5	59	0
HD 89744	0384	6169	45	3.93	0.08	0.18	0.03	9	57	0
HD 89995	0385	6472	48	4.08	0.06	–0.24	0.04	9	57	0
HD 89822	0386	10182	305	3.85	0.18	0.07	0.14	–25	54	0
HD 90508	0387	5776	44	4.31	0.08	–0.30	0.04	1	58	0
HD 237903	0388	4076	41	4.70	0.11	–0.26	0.08	–3	60	0
HD 91347	0389	5887	35	4.26	0.06	–0.44	0.03	1	59	0
HD 91889	0390	6109	38	4.16	0.06	–0.21	0.03	1	61	0
HD 92523	0391	4135	36	1.77	0.17	–0.29	0.06	4	58	0
HD 93329	0392	8400		3.10		–1.20				4,27,30
HD 93487	0393	5215	71	2.41	0.17	–1.06	0.09	–9	60	0
HD 94028	0394	6076	52	4.23	0.07	–1.30	0.07	11	66	0
BD-10 3166	0395	5329	46	4.38	0.09	0.42	0.04	–10	59	0
HD 95128	0396	5852	42	4.24	0.07	0.02	0.03	7	57	0
HD 95578	0397	3864	30	1.25	0.23	0.07	0.07	–7	56	0
HD 95735	0398	3550		4.82		–0.40				0,37,23
BD+44 2051A	0399	3600		4.90		–0.45				0,37,23
HD 96360	0400	3340	29	0.79	0.31	–0.02	0.13	–6	60	0
BD+36 2165	0401	6144	48	4.18	0.06	–1.45	0.06	–12	67	0
HD 97560	0402	5328	56	2.69	0.14	–1.04	0.06	–3	58	0
HD 97633	0403	9201	277	3.68	0.24	–0.16	0.13	11	44	0
HD 97907	0404	4310	87	2.09	0.28	–0.12	0.11	–3	59	0
HD 97916	0405	6478	56	4.28	0.06	–0.73	0.05	13	61	0
HD 97855	0406	6416	48	4.18	0.06	–0.39	0.04	7	57	0
HD 98468	0407	4528	51	2.06	0.14	–0.36	0.06	7	57	0
HD 98553	0408	5832	47	4.27	0.08	–0.44	0.05	0	60	0
HD 99109	0409	5242	40	4.29	0.07	0.40	0.04	0	59	0
HD 233832	0410	4970	45	4.49	0.08	–0.59	0.05	–1	60	0
HD 99648	0411	4977	49	2.24	0.12	–0.03	0.06	12	57	0
HD 99747	0412	6738	49	4.19	0.05	–0.46	0.04	7	60	0
HD 99998	0413	4001	32	1.56	0.20	–0.24	0.07	–5	57	0
HD 100906	0414	5042	65	2.31	0.16	–0.46	0.08	–3	59	0
HD 101227	0415	5534	30	4.52	0.05	–0.32	0.03	–11	56	0
HD 101501	0416	5535	35	4.52	0.06	0.03	0.03	–3	58	0
HD 101606	0417	6362	47	4.13	0.06	–0.57	0.05	–5	61	0
HD 102224	0418	4477	81	2.06	0.22	–0.33	0.10	–6	59	0
BD+51 1696	0419	5656	42	4.28	0.07	–1.30	0.05	9	60	0
HD 102328	0420	4407	79	2.66	0.23	0.32	0.09	–5	60	0
HD 102634	0421	6281	50	4.15	0.08	0.22	0.03	–3	62	0
HD 102870	0422	6081	38	4.07	0.07	0.14	0.03	4	59	0
HD 103095	0423	5165	31	4.74	0.05	–1.21	0.05	2	59	0
HD 103578	0424	8509	134	3.80	0.13	–0.19	0.09	19	64	0
HD 103877	0425	7170	107	3.76	0.10	0.65	0.06	–2	58	0
HD 103932	0426	4414	34	4.55	0.07	0.08	0.04	18	61	0
HD 104307	0427	4459	41	2.30	0.12	–0.01	0.05	7	60	0
HD 104304	0428	5485	37	4.23	0.07	0.30	0.03	7	59	0
HD 104833	0429	7588	117	3.51	0.11	0.49	0.06	–6	63	0
HD 105262	0430	8500		1.50		–1.87				33
HD 105452	0431	7041	53	4.13	0.05	–0.19	0.04	–1	62	0
HD 105546	0432	5131	73	2.36	0.19	–1.46	0.09	0	58	0
HD 105740	0433	4798	89	2.74	0.23	–0.55	0.10	–14	58	0
HD 106038	0434	6014	53	4.18	0.07	–1.25	0.06	–1	65	0
CD-28 09374	0435	4995	70	3.11	0.17	–0.76	0.07	0	54	0
HD 106516	0436	6207	50	4.25	0.07	–0.69	0.05	0	61	0
HD 107113	0437	6543	59	4.19	0.07	–0.42	0.05	9	63	0
HD 107213	0438	6209	50	4.00	0.08	0.24	0.03	–6	61	0
BD+17 2473	0439	5283	46	3.37	0.11	–1.04	0.05	–10	59	0
BD+31 2360	0440	4765	63	2.45	0.17	–0.70	0.07	3	59	0
HD 108177	0441	6278	81	4.19	0.09	–1.41	0.11	11	65	0
HD 108564	0442	4675	68	4.66	0.13	–0.87	0.09	6	60	0
HD 108915	0443	5037	50	3.32	0.11	–0.10	0.05	0	58	0

Table 1. continued.

Name	Miles[a]	$T_{\rm eff}$ (K)	Error	log(g) (cm s^{-2})	Error	[Fe/H] (dex)	Error	cz[b]	σ[c]	References
HD 109443	0444	6758	73	4.17	0.07	–0.60	0.07	–7	61	0
HD 109871	0445	3979	25	1.77	0.16	–0.15	0.05	–5	58	0
HD 109995	0446	8550		2.39		–1.66				4,30
HD 110014	0447	4494	67	2.49	0.18	0.32	0.07	–6	56	0
HD 110379	0448	6857	59	4.17	0.05	–0.19	0.04	18	61	0
HD 110897	0449	5851	37	4.28	0.06	–0.53	0.04	2	58	0
HD 110885	0450	5545	62	2.99	0.14	–1.06	0.07	–1	57	0
HD 112028	0451	9443	345	2.88	0.13	–0.39	0.22	–5	150	0
HD 111631	0452	3877	33	4.59	0.11	–0.26	0.10	1	61	0
HD 111786	0453	8080		3.88		–1.50				16
HD 111980	0454	5876	49	4.04	0.09	–1.02	0.06	0	62	0
HD 112127	0455	4428	67	2.55	0.19	0.29	0.07	–4	57	0
HD 112413	0456	12303	487	4.09	0.22	0.90	0.16	9	66	0
HD 113092	0457	4273	51	1.43	0.17	–0.69	0.08	–4	58	0
HD 113022	0458	6491	53	4.09	0.06	0.11	0.03	6	57	0
HD 113285	0459	2924		1.50						2,0b
HD 114038	0460	4607	41	2.38	0.10	0.04	0.04	2	60	0
HD 114330	0461	9570	264	3.95	0.11	–0.13	0.09	18	44	0
HD 114606	0462	5584	37	4.15	0.07	–0.53	0.04	–3	51	0
HD 114710	0463	5994	51	4.35	0.09	0.05	0.04	2	58	0
HD 114642	0464	6491	60	4.04	0.07	–0.04	0.04	–14	59	0
HD 114946	0465	4999	90	3.12	0.21	–0.36	0.10	–5	62	0
HD 115383	0466	6047	39	4.24	0.07	0.17	0.03	5	55	0
HD 115589	0467	5227	40	4.39	0.07	0.28	0.04	–2	56	0
HD 115617	0468	5539	39	4.35	0.07	0.02	0.04	–9	61	0
HD 115659	0469	5104	59	2.64	0.15	0.04	0.06	–13	59	0
HD 116114	0470	8226	218	4.10	0.19	0.67	0.11	–13	62	0
HD 116316	0471	6487	64	4.26	0.07	–0.51	0.06	–13	63	0
HD 116544	0472	4451	79	3.18	0.20	0.22	0.09	–15	60	0
HD 117200	0473	6843	63	4.02	0.06	0.03	0.04	6	53	0
HD 117176	0474	5467	50	3.86	0.10	–0.10	0.05	8	57	0
HD 117635	0475	5175	37	4.48	0.07	–0.42	0.04	5	61	0
HD 117876	0476	4745	61	2.36	0.16	–0.44	0.07	–5	56	0
HD 118055	0477	4384	81	0.86	0.19	–1.82	0.09	–11	58	0
HD 118100	0478	4313	59	4.55	0.11	–0.16	0.08	–8	58	0
HD 118244	0479	6391	53	4.19	0.07	–0.46	0.05	–17	63	0
BD+30 2431	0480	13069	576	4.12	0.17	0.28	0.16	–1	90	0
HD 119228	0481	3684	20	1.02	0.21	–0.00	0.07	4	60	0
HD 119288	0482	6595	58	4.18	0.06	–0.23	0.04	16	55	0
HD 119291	0483	4295	46	4.59	0.09	0.02	0.06	13	57	0
HD 119667	0484	3711	49	1.16	0.51	–0.03	0.16	–8	55	0
HD 120136	0485	6386	62	4.15	0.08	0.24	0.04	10	54	0
HD 121130	0486	3448	33	0.80	0.37	0.05	0.13	10	62	0
HD 120933	0487	3529	25	0.98	0.30	–0.09	0.11	17	60	0
HD 121370	0488	5967	45	3.78	0.09	0.28	0.03	8	54	0
HD 121299	0489	4740	55	2.64	0.13	0.14	0.06	8	59	0
HD 121258	0490	5730	47	4.40	0.08	–0.20	0.05	–6	58	0
BD+34 2476	0491	6200		3.96		–2.05				0,4
HD 122106	0492	6321	72	3.84	0.12	0.16	0.05	–4	62	0
HD 122563	0493	4600		1.30		–2.70				43,44,45
HD 122742	0494	5485	42	4.35	0.08	0.03	0.04	–13	59	0
HD 123299	0495	10371	269	3.95	0.11	–0.19	0.10	9	44	0
HD 122956	0496	4709	87	1.54	0.23	–1.68	0.10	–5	58	0
HD 123657	0497	3261	43	0.59	0.38	–0.02	0.19	–13	63	0
HD 123821	0498	4900	94	2.28	0.22	–0.13	0.11	–7	60	0
HD 124186	0499	4419	59	2.66	0.17	0.30	0.06	14	55	0
HD 124292	0500	5398	38	4.35	0.07	–0.11	0.04	–6	57	0
HD 124897	0501	4280		1.70		–0.53				5
HD 124850	0502	6207	50	3.86	0.08	–0.06	0.04	12	56	0
HD 125184	0503	5536	51	3.85	0.11	0.24	0.04	–17	62	0
HD 125451	0504	6700	67	4.12	0.07	0.01	0.05	–21	65	0
BD+01 2916	0505	4282	54	0.74	0.12	–1.89	0.05	–1	59	0
HD 126141	0506	6699	60	4.14	0.06	–0.05	0.04	17	54	0
HD 126053	0507	5598	47	4.22	0.09	–0.37	0.05	–7	58	0
HD 126327	0508	3000				–0.58				2
HD 126218	0509	5137	46	2.70	0.11	0.24	0.05	6	59	0
HD 126660	0510	6293	45	4.13	0.06	0.02	0.03	10	56	0
HD 126614	0511	5399	42	4.02	0.09	0.52	0.03	5	58	0
HD 126778	0512	4832	86	2.41	0.22	–0.52	0.10	0	55	0
HD 126681	0513	5577	38	4.25	0.07	–1.12	0.05	–11	62	0
HD 127243	0514	4903	113	2.27	0.28	–0.78	0.14	–14	60	0
HD 127334	0515	5579	37	4.10	0.07	0.20	0.03	5	58	0
BD+18 2890	0516	5024	70	2.31	0.19	–1.54	0.08	–3	59	0
HD 128167	0517	6777	46	4.18	0.04	–0.39	0.04	–23	61	0

Table 1. continued.

Name	Miles[a]	$T_{\rm eff}$ (K)	Error	log(g) (cm s^{-2})	Error	[Fe/H] (dex)	Error	cz[b]	σ[c]	References
HD 128429	0518	6427	62	4.22	0.08	–0.08	0.05	8	59	0
HD 128801	0519	10200		3.50		–1.40				2,27
CD-26 10417	0520	4668	64	4.67	0.11	–0.13	0.07	0	61	0
HD 128959	0521	5857	75	3.84	0.15	–0.51	0.07	1	59	0
HD 129174	0522	12052	456	3.99	0.18	0.18	0.17	1	58	0
HD 130095	0523	8900		3.35		–1.70				2,27
HD 130322	0524	5391	37	4.52	0.07	0.12	0.04	–5	58	0
HD 130817	0525	6749	58	4.14	0.06	–0.29	0.05	17	61	0
HD 130705	0526	4430	70	2.64	0.20	0.38	0.08	18	57	0
HD 130694	0527	4131	53	1.76	0.25	–0.58	0.10	–12	60	0
HD 131430	0528	4311	44	2.22	0.15	0.17	0.05	–2	59	0
HD 132142	0529	5163	76	4.38	0.14	–0.37	0.08	–30	58	0
HD 131918	0530	4154	51	1.65	0.22	0.00	0.07	7	55	0
HD 131976	0531	3663	33	4.74	0.13	–0.97	0.21	–19	58	0
HD 131977	0532	4507	48	4.59	0.09	–0.04	0.05	13	57	0
HD 132345	0533	4467	69	2.58	0.19	0.39	0.07	–5	57	0
HD 132475	0534	5823	47	3.93	0.09	–1.37	0.06	4	62	0
HD 132933	0535	3805	24	1.23	0.22	–0.50	0.10	–2	58	0
HD 133124	0536	4026	41	1.88	0.24	0.06	0.08	0	58	0
BD+06 2986	0537	3897	42	4.66	0.13	–0.83	0.15	6	62	0
BD+30 2611	0538	4379	75	1.00	0.19	–1.43	0.10	–10	59	0
HD 134063	0539	4880	87	2.31	0.22	–0.69	0.10	3	58	0
HD 134083	0540	6573	47	4.17	0.05	–0.01	0.03	3	57	0
HD 134169	0541	5807	43	3.99	0.08	–0.81	0.05	–1	58	0
HD 134440	0542	5011	49	4.77	0.09	–1.21	0.07	3	59	0
HD 134439	0543	5172	40	4.68	0.07	–1.27	0.06	6	58	0
HD 134987	0544	5623	37	4.09	0.07	0.26	0.03	–15	61	0
HD 136064	0545	6083	46	3.94	0.08	0.03	0.03	–5	57	0
HD 135482	0546	4613	58	2.30	0.14	0.01	0.06	–10	63	0
HD 135722	0547	4850	74	2.39	0.18	–0.39	0.09	0	57	0
HD 135485	0548	15500		4.00		0.50				28
HD 136726	0549	4212	51	1.95	0.20	0.05	0.07	–11	56	0
HD 136202	0550	6139	57	4.00	0.10	0.05	0.04	–14	60	0
HD 137071	0551	3892	46	1.04	0.28	0.09	0.09	1	54	0
HD 136834	0552	4880	71	4.54	0.12	0.27	0.07	–8	56	0
HD 137391	0553	7186	65	3.93	0.06	0.10	0.04	15	61	0
HD 137759	0554	4520	56	2.61	0.15	0.12	0.06	8	53	0
HD 137471	0555	3794	21	1.07	0.18	0.05	0.06	–13	59	0
HD 137510	0556	5872	37	3.90	0.07	0.30	0.03	14	59	0
HD 137704	0557	4084	42	1.97	0.21	–0.32	0.08	–2	55	0
HD 137909	0558	8466	277	4.06	0.30	0.96	0.15	13	71	0
HD 138290	0559	6822	56	4.14	0.05	–0.10	0.04	16	55	0
HD 138481	0560	3917	27	1.15	0.17	0.00	0.06	–5	58	0
HD 139669	0561	3962	36	1.44	0.23	0.18	0.06	2	59	0
HD 138776	0562	5524	33	3.99	0.07	0.35	0.03	7	58	0
HD 138764	0563	14054	531	3.88	0.19	0.08	0.15	21	94	0
HD 139195	0564	4946	51	2.64	0.12	–0.13	0.06	–12	61	0
HD 139641	0565	4945	57	2.82	0.14	–0.51	0.06	–2	59	0
HD 139446	0566	5065	59	2.65	0.14	–0.27	0.07	–1	60	0
HD 140160	0567	9557	274	3.66	0.24	0.35	0.13	–5	67	0
HD 140283	0568	4250		0.60		–2.40				0,2,46,47
BD+05 3080	0569	5034	44	4.46	0.08	–0.44	0.05	–2	60	0
HD 141004	0570	5823	42	4.10	0.08	–0.03	0.03	11	52	0
HD 141714	0571	5332	39	3.22	0.09	–0.20	0.04	6	57	0
HD 141851	0572	8246		3.89		–2.00				2
HD 142373	0573	5783	46	3.93	0.09	–0.54	0.05	–20	59	0
HD 142575	0574	6779	75	4.23	0.06	–0.70	0.07	–24	65	0
HD 142908	0575	7038	58	3.98	0.06	–0.02	0.04	8	60	0
HD 142860	0576	6309	52	4.18	0.07	–0.16	0.04	8	56	0
HD 142703	0577	6903	76	4.32	0.07	–1.10	0.10	2	133	0
HD 143459	0578	10498	271	4.00	0.10	–0.39	0.12	–9	49	0
HD 143761	0579	5752	40	4.13	0.08	–0.26	0.04	8	58	0
MS 1558.4-2232	0580	4727	76	4.02	0.15	–0.14	0.08	–18	59	0
HD 143807	0581	10727	278	3.84	0.16	–0.01	0.12	24	49	0
HD 144172	0582	6432	55	4.14	0.07	–0.38	0.05	3	61	0
HD 144872	0583	4774	48	4.70	0.08	–0.25	0.05	9	58	0
HD 144585	0584	5767	42	4.09	0.08	0.29	0.03	8	52	0
HD 144608	0585	5363	42	2.62	0.11	0.03	0.05	–14	59	0
HD 145148	0586	4868	52	3.65	0.10	0.10	0.05	0	59	0
HD 145675	0587	5270	46	4.31	0.09	0.48	0.04	4	55	0
HD 145250	0588	4580	47	2.32	0.13	–0.25	0.05	1	59	0
HD 145976	0589	6927	58	4.08	0.05	–0.02	0.04	4	56	0
HD 146051	0590	3783	20	1.45	0.19	–0.03	0.06	–13	56	0
HD 147379B	0591	3852	34	4.57	0.12	–0.28	0.11	7	56	0

Table 1. continued.

Name	Miles[a]	$T_{\rm eff}$ (K)	Error	log(*g*) (cm s^{-2})	Error	[Fe/H] (dex)	Error	cz[b]	σ[c]	References
HD 146624	0592	9125	322	3.99	0.13	–0.27	0.12	–16	44	0
HD 147923	0593	4773	47	4.69	0.08	–0.26	0.05	8	55	0
BD-11 4126	0594	4702	51	4.62	0.09	–0.00	0.05	7	60	0
HD 148112	0595	10052	320	3.51	0.35	0.47	0.15	10	66	0
BD+09 0352	0596	6131	46	4.04	0.07	–1.88	0.08	–2	66	0
HD 148513	0597	4131	44	2.15	0.21	0.20	0.07	0	58	0
BD+11 2998	0598	5527	67	2.97	0.15	–1.01	0.07	–3	56	0
HD 148816	0599	5828	40	4.05	0.07	–0.72	0.04	1	59	0
HD 148897	0600	4293	76	1.01	0.20	–1.11	0.11	–11	56	0
HD 150275	0601	4675	63	2.46	0.18	–0.60	0.07	–6	57	0
HD 148786	0602	5144	60	2.70	0.15	0.21	0.06	–12	58	0
HD 149009	0603	3877	37	1.23	0.26	0.12	0.08	–4	55	0
HD 148898	0604	9141	303	3.85	0.18	0.38	0.13	–9	63	0
HD 149121	0605	11099	316	3.89	0.16	0.03	0.13	–11	52	0
HD 149161	0606	3939	34	1.79	0.23	–0.17	0.08	–8	53	0
BD+09 3223	0607	5200		2.00		–2.31				0,2,4
HD 149382	0608	35500		5.70		–1.30				2,9
HD 149661	0609	5281	37	4.59	0.07	0.13	0.04	–11	56	0
HD 150012	0610	6651	55	3.96	0.06	0.13	0.03	8	53	0
HD 150177	0611	6190	46	4.08	0.07	–0.58	0.05	–9	60	0
HD 150281	0612	5164	53	4.54	0.09	0.14	0.05	–4	59	0
HD 150453	0613	6589	63	4.07	0.06	–0.24	0.05	8	60	0
HD 151203	0614	3475	24	0.91	0.28	0.04	0.10	–19	56	0
HD 151217	0615	3892	26	1.70	0.19	0.06	0.06	0	53	0
HD 152601	0616	4713	63	2.72	0.15	0.15	0.06	4	59	0
HD 152781	0617	4969	63	3.55	0.13	0.08	0.06	7	53	0
HD 153286	0618	7534	112	3.75	0.10	0.49	0.06	13	52	0
HD 153882	0619	9999	348	3.50	0.35	0.61	0.15	–13	63	0
HD 154733	0620	4250	41	2.31	0.15	0.00	0.06	12	56	0
HD 155763	0621	12500		3.50		–0.11				31
HD 155358	0622	5888	43	4.09	0.08	–0.63	0.04	4	57	0
HD 155078	0623	6508	78	4.00	0.10	0.03	0.05	–18	66	0
HD 156283	0624	4233	39	1.56	0.13	0.10	0.05	11	56	0
HD 156026	0625	4380	53	4.71	0.09	–0.27	0.07	7	58	0
HD 157373	0626	6552	52	4.18	0.06	–0.43	0.05	8	63	0
HD 157214	0627	5621	32	4.05	0.07	–0.41	0.03	3	59	0
HD 157089	0628	5792	45	4.05	0.09	–0.57	0.05	0	60	0
HD 157910	0629	5227	44	2.58	0.11	–0.07	0.05	5	56	0
HD 157881	0630	3962	36	4.56	0.10	–0.16	0.08	0	60	0
HD 157856	0631	6523	59	4.04	0.07	–0.07	0.04	11	54	0
HD 157919	0632	6826	105	3.61	0.13	0.29	0.06	–18	59	0
BD+23 3130	0633	5017	84	2.31	0.21	–2.45	0.08	0	68	0
HD 159332	0634	6298	48	4.01	0.07	–0.10	0.04	12	53	0
HD 159307	0635	6395	50	4.19	0.06	–0.54	0.05	9	57	0
HD 159482	0636	5740	41	4.11	0.08	–0.75	0.05	–3	59	0
HD 160933	0637	5770	39	3.79	0.08	–0.31	0.04	8	58	0
HD 160762	0638	17678	846	3.69	0.22	0.02	0.14	–9	81	0
HD 160693	0639	5691	41	4.07	0.08	–0.56	0.04	–10	59	0
HD 161074	0640	3982	29	2.04	0.17	–0.08	0.06	0	59	0
HD 161149	0641	7015	91	3.70	0.10	0.33	0.06	9	57	0
HD 161096	0642	4594	74	2.72	0.18	0.27	0.07	–8	56	0
HD 161796	0643	7000		0.44		–0.30				8,19
HD 161227	0644	7320	82	3.72	0.08	0.38	0.05	5	62	0
HD 161695	0645	11506	335	2.23	0.08	0.11	0.15	19	67	0
HD 161797	0646	5454	35	3.82	0.08	0.22	0.03	17	54	0
HD 161817	0647	7200		3.05		–1.48				1,4
HD 162211	0648	4539	58	2.56	0.15	0.04	0.06	3	60	0
BD+20 3603	0649	6115		4.10		–2.10				2,46
HD 164058	0650	3990	29	1.64	0.18	0.11	0.05	3	53	0
HD 163990	0651	3203	54	0.34	0.43	–0.10	0.25	–10	58	0
HD 163993	0652	5091	39	2.87	0.09	0.09	0.04	10	57	0
HD 164136	0653	7140	98	3.87	0.08	0.00	0.06	–1	50	0
HD 164349	0654	4623	62	1.76	0.13	–0.01	0.07	–16	60	0
HD 164353	0655	15600		2.55		–0.03				10,17
HD 164432	0656	21371	958	3.81	0.13	–0.02	0.08	–8	51	0
HD 165195	0657	4401	81	0.86	0.18	–2.19	0.08	–2	61	0
HD 164975	0658	5863	47	1.22	0.09	0.06	0.05	–11	62	0
HD 165341	0659	5349	70	4.58	0.12	0.16	0.07	–22	58	0
HD 165438	0660	4868	61	3.43	0.13	0.02	0.06	–4	60	0
HD 165908	0661	6045	50	4.19	0.08	–0.50	0.05	–24	61	0
HD 166208	0662	5107	79	2.73	0.18	0.15	0.08	–19	60	0
HD 165634	0663	4907	60	2.31	0.14	–0.14	0.07	–7	55	0
HD 166620	0664	4968	65	4.55	0.11	–0.18	0.07	–28	59	0
HD 166161	0665	5201	94	2.33	0.23	–1.25	0.12	–27	62	0

Table 1. continued.

Name	Miles[a]	$T_{\rm eff}$	Error	log(g)	Error	[Fe/H]	Error	cz[b]	σ[c]	References
		(K)		(cm s^{-2})		(dex)				
HD 166285	0666	6389	51	4.10	0.07	–0.06	0.04	10	56	0
HD 166460	0667	4540	71	2.29	0.18	0.05	0.08	–18	62	0
HD 167105	0668	9000		2.36		–1.50				4,27
HD 167006	0669	3535	24	0.99	0.29	–0.08	0.10	–5	53	0
HD 167768	0670	4953	73	2.29	0.18	–0.69	0.09	–5	54	0
HD 169027	0671	11030	307	3.89	0.14	–0.08	0.12	12	49	0
HD 168322	0672	4780	59	2.39	0.15	–0.45	0.07	–2	57	0
HD 167665	0673	6125	42	4.15	0.07	–0.16	0.04	1	60	0
HD 168720	0674	3797	36	1.57	0.34	–0.05	0.11	–10	56	0
HD 168723	0675	4923	63	3.00	0.15	–0.22	0.07	–15	58	0
HD 168608	0676	5580	38	1.00	0.07	0.03	0.04	–1	56	0
HD 170693	0677	4447	51	2.19	0.15	–0.37	0.06	12	55	0
HD 169985	0678	6249	113	3.84	0.19	0.36	0.07	13	64	0
HD 170737	0679	5093	57	3.36	0.13	–0.77	0.06	–8	54	0
HD 234677	0680	4226	60	4.30	0.13	–0.07	0.09	11	61	0
HD 171391	0681	5150	51	2.89	0.12	0.04	0.05	1	55	0
HD 171443	0682	4263	51	2.21	0.19	0.01	0.07	13	54	0
HD 171496	0683	4978	73	2.29	0.18	–0.69	0.09	–2	58	0
HD 171999	0684	5276	76	4.35	0.14	0.27	0.07	4	57	0
HD 172380	0685	3228	47	0.56	0.40	–0.24	0.25	–4	57	0
HD 172103	0686	6815	65	4.01	0.06	0.03	0.04	14	55	0
HD 172365	0687	5886	49	1.28	0.10	0.05	0.05	–3	60	0
HD 172958	0688	11464	396	3.97	0.18	0.02	0.17	–25	95	0
HD 173524	0689	11323	519	3.93	0.27	0.10	0.23	–11	179	0
HD 173740	0690	3419	65	4.76	0.25	–1.09	0.56	–3	58	0
HD 172816	0691	3196	52	0.60	0.49	–0.34	0.33	–3	57	0
HD 173093	0692	6373	50	4.11	0.07	–0.00	0.04	10	55	0
HD 173648	0693	7914	112	3.70	0.10	0.38	0.06	0	56	0
HD 173650	0694	11832	376	3.71	0.26	0.64	0.13	–21	62	0
HD 173667	0695	6458	50	4.04	0.07	0.01	0.04	5	56	0
HD 175305	0696	5036	71	2.51	0.19	–1.44	0.08	–35	56	0
HD 173819	0697	4278	123	0.25	0.21	–0.86	0.15	–27	57	0
HD 174567	0698	10256	300	3.95	0.14	–0.07	0.11	13	44	0
HD 174912	0699	5936	42	4.34	0.07	–0.45	0.04	–1	58	0
HD 175225	0700	5286	40	3.70	0.09	0.20	0.04	9	59	0
HD 174959	0701	18073	1942	3.41	0.44	0.29	0.21	–43	275	0
HD 174704	0702	7193	118	3.63	0.13	0.79	0.06	10	51	0
HD 175535	0703	5197	66	2.85	0.15	–0.07	0.07	0	57	0
HD 175588	0704	3382	29	0.55	0.25	–0.06	0.12	–31	57	0
HD 175865	0705	3181	52	0.47	0.47	–0.29	0.33	3	58	0
HD 175640	0706	12077	453	3.94	0.21	0.17	0.15	29	54	0
HD 178089	0707	6722	53	4.07	0.05	–0.09	0.04	8	55	0
HD 175892	0708	8705	147	4.11	0.09	–0.29	0.08	–10	44	0
HD 176301	0709	12667	521	4.18	0.13	0.18	0.16	–4	73	0
HD 176232	0710	8743	163	4.47	0.12	0.53	0.12	12	71	0
HD 176437	0711	11226	377	4.11	0.12	0.09	0.16	5	63	0
HD 177463	0712	4660	42	2.35	0.11	–0.19	0.05	4	56	0
HD 180711	0713	4837	44	2.49	0.11	–0.18	0.05	3	57	0
HD 179761	0714	12746	372	4.22	0.09	0.30	0.12	–29	66	0
HD 180163	0715	18663	725	3.69	0.14	0.04	0.09	3	47	0
HD 181096	0716	6347	46	4.03	0.07	–0.17	0.04	–14	59	0
HD 180928	0717	4069	41	1.94	0.21	–0.53	0.09	–5	53	0
HD 181470	0718	9802	297	3.91	0.13	–0.13	0.14	–22	57	0
HD 182293	0719	4457	70	2.85	0.19	0.04	0.08	0	59	0
HD 187216	0720	3950		0.75		–1.70				11,26
HD 182572	0721	5473	47	3.91	0.10	0.34	0.04	–19	60	0
HD 183324	0722	10325		4.17		–1.24				1
CD–24 15398	0723	6269		2.93		–1.17				2,22
HD 185144	0724	5293	62	4.56	0.11	–0.12	0.06	–23	60	0
HD 338529	0725	6178	44	3.95	0.06	–2.09	0.06	4	75	0
HD 184499	0726	5743	45	4.07	0.09	–0.54	0.05	7	60	0
HD 184786	0727	3306	31	0.60	0.26	0.01	0.12	–10	56	0
HD 184406	0728	4451	78	2.83	0.21	0.09	0.09	–15	58	0
HD 185351	0729	5045	61	3.27	0.14	0.08	0.06	2	58	0
HD 185657	0730	4868	59	2.61	0.14	–0.16	0.07	2	54	0
HD 232078	0731	4014	48	0.81	0.20	–1.22	0.11	–10	56	0
HD 185859	0732	26200		3.05		–0.09				1,14,15
HD 186408	0733	5731	43	4.15	0.08	0.08	0.04	–8	58	0
HD 186427	0734	5648	40	4.18	0.08	0.03	0.04	2	58	0
HD 188119	0735	4904	77	2.34	0.19	–0.49	0.09	1	54	0
HD 187111	0736	4455	91	1.05	0.23	–1.67	0.12	–7	61	0
HD 187879	0737	21004	1827	3.14	0.16	0.05	0.12	0	52	0
HD 187691	0738	6099	66	4.12	0.11	0.14	0.05	–22	58	0
HD 187921	0739	5502	56	0.68	0.07	0.10	0.04	8	55	0

Table 1. continued.

Name	Miles[a]	$T_{\rm eff}$ (K)	Error	log(g) (cm s^{-2})	Error	[Fe/H] (dex)	Error	cz[b]	σ[c]	References
HD 188041	0740	9506	449	3.91	0.42	1.00		13	62	0
HD 188650	0741	5184	93	2.01	0.21	–0.81	0.13	16	56	0
HD 188510	0742	5539	43	4.28	0.08	–1.43	0.06	–26	63	0
HD 188512	0743	5082	69	3.48	0.15	–0.22	0.07	–1	57	0
HD 188727	0744	6240	88	1.00	0.11	0.13	0.06	–5	57	0
HD 188947	0745	4828	56	2.62	0.13	0.06	0.06	6	58	0
HD 189005	0746	5080	53	2.32	0.13	–0.26	0.06	–1	57	0
HD 189558	0747	5770	57	3.92	0.11	–1.04	0.07	–13	61	0
HD 189849	0748	7804	92	3.89	0.07	–0.01	0.06	–11	47	0
HD 190360	0749	5468	40	4.11	0.08	0.21	0.04	23	60	0
HD 190404	0750	5008	68	4.51	0.13	–0.58	0.08	–30	62	0
HD 190603	0751	19500		2.36		0.07				14,15,21
HD 190178	0752	6263	63	4.05	0.09	–0.66	0.06	–7	60	0
HD 190390	0753	6440		1.55		–1.05				2
HD 191026	0754	5177	43	3.81	0.09	0.08	0.04	–1	59	0
HD 191046	0755	4452	68	1.65	0.19	–0.68	0.09	6	57	0
HD 192907	0756	10444	262	3.97	0.11	–0.18	0.11	39	44	0
HD 345957	0757	5988	54	4.06	0.08	–1.20	0.06	26	61	0
HD 192577	0758	4186	75	1.23	0.25	0.03	0.10	–9	56	0
HD 192640	0759	8774	113	4.42	0.09	–0.80	0.14	–7	105	0
HD 192909	0760	3978	46	1.03	0.22	0.06	0.08	8	54	0
HD 193281	0761	8597	218	4.11	0.14	–0.37	0.13	–12	47	0
HD 194598	0762	6090	47	4.24	0.07	–1.04	0.06	–27	64	0
HD 194943	0763	6971	69	4.04	0.06	–0.01	0.05	–2	68	0
HD 196502	0764	9417	432	3.58	0.44	0.74	0.18	13	62	0
HD 195633	0765	6119	44	4.09	0.07	–0.52	0.04	–7	61	0
HD 195838	0766	6152	42	4.08	0.07	0.00	0.03	7	57	0
HD 196544	0767	8678	203	3.80	0.16	–0.12	0.10	20	44	0
HD 196755	0768	5582	31	3.64	0.07	–0.02	0.03	20	60	0
HD 197177	0769	4964	44	1.92	0.10	–0.03	0.05	14	55	0
HD 197572	0770	5188	65	0.83	0.09	0.15	0.06	–15	53	0
HD 197461	0771	7334	73	4.02	0.06	–0.07	0.05	6	53	0
HD 198149	0772	4970	47	3.29	0.11	–0.19	0.05	–13	58	0
HD 197989	0773	4748	47	2.52	0.11	–0.17	0.05	–8	59	0
HD 197964	0774	4762	53	2.93	0.12	0.15	0.05	3	57	0
HD 198183	0775	15630	534	3.81	0.17	0.05	0.13	–3	74	0
HD 198001	0776	9266	255	4.00	0.10	–0.32	0.11	–6	48	0
BD+04 4551	0777	6089	44	4.21	0.06	–1.26	0.06	19	61	0
HD 198478	0778	16500		2.17		–0.21				10,14,15
HD 199191	0779	4779	72	2.66	0.19	–0.63	0.08	–3	53	0
HD 199478	0780	11200		1.90						2
HD 199799	0781	3251	80	0.41	0.61	–0.11	0.35	0	59	0
HD 200527	0782	3386	34	0.67	0.32	0.01	0.13	–13	54	0
HD 200580	0783	6003	45	4.34	0.07	–0.50	0.05	7	58	0
HD 200905	0784	4031	40	0.89	0.18	0.15	0.07	14	53	0
HD 200779	0785	4214	47	4.61	0.11	–0.01	0.07	–6	58	0
HD 200790	0786	6115	37	3.98	0.07	0.02	0.03	5	57	0
HD 201078	0787	6151	49	1.85	0.12	0.09	0.05	2	54	0
HD 201091	0788	4242	53	4.70	0.11	–0.38	0.08	–3	60	0
HD 201601	0789	8790	192	4.49	0.17	0.78	0.14	–9	77	0
HD 201891	0790	5881	39	4.18	0.07	–1.05	0.05	0	57	0
HD 201889	0791	5762	42	4.13	0.08	–0.74	0.05	5	57	0
HD 202109	0792	4925	84	2.39	0.20	–0.23	0.10	–15	58	0
HD 202447	0793	6277	104	4.01	0.16	0.26	0.06	27	60	0
HD 202671	0794	14353	598	3.25	0.20	0.36	0.17	13	80	0
HD 203638	0795	4613	75	2.61	0.18	0.17	0.08	–2	56	0
HD 204041	0796	8737	129	4.45	0.09	–0.44	0.12	–18	83	0
HD 204075	0797	5397	82	1.48	0.16	–0.14	0.10	–4	60	0
HD 204155	0798	5718	56	3.93	0.11	–0.69	0.06	29	59	0
HD 204613	0799	5718	49	3.88	0.09	–0.38	0.04	1	55	0
HD 205021	0800	25500		3.70		–0.10				1,2,6,10
HD 204381	0801	5081	64	2.76	0.16	–0.09	0.07	–6	57	0
HD 204754	0802	12610	373	4.20	0.10	0.30	0.13	–28	54	0
HD 204543	0803	4617		1.31		–1.76				0,2
HD 204587	0804	4065	59	4.60	0.15	–0.21	0.11	–35	57	0
HD 205435	0805	5069	60	2.86	0.14	–0.12	0.07	–7	57	0
HD 205153	0806	6005	66	4.02	0.12	0.07	0.05	13	67	0
HD 205512	0807	4732	61	2.60	0.15	0.03	0.06	0	57	0
HD 206078	0808	4809	67	2.63	0.17	–0.53	0.07	–6	53	0
HD 206165	0809	19300		2.65		–0.27				1,3,14,15
HD 206952	0810	4701	78	2.70	0.19	0.21	0.08	–21	58	0
HD 206453	0811	5026	61	2.34	0.15	–0.41	0.07	3	60	0
HD 207130	0812	4783	41	2.69	0.10	0.12	0.04	11	59	0
HD 206826	0813	6490	50	4.09	0.06	–0.11	0.04	8	53	0

Table 1. continued.

Name	Miles[a]	$T_{\rm eff}$	Error	log(g)	Error	[Fe/H]	Error	cz[b]	σ[c]	References
		(K)		(cm s^{-2})		(dex)				
HD 206778	0814	4238	57	0.84	0.13	0.11	0.07	16	54	0
HD 207260	0815	9911	209	1.57	0.06	0.27	0.10	2	58	0
HD 207076	0816	2750								2
HD 207330	0817	20815	1057	3.69	0.16	0.04	0.09	–22	54	0
HD 207222	0818	9230	316	4.01	0.12	–0.36	0.15	–24	55	0
HD 207673	0819	10482	297	1.87	0.08	0.16	0.14	21	63	0
HD 208501	0820	16477	1160	2.80	0.17	0.05	0.18	–12	52	0
HD 208906	0821	6048	43	4.27	0.07	–0.68	0.05	0	60	0
HD 209369	0822	6632	54	4.06	0.06	–0.04	0.04	14	55	0
HD 209459	0823	11015	301	3.99	0.12	–0.07	0.13	–24	47	0
HD 209975	0824	32983	1428	3.40	0.08	0.06	0.08	46	44	0
HD 210295	0825	4898	82	2.29	0.22	–1.23	0.09	–20	54	0
HD 210424	0826	12771	443	4.21	0.11	0.22	0.14	–17	72	0
HD 210745	0827	4340	74	0.88	0.15	0.12	0.08	21	51	0
HD 210595	0828	6639	70	4.11	0.07	–0.47	0.06	15	54	0
HD 210705	0829	6939	72	4.16	0.06	–0.18	0.05	–29	61	0
HD 211075	0830	4364	80	1.96	0.25	–0.31	0.11	8	54	0
HD 212454	0831	14466	614	3.33	0.22	0.35	0.18	0	74	0
HD 212943	0832	4676	56	2.75	0.14	–0.24	0.06	–13	60	0
HD 213119	0833	3936	31	1.51	0.21	–0.07	0.07	–4	53	0
HD 213307	0834	7800		2.00		0.20				0a
HD 213042	0835	4514	54	4.51	0.10	0.16	0.06	–20	58	0
HD 213470	0836	8943	103	1.36	0.05	0.11	0.08	17	60	0
HD 214080	0837	23445	3214	3.28	0.20	0.04	0.12	0	53	0
G 156-031	0838	2700		5.09						2,18
HD 214567	0839	4997	53	2.62	0.13	–0.23	0.06	14	59	0
HD 214714	0840	5224	74	2.03	0.17	–0.67	0.10	–6	57	0
HD 214994	0841	9373	303	3.73	0.23	–0.14	0.12	21	44	0
BD+39 4926	0842	7261		0.85		–2.52				2
HD 215648	0843	6243	44	4.03	0.07	–0.21	0.04	5	57	0
HD 216228	0844	4780	51	2.54	0.12	0.01	0.05	–6	60	0
HD 216174	0845	4385	54	1.87	0.17	–0.50	0.07	–5	57	0
HD 216131	0846	4999	43	2.70	0.10	–0.07	0.05	–11	60	0
HD 216143	0847	4693	79	1.48	0.20	–1.96	0.09	0	58	0
HD 216219	0848	5637	58	3.10	0.13	–0.36	0.06	–2	61	0
HD 216385	0849	6323	41	4.06	0.06	–0.15	0.03	–4	61	0
HD 217382	0850	4126	56	2.06	0.27	0.11	0.09	9	54	0
HD 216640	0851	4650	57	3.19	0.13	0.20	0.06	–7	58	0
HD 216831	0852	13207	742	3.05	0.21	0.05	0.21	13	80	0
HD 216916	0853	21500		3.75		–0.12				2,3
HD 217014	0854	5674	38	4.14	0.07	0.18	0.03	0	59	0
HD 217107	0855	5523	35	4.11	0.07	0.33	0.03	5	55	0
HD 217754	0856	7089	86	3.80	0.08	0.27	0.05	8	51	0
HD 218031	0857	4743	52	2.46	0.13	–0.16	0.06	5	57	0
HD 218235	0858	6463	67	4.06	0.09	0.23	0.04	9	60	0
HD 218329	0859	3796	41	1.63	0.36	0.17	0.10	–11	56	0
HD 218502	0860	6167	49	4.11	0.06	–1.75	0.07	–7	66	0
HD 218640	0861	5799	60	3.26	0.14	0.36	0.05	22	60	0
HD 218804	0862	6493	58	4.17	0.07	–0.13	0.04	4	57	0
HD 218857	0863	5057	83	2.43	0.22	–1.93	0.09	–3	59	0
HD 219134	0864	4715	44	4.57	0.07	0.06	0.04	–13	59	0
HD 219116	0865	4790	106	1.79	0.26	–0.79	0.14	3	62	0
BD+38 4955	0866	5270	52	3.50	0.11	–2.23	0.06	0	67	0
HD 219449	0867	4696	45	2.59	0.11	0.03	0.05	10	57	0
HD 219623	0868	6138	42	4.24	0.07	0.07	0.03	0	60	0
HD 219617	0869	5941	55	4.12	0.08	–1.36	0.07	16	67	0
HD 219615	0870	4890	86	2.42	0.21	–0.57	0.10	15	60	0
HD 219734	0871	3616	22	1.00	0.25	0.04	0.08	2	57	0
HD 219916	0872	5070	49	2.84	0.12	–0.04	0.05	1	58	0
HD 219978	0873	3951	55	0.57	0.18	0.22	0.08	0	51	0
HD 220009	0874	4314	80	1.81	0.28	–0.71	0.12	3	57	0
HD 220575	0875	12241	402	4.09	0.13	0.27	0.15	24	55	0
BD+59 2723	0876	5987	51	3.98	0.07	–1.89	0.07	13	77	0
HD 220825	0877	10228	375	3.71	0.34	0.78	0.14	5	69	0
HD 220933	0878	10515	357	3.72	0.28	–0.06	0.17	36	52	0
HD 220954	0879	4731	46	2.61	0.11	0.07	0.05	1	59	0
HD 221170	0880	4557	67	1.15	0.16	–2.05	0.07	–8	58	0
HD 221148	0881	4653	58	3.32	0.12	0.36	0.05	8	53	0
HD 221345	0882	4685	56	2.41	0.14	–0.29	0.06	–4	57	0
HD 221377	0883	6553	52	4.20	0.05	–0.60	0.05	–7	59	0
BD+19 5116B	0884	3200		5.06		0.09				2,13,23
HD 221756	0885	8833	111	4.21	0.08	–0.64	0.10	0	64	0
HD 221830	0886	5719	37	4.09	0.07	–0.40	0.04	0	57	0
HD 222404	0887	4782	54	3.25	0.12	0.11	0.05	7	55	0

Table 1. continued.

Name	Miles[a]	$T_{\rm eff}$	Error	log(g)	Error	[Fe/H]	Error	cz[b]	σ[c]	References
		(K)		(cm s^{-2})		(dex)				
HD 222368	0888	6231	53	4.14	0.08	–0.08	0.04	8	57	0
HD 222451	0889	6698	73	4.07	0.08	0.10	0.05	17	59	0
G 171–010	0890	2799		5.12						2
HD 223047	0891	5002	50	1.26	0.09	0.04	0.05	16	56	0
HD 223385	0892	10023	227	1.59	0.07	0.29	0.12	28	61	0
HD 223524	0893	4611	62	2.59	0.15	0.08	0.06	–16	56	0
HD 223640	0894	12429	435	3.93	0.23	0.73	0.13	–9	62	0
HD 224458	0895	4819	67	2.29	0.17	–0.44	0.08	9	57	0
BD+61 2575	0896	6973	121	0.86	0.10	0.15	0.07	–19	57	0
NGC 288 77	0897	4320	77	1.23	0.24	–1.07		–4	56	0
HD 020902	0898	6690	94	1.31	0.11	–0.05		4	59	0
Mel 22 0296	0899	5196	56	4.25	0.14	–0.03		–3	60	0
Mel 22 2462	0900	5219	47	4.47	0.11	–0.03		–11	59	0
HD 025825	0901	6005	30	4.38	0.06	0.13		3	55	0
HD 026736	0902	5772	27	4.39	0.06	0.13		2	56	0
HD 284253	0903	5283	29	4.47	0.07	0.13		0	57	0
HD 027383	0904	6091	37	4.34	0.07	0.13		5	59	0
HD 027524	0905	6580	47	4.14	0.06	0.13		13	71	0
HD 027561	0906	6682	51	4.14	0.06	0.13		11	62	0
HD 027962	0907	8809	139	3.80	0.15	0.13		–14	52	0
HD 028483	0908	6455	42	4.25	0.06	0.13		7	62	0
HD 028546	0909	7490	75	3.85	0.07	0.13		9	56	0
HD 029375	0910	7240	67	3.93	0.07	0.13		15	83	0
HD 030034	0911	7446	64	3.91	0.06	0.13		23	70	0
HD 030210	0912	7694	124	3.66	0.13	0.13		24	51	0
HD 030676	0913	6104	35	4.37	0.06	0.13		3	60	0
HD 031236	0914	7262	64	3.93	0.06	0.13		18	76	0
NGC 1904 153	0915	4394	97	1.07	0.24	–1.37		10	57	0
NGC 1904 160	0916	4379	109	1.02	0.27	–1.37		7	58	0
NGC 1904 223	0917	4253	89	0.86	0.23	–1.37		–4	59	0
NGC 2420 140	0918	4362	41	1.68	0.14	–0.44		1	56	0
NGC 2682 108	0919	4186	52	2.16	0.26	–0.09		10	57	0
HD 107276	0920	7969	103	3.99	0.09	–0.05		28	65	0
HD 107513	0921	7360	113	3.99	0.10	–0.05		7	57	0
HD 109307	0922	8162	96	3.91	0.12	–0.05		1	44	0
Cl* NGC 5272 S I-IV-25	0923	4525	80	1.28	0.20	–1.34		–1	54	0
Cl* NGC 5272 S I-III-28	0924	4374	65	0.99	0.16	–1.34		–13	55	0
NGC 5272 398	0925	4648	100	1.43	0.26	–1.34		–5	58	0
Cl* NGC 5904 ARP III-03	0926	4266	79	0.94	0.20	–1.11		–7	54	0
Cl* NGC 5904 ARP II-51	0927	6115	368	3.84	0.71	–1.11		20	52	0
Cl* NGC 5904 ARP II-76	0928	5974		2.44		–1.11				2
Cl* NGC 5904 ARP II-53	0929	9441		2.43		–1.11				2
Cl* NGC 5904 ARP IV-19	0930	4278	77	1.07	0.22	–1.11		14	57	0
Cl* NGC 5904 ARP IV-86	0931	5576		2.44		–1.11				2
Cl* NGC 5904 ARP IV-87	0932	5965	323	3.80	0.70	–1.11		–20	61	0
Cl* NGC 6121 LEE 2303	0933	6748		2.51		–1.19				2
Cl* NGC 6205 SAV A171	0934	4250		1.00		–1.39				0a
Cl* NGC 6205 SAV B786	0935	4170	80	0.72	0.20	–1.39		–8	52	0
NGC 6341 4114	0936	4844	112	1.77	0.30	–2.16		3	58	0
NGC 6341 3013	0937	4261	64	0.70	0.13	–2.16		–8	56	0
HD 170764	0938	5802	50	0.99	0.07	0.17		–4	55	0
HD 170820	0939	4707	57	1.65	0.13	0.17		–2	59	0
Cl* NGC 6791 GVZH R4	0940	3228	82	0.17	0.55	0.40		–11	71	0
Cl* NGC 6791 GVZH R5	0941	3160		1.00		0.40				0,0b,2
Cl* NGC 6791 GVZH R16	0942	3925	66	2.01	0.42	0.40		–8	56	0
Cl* NGC 6791 GVZH R19	0943	3961	74	2.06	0.45	0.40		2	58	0
Cl* NGC 6838 AH A9	0944	4382	85	1.43	0.26	–0.84		2	57	0
NGC 6838 1109	0945	4714	145	2.31	0.50	–0.84		–1	53	0
NGC 6838 1095	0946	4509	67	1.53	0.18	–0.84		–7	58	0
NGC 6838 1107	0947	4848	75	2.07	0.25	–0.84		–12	57	0
NGC 6838 1075	0948	4777	139	2.53	0.48	–0.84		3	57	0
NGC 6838 1073	0949	4788	179	2.35	0.60	–0.84		28	59	0
Cl* NGC 6838 KC 147	0950	4819	153	2.57	0.51	–0.84		–37	61	0
NGC 6838 1071	0951	4355	101	1.66	0.37	–0.84		27	57	0
Cl* NGC 6838 KC 263	0952	4157	82	1.40	0.33	–0.84		–21	56	0
NGC 6838 1087	0953	4988	77	2.19	0.27	–0.84		–16	57	0
NGC 6838 1066	0954	4193	70	1.44	0.29	–0.84		–9	57	0
NGC 6838 1065	0955	4622	106	2.02	0.35	–0.84		11	56	0
NGC 6838 1064	0956	4476	97	1.70	0.30	–0.84		–6	57	0
NGC 6838 1063	0957	4648	91	1.72	0.28	–0.84		–7	58	0
NGC 6838 1021	0958	4446	79	1.42	0.21	–0.84		–5	56	0
NGC 6838 1037	0959	4529	106	2.01	0.35	–0.84		3	56	0
NGC 6838 1041	0960	5020	79	2.26	0.28	–0.84		–14	57	0
NGC 6838 1009	0961	4766	121	2.14	0.41	–0.84		–11	57	0

Table 1. continued.

Name	Miles[a]	$T_{\rm eff}$ (K)	Error	log(*g*) (cm s^{-2})	Error	[Fe/H] (dex)	Error	cz[b]	σ[c]	References
NGC 6838 1039	0962	5020	80	2.26	0.28	–0.84		–14	57	0
NGC 6838 1034	0963	5114	89	2.35	0.30	–0.84		–15	56	0
NGC 6838 1053	0964	4659	89	1.74	0.26	–0.84		–7	58	0
Cl* NGC 6838 KC 169	0965	5083	93	2.22	0.31	–0.84		–3	60	0
Cl* NGC 6838 AH A2	0966	4679	124	2.21	0.42	–0.84		0	56	0
NGC 6838 1077	0967	4090	99	1.82	0.58	–0.84		7	50	0
NGC 6838 1078	0968	3981	61	1.69	0.34	–0.84		–9	51	0
Cl* NGC 6838 AH S	0969	4214	70	1.19	0.24	–0.84		–1	54	0
Cl* NGC 6838 AH X	0970	3980	57	1.43	0.29	–0.84		4	51	0
Cl* NGC 6838 AH I	0971	4190	65	1.30	0.25	–0.84		4	52	0
NGC 7789 329	0972	5043	40	2.30	0.14	–0.13		16	55	0
NGC 7789 468	0973	4128	46	1.60	0.23	–0.13		–2	54	0
NGC 7789 342	0974	10968	574	3.85	0.34	–0.13		–31	59	0
NGC 7789 353	0975	4482	55	2.16	0.18	–0.13		0	56	0
NGC 7789 415	0976	3809	29	1.21	0.25	–0.13		–19	53	0
NGC 7789 461	0977	4085	45	1.68	0.25	–0.13		18	53	0
NGC 7789 501	0978	4040	38	1.61	0.23	–0.13		9	54	0
NGC 7789 575	0979	4515	61	2.05	0.19	–0.13		9	54	0
NGC 7789 637	0980	4812	42	2.37	0.14	–0.13		–8	54	0
NGC 7789 765	0981	4333	43	1.91	0.16	–0.13		7	56	0
NGC 7789 859	0982	4579	53	2.26	0.17	–0.13		–4	57	0
NGC 7789 875	0983	4861	54	2.56	0.18	–0.13		2	57	0
NGC 7789 897	0984	4918	43	2.50	0.15	–0.13		5	57	0
NGC 7789 971	0985	3737	24	1.20	0.25	–0.13		–26	54	0

Notes. [a] Identification number in (Cenarro et al. 2007). [b] Mean residual velocity shift resulting from the fit to the ELODIE interpolator. The shift may not be uniform throughout the spectrum, because of uncertainties in the wavelength calibration of MILES. [c] Gaussian width of the absolute LSF at 5300 Å. It includes the (variable) instrumental broadening and the physical broadening (rotation). [d] The references are coded as: (0): This work; (0a): This work (interactive fit); (0b): This work (using the MILES interpolator); (1): Wu et al. (2011); (2): Cenarro et al. (2007); (3): ELODIE 3.2, unpublished (4): For & Sneden (2010); (5): Ryde et al. (2010); (6): Lefever et al. (2010); (7): Takeda et al. (2010); (8): Arellano Ferro (2010); (9): Geier et al. (2009); (10): Zorec et al. (2009); (11): Barzdis et al. (2009); (12): Hrivnak et al. (2008); (13): Morales et al. (2008); (14): Markova & Puls (2008); (15): Searle et al. (2008); (16): Saffe et al. (2008); (17): Thompson et al. (2008); (18): Casagrande et al. (2008); (19): Kipper (2007); (20): Kovtyukh (2007); (21): Crowther et al. (2006); (22): Wu et al. (2006); (23): Bonfils et al. (2005); (24): Nordström et al. (2004); (25): Adelman et al. (2002); (26): Bergeat et al. (2001); (27): Castelli & Cacciari (2001); (28): Trundle et al. (2001); (29): Mishenina et al. (2000); (30): Kinman et al. (2000); (31): Adelman (1998); (32): Wylie-de Boer & Cottrell (2009); (33): Giridhar et al. (2010); (34): Takeda et al. (2009); (35): Kovtyukh et al. (2008); (36): Turner et al. (2009); (37): Woolf & Wallerstein (2005); (38): Houdebine (2008); (39): Blanchette et al. (2008); (40): Ishigaki et al. (2010); (41): Zhang et al. (2009); (42): Roederer et al. (2010); (43): Barbuy et al. (2003); (44): Simmerer et al. (2004); (45): Aoki et al. (2007); (46): Honda et al. (2004); (46): Rich & Boesgaard (2009); (47): Meléndez & Barbuy (2009); (48): Lai et al. (2008); (49): Arnone et al. (2005); (50): Beers et al. (1999); (51): Holmberg et al. (2007); (52): Reddy & Lambert (2008); (53): Zhang & Zhao (2005); (54): Stephens & Boesgaard (2002).