EU ABUNDANCES IN ACTIVE AND NON-ACTIVE STARS

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ABSTRACT. Eu abundances have been determined for stars observed at high resolution, high signal to noise ratio with the ELODIE spectrograph at the 1.93-m telescope of the Observatoire de Haute Provence (France). Among them more than 30 stars are active stars with a fraction of BY Dra and RS CVn type stars for which spectral pecularities were investigated. For all stars fundamental parameters were determined earlier. We find the mean abundances of the majority of elements in active and non-active stars. Active and non active cool dwarfs show similar dependencies of elemental ratios vs [Fe/H].

Key words: Stars: fundamental parameters; stars: Eu abundances.

1. Introduction

Studying of the 75 stars of the lower part of the Main Sequence it was found about 30 active stars (BY Dra type) and the difference in Li abundance for active and non active stars (Mishenina et al.2008). We continue the chemical abundance investigation of these stars and have turned our attention to the elements of neutron capture. The aim of this paper is to provide Eu abundances with a high accuracy for a large sample of cool main sequence stars. We present the abundance determination of Eu and the analysis of abundance trends.

2. Observations and stellar parameters.

The spectra of stars were obtained in the region of the lambda 4400-6800 ÅÅand with S/N about 100-350 using the 1.93 mtelescope at the Observatoire de Haute-Provence (OHP, France) equipped with the echelle-spectrograph ELODIE (Barrane et al., 1996) , resolving power is R = 42000. The spectral processing carried out by (Katz et al., 1998; Galazutdinov, 1992).

3. Atmospheric parameters and abundance determination.

For all stars fundamental parameters were determined earlier (Mishenina et al. 2008) Effective temperatures Teff were estimated by the line depth ratio method (Kovtyukh et al. 2003). Surface gravities lg g were determined by two methods: parallaxes and ionization balance of iron. Determination of the Eu abundance was made by STARSP LTE spectral synthesis code (Tsymbal, 1996) from the EuII subordinate line 6645 A with taken into account the hyperfine structure. Recent NLTE calculation for EuII have been carried out by Mashonkina et al., (2000). For Eu 6645 A the correction NLTE ranges from 0.04 dex to 0.06 dex. The example of comparison of synthetic and observed spectra for Eu line is shown in Fig.1 Three synthetic spectra with different Eu abundances, in steps of 0.05 dex have been plotted for each line.

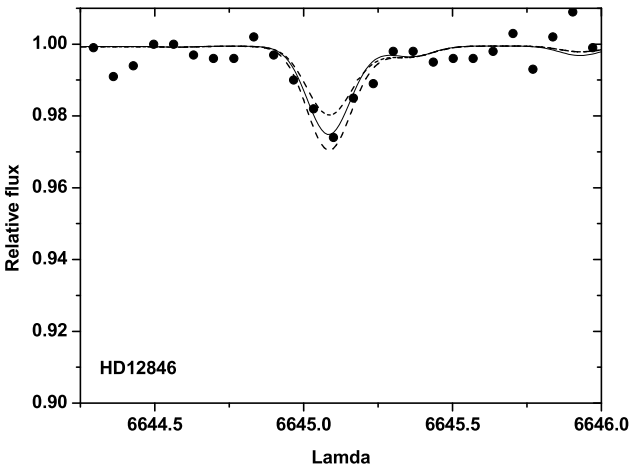

Figure 1: Synthetic LTE (continuous line) flux profiles of the Eu II line compared with the observed spectrum (bold dots).

4. Results and conclusions

Comparison of the behavior of Eu abundance in active (black circles) and non active (red circles) stars captures in the region of metallicities from [Fe/H] = -0.7 to [Fe/H] = +0.4 was presented in Fig. 2. The abundance of europium show appreciable trend with [Fe/H] (the increase of the relative abundance [El/Fe] at the low metallicity). We observe in our sample of stars the trend of [Eu/Fe] vs. [Fe/H] similar to the

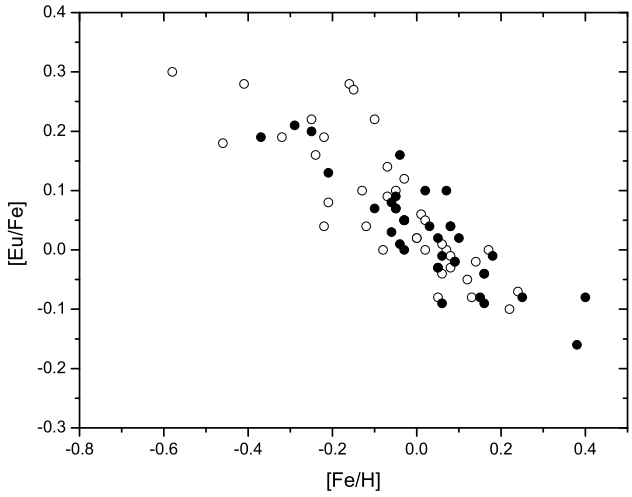

Figure 2: The run of [Eu/Fe] with [Fe/H]. Active stars are marked as filled circles, and non active stars as open circles

those for stars studied in our early works and works of other authors. As can see from the figure active and non active cool dwarfs show similar dependencies of elemental ratios vs [Fe/H]. The mean values of [Eu/Fe] for non activ stars is 0.06 ±0.1 and for activ stars is 0.03 ±0.09.

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