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Lithium in Post T Tauri Stars [1]

G. R. Quast and C. A. O. Torres

Laboratório Nacional de Astrofísica/MCT, CP 21, 37504-360 Itajubá, MG, Brazil

R. de la Reza and L. da Silva

Observatório Nacional/MCT, Rua General José Cristino 77, 20921-030, Rio de Janeiro, Brazil

Abstract. We analyze the Li depletion in the PTT-gap proposed by Martín (1997) using the young stars, with ages between 10 and 100 Myr, recently discovered by us during a survey around isolated T Tau stars.

1. Introduction

Martín (1997) proposed that the low-mass Post-T Tau stars (PTTS) should have Lithium equivalent widths (W_{Li}) between those of typical T Tau stars (TTS) and those of young main sequence stars of the Local Association – the PTT-gap. In X-ray surveys he found that ∼15% of the X-ray stars are within this gap. We analyze the W_{Li} in the young associations found around the isolated TTS ER Eri [2], TW Hya and V4046 Sgr and also in two control areas where no TTS is known. The observational set-up is described in Torres et al. (2000).

2. The three New Nearby Associations

The TW Hya Association (TWA) – The first members of this group were found using as indicator IRAS sources (de la Reza et al., 1989; Gregorio-Hetem et al., 1992). Having now 21 stars, TWA is at a mean distance of 45 pc and has an age of ∼10 Myr (Webb et al., 1999; Torres et al., 2000).
The Horologium Association (HorA) – This association, recently found by us using as indicator ROSAT sources (Torres et al., 2000), has 16 probable or possible members, is at a mean distance of ∼60 pc and has an age of ∼30 Myr.
The V4046 Sgr Association (VSA) – We found, using again ROSAT, 5 young stars around V4046 Sgr possibly associated with it. If these 6 stars form a new nearby - but somewhat loose - association (∼100 pc), the age would be ∼15 Myr.

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[1] Based on observations made under the Observatório Nacional-ESO agreement for the joint operation of the 1.52 m ESO telescope and at the Observatório do Pico dos Dias, operated by MCT/Laboratório Nacional de Astrofísica, Brazil

[2] Actually, ER Eri was later identified as a RS CVn star

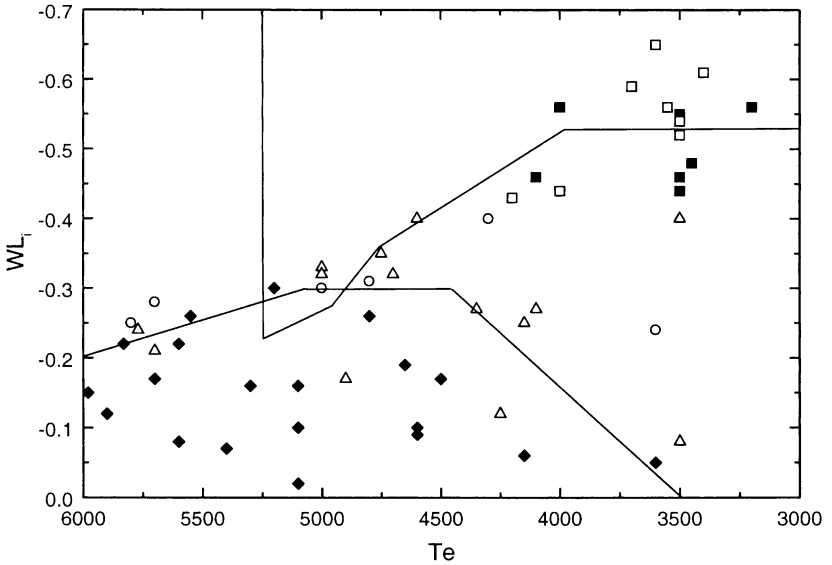

Figure 1. W_{Li} vs T_{eff} for the nearby associations: TWA (open squares, ours; filled from Webb et al. (1999)), VSA (circles) and HorA (triangles) and the observed young field stars (filled diamonds). The lines, defining the boundaries for classical TTS and representing the upper limit for Local Association stars, were taken from Martín (1997).

3. The distribution of the Li abundance

In Figure 1 we plot the three associations and the young field stars found during our surveys. We can see that the TWA is at the upper limit of the PTT-gap and the HorA is at the lower limit. This gap between the TWA and the HorA stars indicates the amount of Li depletion in ~20 Myr. As the Li depletion in convective evolutionary models for low mass stars is rather insensitive to opacity and atmospheric parameters, but depends critically on convection, these stars should restrict the values of convective parameters.

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