The Light Elements and Their Evolution
IAU Symposium, Vol. 198, *2000*
L. da Silva, M. Spite, J. R. de Medeiros, eds.

Detailed Analysis of Li-rich Giants

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Abstract. We have carried out a survey to detect Lithium-rich giants (LRGs). In Castilho et al. (1998) we reported the discovery of five red giants showing a strong Li I (λ670.78 nm) line and six other ones showing a moderate Li I line. In this work we present the main results of a detailed analysis of 10 stars from our survey and 6 LRGs selected from the literature.

1. The Program Stars and Observational data

In our search for Lithium-Rich Giants (LRGs) we prepared a list of candidates with IRAS colours in a precise locus of the [12-25] *vs.* [25-60] diagram and obtained spectroscopy for more than a hundred of them (Castilho et al. 1998). In this Poster we present the detailed analysis of 10 stars, revealed in this survey to show a strong Li line, as well as 6 other previously known LRGs.

The observations obtained at ESO (Chile) provided high-resolution ($R \sim$ 58000) spectra in regions from 535nm to 807nm. The medium-resolution spectra in the range $\lambda\lambda$650-680nm were obtained at LNA (Brazil), and OHP (France), with $R \sim$ 20000. Photometry in the UBVRI *Johnson-Cousins* system was obtained at the LNA.

2. Calculations and Results

Effective temperatures $T_{\rm eff}$ were estimated from the photometric calibrations by Bessell et al. (1998) and Lejeune et al. (1998) and checked against excitation equilibrium of FeI lines. Gravities (log g) were obtained from ionization equilibrium of Fe I and Fe II lines. [Fe/H] and microturbulence velocities v_t were derived from FeI curves-of-growth.

The Li abundances were determined by fitting LTE synthetic spectra to the Li λ670.78 nm and λ610.36 nm (when available) lines. The non-LTE corrections by Carlsson et al. (1994) were then applied. Model atmospheres employed have been interpolated in the MARCS grids computed by Plez (1992) and Plez (1997, private communication).

In Castilho et al. (2000) we show that the strength of the Li lines is very dependent on $T_{\rm eff}$ and very little on gravity. A summary of the results obtained for our sample is reported in Table 1.

Table 1. Stellar parameters and Li abundance for the program stars.

Object	$T_{\rm eff}$	log g	[Fe/H]	v_t km.s^{-1}	logN(Li) ETL	NETL
HD 4893	4057	1.8	0.2	3.0	0.45	0.78
HD 44889	3775	0.4	-0.2	1.5	0.40	0.84
HD 65750	3600	0.6	-0.4	1.5	0.95	1.35
HD 90082	3686	0.0	-0.2	1.2	-0.10	0.18
HD 96195	3407	-0.5	0.2	1.5	0.10	0.38
GCSS 577	3300	0.0	0.0	2.0	0.25	0.70
HD 176588	3793	1.6	0.0	1.5	1.10	1.57
iras19012-0747	3810	1.5	0.0	1.5	2.50	2.55
iras19038-0026	3600	1.0	0.0	1.0	0.30	0.56
HD178168	4000	1.0	0.0	2.5	0.50	0.92
HD 787	3950	1.4	0.0	1.5	2.10	2.27
HD 19745	4750	2.9	0.1	1.2	3.85	3.65
HD 30238	3925	1.4	0.0	1.5	0.80	1.20
HD 31993	4350	2.4	0.1	3.0	1.65	1.84
HD 39853	3850	1.6	-0.3	1.5	2.80	2.95
HD 95799	4900	3.2	0.0	1.5	3.20	3.05

3. Conclusions

LRGs are characterized by IRAS colours indicating the presence of a dust envelope and by a high Li abundance, but the abundances of other elements are typical of normal red giants. This confirms the hypothesis that LRGs may correspond to an evolutionary stage of normal giants where Li and dust are produced.

References

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https://doi.org/10.1017/S0074180900166926 Published online by Cambridge University Press