Tested by Miriam Cortés Contreras, on September 22nd 2017.

1 Summary

We compare the effective temperatures and luminosities derived by Carlos Cifuentes San Román (Master thesis, Sept. 2017, Universidad Complutense de Madrid; hereafter CCSR), and the effective temperatures from Passeger et al. in prep. (hereafter Pass17) with the fit results obtained with VOSA.

- Effective temperatures

  VOSA provides effective temperatures using BT-Settl models in agreement with the estimated values of CCSR within 200 K. The comparison with the effective temperatures computed by Pass17 results in a higher dispersion. This differences are explained by the differences among CCSR's and Pass17's temperatures (the relation between them gives a correlation coefficient of $r = 0.88$).

- Luminosities

  Excellent agreement between the bolometric luminosities provided by VOSA and CCSR's.

2 Sample and input parameters

- CCSR
  - Effective temperatures estimation for 48 M dwarfs from their spectral types and low-resolution model spectra.
  - Luminosity determination for 48 M dwarfs given the magnitudes (u)BgVRriJHKW1W2W3W4 (u only used when available) performing numerical integration via Simpson's rule and Trapezoidal rule.
    - Up to 16 photometric passbands in the range 154 to 22088 nm.W.
    - Spectral types of the sample: M0 V – M7.0 V.
    - $2600 < T_{eff} < 4100$ K.
    - $0.0007 < L < 0.1162\,L_{\odot}$.
- Pass17
  - Effective temperatures for 30 M dwarfs of the previous sample derived using high-resolution spectra taken with FEROS at the 2.2 m of the European Southern Observatory (La Silla, Chile), CAFE and CARMENES at the 2.2 m and 3.5 m telescopes in Calar Alto (Almera, Spain), and HRS at the 9.2 m HET (Texas).
  - $3230 < T_{eff} < 4169$ K.
- SED building using VOSA
  - Photometric SED built using photometry from GALEX, Stromgren, Johnson, SDSS, TYCHO, APASS, Gaia, DENIS, 2MASS, UKIDSS, VISTA, WISE, MSX, IRC and IRAS retrieved from VO services.
  - Model fit using BT-Settl ($\log g$: 4.0 − 6.0; [M/H]: −0.5 − 0.5, T_{eff} : 2300 − 5200 K)

3 Parameters determination

Of the 48 stars in this study, five have not enough photometric points retrieved by VOSA for the fit.

3.1 Effective Temperatures

To give an idea of the temperatures used for the analysis, the difference between them has a mean value of 58 K and a standard deviation of 111 K.

- CCSR:

  Mean(T_{eff}(CCSR) $-$ T_{eff}(VOSA)) = -7 K; std = 210 K

  Effective temperatures provided by VOSA are in agreement with those derived by CCSR with one exception which effective temperature is 1000 K higher than estimated by CCSR. Fig. 1.

- Pass17

  Mean(T_{eff}(Pass17) $-$ T_{eff}(VOSA)) = -21 K; std = 334 K

  In this case, the concordance between temperatures is slightly worse, but also consistent. On average, VOSA provides higher values. Fig. 2.

3.2 Luminosity

In CCSR, luminosities were derived from two different approaches: via Simpson's rule and Trapezoidal rule. The difference between them has a mean value of 0.00008 $L_{\odot}$ and, therefore, the comparison will be carried out using the luminosities obtained via Trapezoidal rule. The comparison with those obtained via Simpson's rule would be analogue.

Mean(L(CCSR) $-$ L(VOSA)) = -0.002 $L_{\odot}$, std= 0.004 $L_{\odot}$

The estimated luminosities are in very good agreement. Fig. 3.

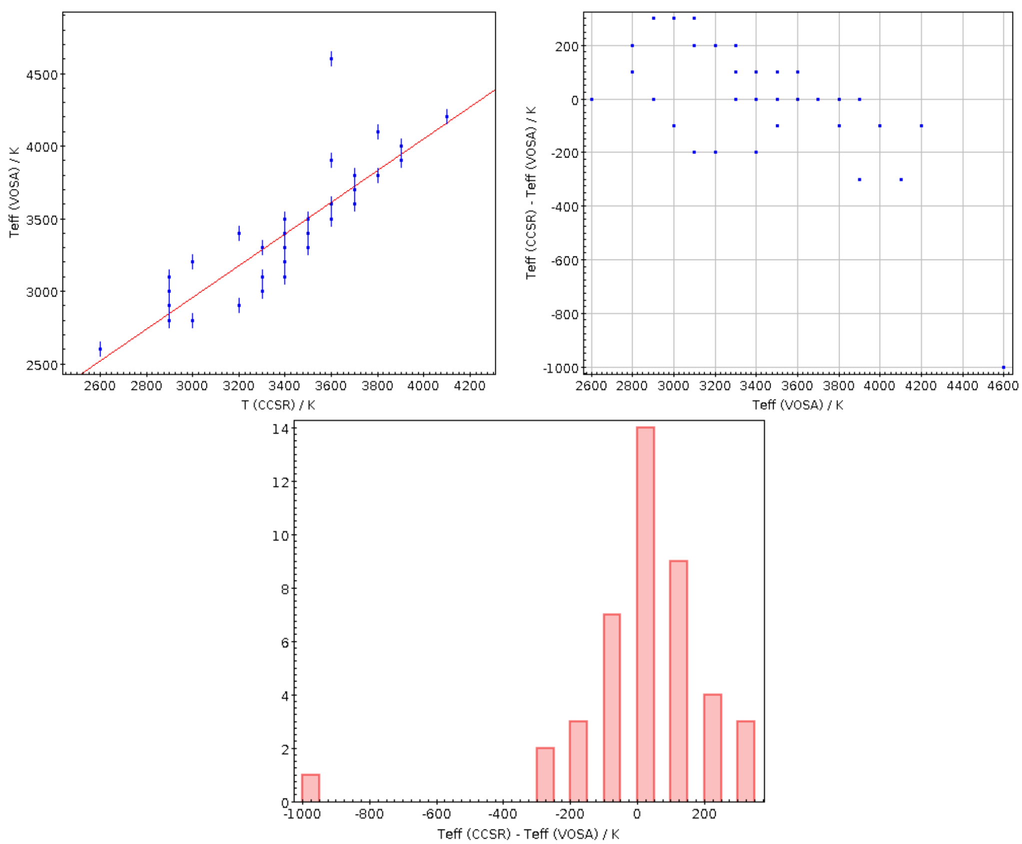

Figure 1: Comparison of CCSR's effective temperatures. Correlation coefficient $r = 0.87$ ($r = 0.93$ excluding the one outlier).

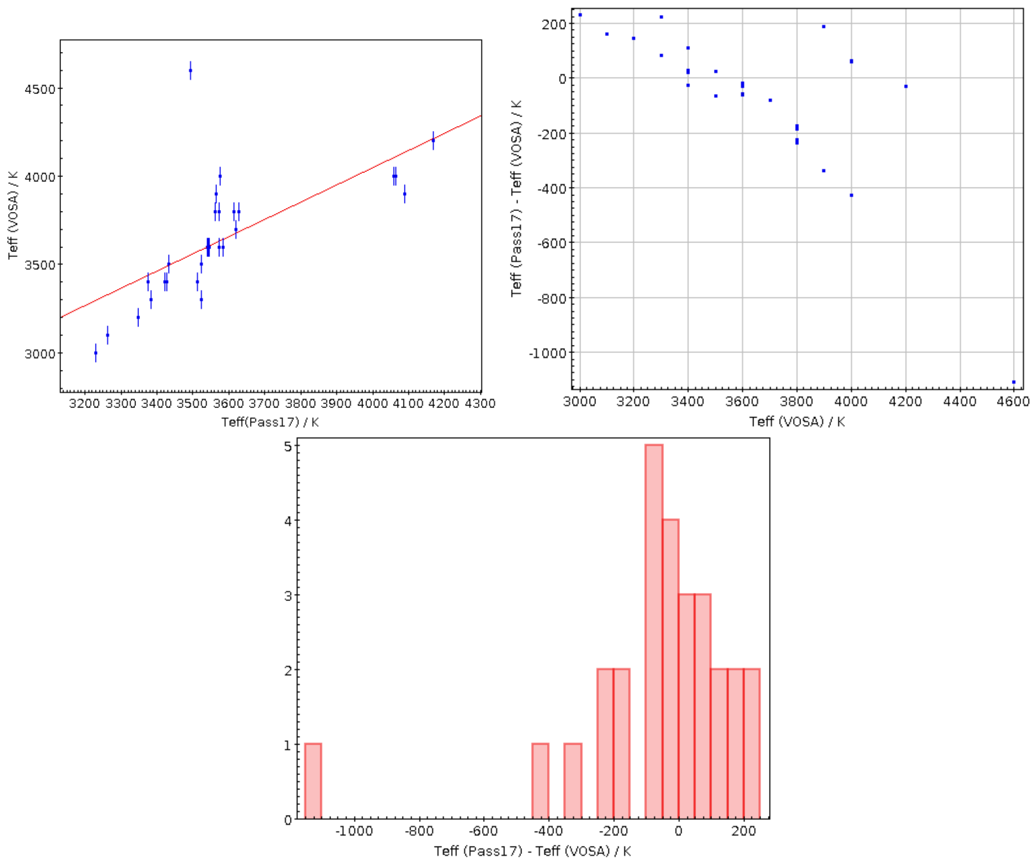

Figure 2: Comparison of Pass17's effective temperatures. Correlation coefficient $r = 0.67$ ($r = 0.84$ excluding the one outlier).

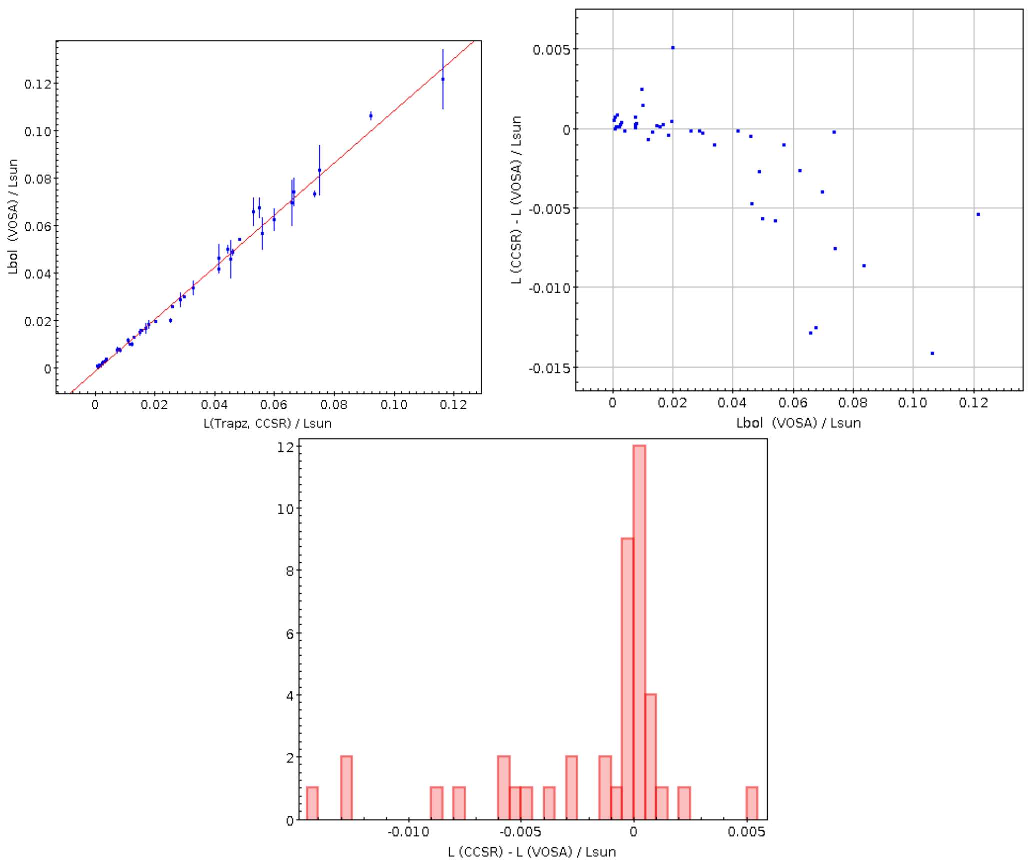

Figure 3: Luminosities comparison. Correlation coefficient $r = 0.99$.