

Erratum

Multi-component structure of solar and stellar transition regions

H. Peter

Kiepenheuer-Institut für Sonnenphysik, Schöneckstrasse 6, 79104 Freiburg, Germany (peter@kis.uni-freiburg.de)

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Due to an unfortunate misunderstanding the line widths are not properly corrected for the instrumental broadening. Instead of the full width at half maximum, FWHM, the Doppler width, $\Delta v_{1/e}$, was used as input for the SUMER IDL procedure `con_width_funct_2`, which is correcting for instrumental effects. Meanwhile the SUMER team has emphasized this point in the description of this routine to avoid future misuses.

As FWHM and Doppler width are related by $\text{FWHM} = 2\sqrt{\ln 2} \Delta v_{1/e}$, one has basically to multiply all line widths as published in the original paper by $2\sqrt{\ln 2} \approx 1.67$. This simple correction is valid for line widths above ≈ 15 km/s. For smaller widths the correction is non-linear. In the general case the following formula can be used to calculate the corrected line widths from the values published in the original paper:

$$\Delta v_{1/e}^{[\text{corr}]} = (2\sqrt{\ln 2} + f) \Delta v_{1/e}^{[\text{old}]}; f = 23(\Delta v_{1/e}^{[\text{old}]})^{-1.75} \quad (1)$$

The correction factor f is plotted in Fig. 1.

The correction and also the calculation of the non-thermal broadening is non-linear. Therefore the line width of the Sun-as-a-star spectrum and the median values of the distribution of line shifts have to be re-calculated. Table 1 and 2 show the parts of the respective original tables with the corrected values. Figures 5c, 6a–c and 7a–i are re-plotted for clarity. They change quantitatively but not qualitatively.

This error does not change the conclusion of the original paper, as the discussion is not build on the absolute values of the line widths, but only on the relative values.

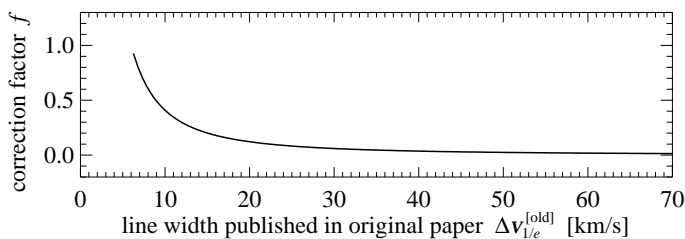


Fig. 1. Correction factor f as defined in Eq. (1) to remove the error of the originally published line widths.

Table 1. Quiet Sun as a star. Parameters for the double Gaussian fit of C IV (1548 Å) for the mean spectrum. Corrected values for line width and non-thermal broadening.

	$\Delta v_{1/e}$	ξ
	[km/s]	
core component	28	25
second component	62	60
single Gaussian fit	32	30

Table 2. Median values as derived from the distributions shown in Fig. 5c. Corrected values for line width and non-thermal broadening.

median values		$\Delta v_{1/e}$	ξ
		[km/s]	
network (N):	core component	25	23
	second component	53	52
inter-network (IN):	single Gaussian fit	27	25

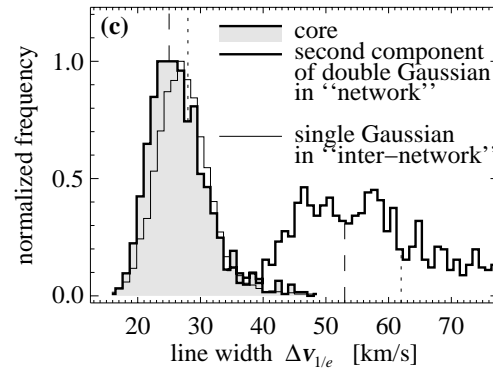


Fig. 5c. Histograms of line widths with corrected values.

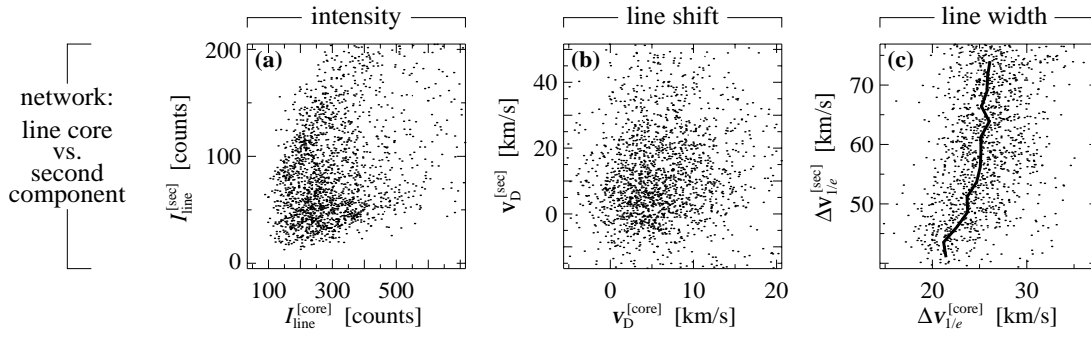


Fig. 6a–c. Correlation of line intensities I_{line} , Doppler shifts v_D and line widths $\Delta v_{1/e}$ between the core and second components ($^{[\text{core}]}$, $^{[\text{sec}]}$) for the double Gaussian fits in the network. Positive values of v_D correspond to redshifts. The solid line shows the median variation. Corrected values for the line width.

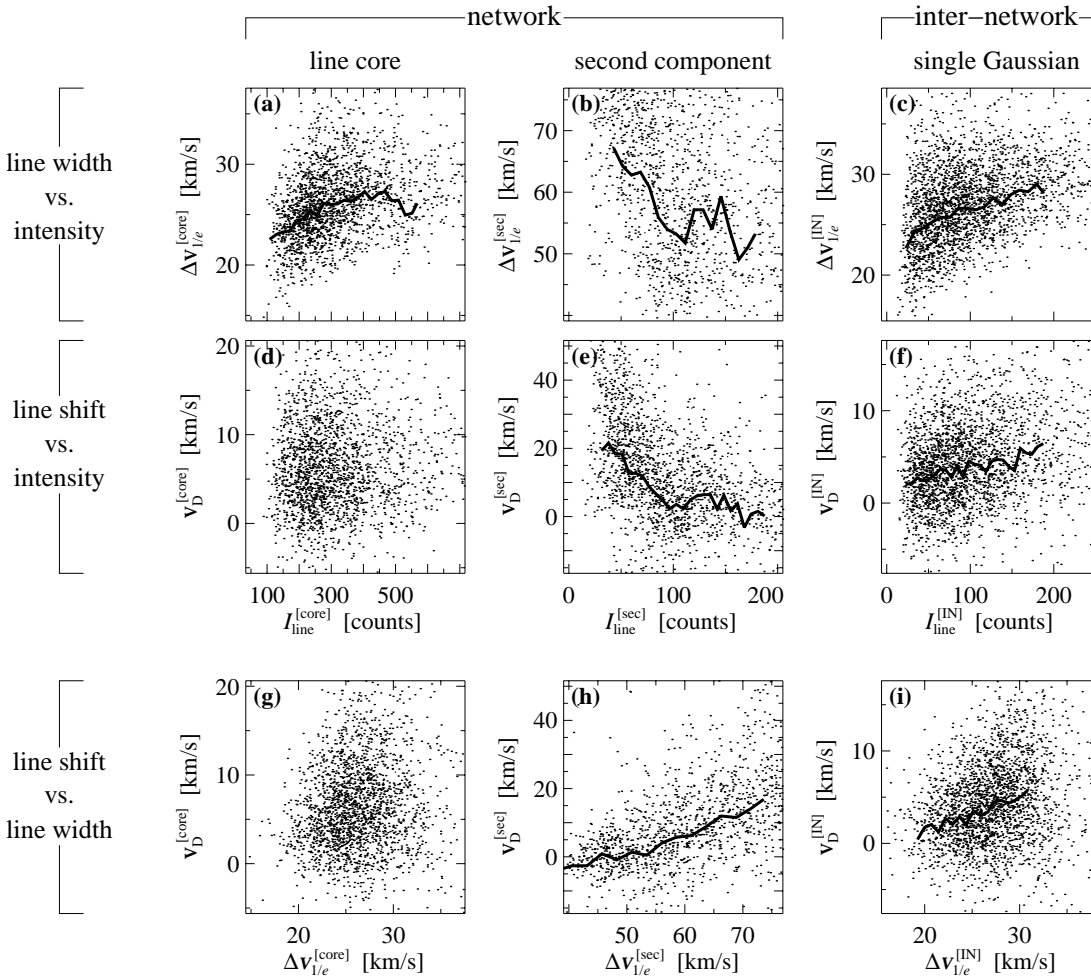


Fig. 7a–i. Correlation of the fit parameters between line intensity I_{line} and Doppler shift v_D as well as line width $\Delta v_{1/e}$ for the core and second components ($^{[\text{core}]}$, $^{[\text{sec}]}$) in the network as well as the single Gaussian profiles in the inter-network ($^{[\text{IN}]}$). Positive values of v_D correspond to redshifts. The solid lines show the median variations. Corrected values for the line width.