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LETTER TO THE EDITOR

# A first look at the submillimeter Sun with ALMA (*Corrigendum*)

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**Key words.** Sun: radio radiation – Sun: chromosphere – Sun: atmosphere – submillimeter: general – errata, addenda

In the original paper, where we analyzed solar observations in bands 3, 6, and 7 of the Atacama Large Millimeter/submillimeter Array (ALMA), Eq. (1) is not accurate because the frequency variation of the Gaunt factor has been ignored. The correct expression for the reduction of data at different frequencies to a common reference frequency is as follows:

$$T_{\rm b}\left((f/f_{\rm ref})^{2.16}\mu, f_{\rm ref}\right) = T_{\rm b}(\mu, f). \quad (1)$$

The value of the exponent in Eq. (1), 2.16 instead of 2 in the original paper, was determined empirically using the expression (6.1) of Zheleznyakov (1996; see also Lang 1980, p. 46) for the free-free absorption, together with the expression of Stallcop (1974) for $H^-$ absorption, in the pertinent range of the Fontenla et al. (1993) model C physical parameters. We note that this value is close to 2.1, proposed by Zirin et al. (1991).

The exact expression slightly changes the results presented in Fig. 3, Table 2, and Table 3. The corrected versions are given in this corrigendum.

We note that the electron temperature deduced from the inversion is now much closer to the prediction of model C of Fontenla et al. (1993; bottom panel of new Fig. 3). Moreover, the disk center brightness temperatures of 6271 K and 5985 K for ALMA Bands 6 and 7, respectively, are slightly lower than those reported in the original paper, which are 6347 K and 6085 K, respectively, but they are still well above the values recommended by ALMA science operations (5900 K and 5500 K, respectively).

**Table 2.** Disk center brightness temperatures.

| Band | Freq GHz | $T_{\rm b}$, recom [(1)] K | $T_{\rm b}$, Paper II K | % | $T_{\rm b}$, this work K | % |
|---|---|---|---|---|---|---|
| Band 3 SW1 | 93 | | 7406 | | 7410 | |
| Band 3 SW2 | 95 | | 7382 | | 7383 | |
| **Band 3 Aver** | **100** | **7300** | **7324** | **0.3** | **7316** | **0.2** |
| Band 3 SW3 | 105 | | 7269 | | 7253 | |
| Band 3 SW4 | 107 | | 7248 | | 7228 | |
| Band 5 SW1 | 191 | | – | | 6507 | |
| Band 5 SW2 | 193 | | – | | 6495 | |
| **Band 5 Aver** | **198** | **–** | **–** | | **6467** | |
| Band 5 SW3 | 203 | | – | | 6439 | |
| Band 5 SW4 | 205 | | – | | 6429 | |
| Band 6 SW1 | 230 | | 6386 | | 6310 | |
| Band 6 SW2 | 232 | | 6376 | | 6301 | |
| **Band 6 Aver** | **239** | **5900** | **6343** | **7.5** | **6271** | **6.3** |
| Band 6 SW3 | 246 | | 6310 | | 6245 | |
| Band 6 SW4 | 248 | | 6301 | | 6237 | |
| Band 7 SW1 | 341 | | – | | 5995 | |
| Band 7 SW2 | 343 | | – | | 5991 | |
| **Band 7 Aver** | **347** | **5500** | **–** | | **5985** | **8.8** |
| Band 7 SW3 | 351 | | – | | 5979 | |
| Band 7 SW4 | 353 | | – | | 5975 | |

**Notes.** [(1)]From White et al. (2017).

**Table 3.** Atmospheric parameters from ALMA inversion.

| Parameter | Paper II | This work |
|---|---|---|
| $a_0$ | 6999 | 6978.3 |
| $a_1$ | −563 | −684.9 |
| $a_2$ | – | 21.6 |
| $a_3$ | – | 18.4 |

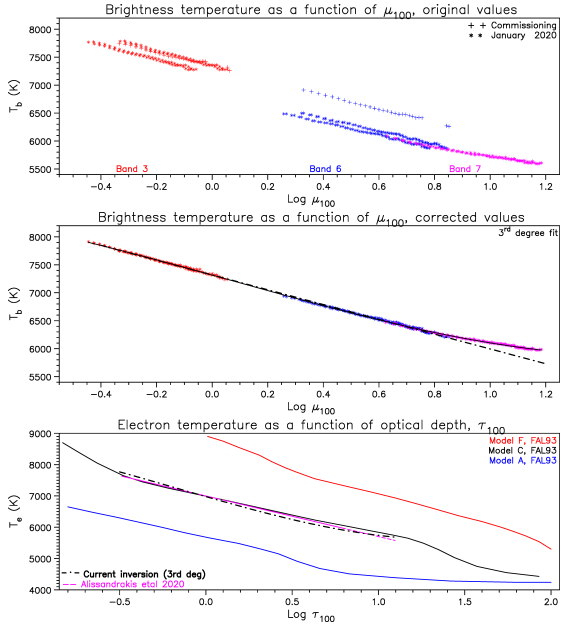


**Fig. 3.** CLV observations and their inversion. *Top row:* Measured brightness temperature as a function of reference $\mu$, for commissioning data and from the current data set. *Middle row:* Normalized data set. The solid line shows a third degree fit and the dash-dotted line shows a linear fit up to $\log \mu_{100} = 0.8$. *Bottom row:* Electron temperature as a function of the reference optical depth, deduced from the inversion of the observations. Model curves from Fontenla et al. (1993) and our results from Paper II are also plotted.

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