

A compilation of solar atlases (after Delbouille, Kurucz, Gandorfer, Stenflo) at disk centre and at limb from λ 3000 Å to λ 8800 Å

J.-M. Malherbe, Observatoire de Paris, Université de Recherche PSL, CNRS, LESIA, Meudon, France

Email : Jean-Marie.Malherbe@obspm.fr

ORCID : <https://orcid.org/0000-0002-4180-3729>

Abstract

We present in this paper a compilation of solar atlases from λ 3000 Å to λ 8800 Å with spectral lines identified by the Moore table and with the corresponding equivalent Lande factors g^* . We used two spectra at disk centre ($\mu = 1.0$), from Delbouille and Kurucz, and two spectra at the limb from Stenflo and Gandorfer, respectively at $\mu = 0.145$ and $\mu = 0.10$.

Keywords

Solar spectrum, visible, disk centre, limb

Description of the spectra

We used the solar atlases of Delbouille *et al* (1973), from λ 3000 Å to λ 10000 Å (step 2 mÅ) and from Kurucz *et al* (1984) from λ 4080 Å to λ 9950 Å (step 5 mÅ) at disk centre ($\mu = 1.0$), taken respectively at the Jungfraujoch station (Switzerland, a very high and dry site) and Kitt Peak (USA). We restricted the wavelength range to λ 3000 - 8800 Å for which we have the line identification provided by the Moore table (Moore *et al*, 1966). The equivalent Lande factors g^* were also provided in the range λ 3700 – 8800 Å, as this is important to characterize the sensitivity to the Zeeman effect (Stokes V and the circular polarization rate are proportional to g^*). The spectra are displayed in annex, by pages of 100 Å displaying bands of 10 Å. Delbouille's spectrum is shown in **black**, while Kurucz's spectrum is plotted in **green colour**. The **blue numbers** are equivalent Lande factors g^* . The line identification follows the convention of the Moore *et al* (1966) table (slash for main contributors in case of a blend, dash for blends, parenthesis for masked lines, p for predicted line, see page XVIII of their book for details). The equivalent width w of lines (in fact $0.2 \cdot \log(w)$, with w in mÅ) is represented by the **violet dashed** vertical bars (for instance, CaII K 3933.68 Å line has $w = 20253$ mÅ, which gives a bar length of $0.2 \cdot \log(20253) = 0.86$). Limb spectra obtained by Stenflo (2014, 2015) with the FTS at Kitt Peak (USA) and Gandorfer (2000, 2002, 2005) with ZIMPOL at IRSOL (Switzerland) are superimposed, respectively for $\mu = 0.145$ (**blue dotted**) and $\mu = 0.10$ (**red dotted**). All spectra (I/I_c) are normalized to the adjacent continuum I_c .

This PDF document is based on 2280 x 3324 pixel GIF images which are available here:

<https://www.lesia.obspm.fr/perso/jean-marie-malherbe/spectrevisible/spectreCL/index.html>

The spectra from 3000 Å to 8800 Å are displayed in the following pages (58 pages, each page contains a 100 Å waveband, and there are 10 bands of 10 Å per page).

For wavelength intervals $[\lambda_1, \lambda_2]$ (in Å), the spectrum can be found at the following pages :

3000-3100 : **3** / 3100-3200 : **4** / 3200-3300 : **5** / 3300-3400 : **6** / 3400-3500 : **7**

3500-3600 : **8** / 3600-3700 : **9** / 3700-3800 : **10** / 3800-3900 : **11** / 3900-4000 : **12**

4000-4100: **13** / 4100-4200 : **14** / 4200-4300 : **15** / 4300-4400 : **16** / 4400-4500 : **17**

4500-4600 : [18](#) / 4600-4700 : [19](#) / 4700-4800 : [20](#) / 4800-4900 : [21](#) / 4900-5000 : [22](#)
5000-5100: [23](#) / 5100-5200 : [24](#) / 5200-5300 : [25](#) / 5300-5400 : [26](#) / 5400-5500 : [27](#)
5500-5600 : [28](#) / 5600-5700 : [29](#) / 5700-5800 : [30](#) / 5800-5900 : [31](#) / 5900-6000 : [32](#)
6000-6100 : [33](#) / 6100-6200 : [34](#) / 6200-6300 : [35](#) / 6300-6400 : [36](#) / 6400-6500 : [37](#)
6500-6600 : [38](#) / 6600-6700 : [39](#) / 6700-6800 : [40](#) / 6800-6900 : [41](#) / 6900-7000 : [42](#)
7000-7100 : [43](#) / 7100-7200 : [44](#) / 7200-7300 : [45](#) / 7300-7400 : [46](#) / 7400-7500 : [47](#)
7500-7600 : [48](#) / 7600-7700 : [49](#) / 7700-7800 : [50](#) / 7800-7900 : [51](#) / 7900-8000 : [52](#)
8000-8100 : [53](#) / 8100-8200 : [54](#) / 8200-8300 : [55](#) / 8300-8400 : [56](#) / 8400-8500 : [57](#)
8500-8600 : [88](#) / 8600-8700 : [59](#) / 8700-8800 : [60](#)

References

Atlases at disk centre ($\mu = 1.0$), Jungfraujoeh (Delbouille *et al*), FTS Kitt Peak (Kurucz *et al*)

Delbouille, L. Roland, G. and Neven, L., 1973, Atlas photometrique du spectre solaire de $[\lambda]$ 3000 a $[\lambda]$ 10000, https://bass2000.obspm.fr/Atlas_visible.pdf, also available on line at https://bass2000.obspm.fr/solar_spect.php

Kurucz, R.L., Furenlid, L., Brault, J., Testerman, L., 1984, Solar flux atlas from 296 to 1300 nm, NSO, Sunspot, New Mexico, on line at https://www.irsol.usi.ch/data/data_archive/#ss2

Atlases at 5'' and 10'' from the limb ($\mu = 0.1$, IRSOL, $\mu = 0.145$, FTS Kitt Peak)

The data for this analysis have been provided in electronic form by IRSOL as a compilation by Stenflo (2014), based on the atlases of Stenflo (2015) and Gandorfer (2000, 2002, 2005), which are on line at <https://www.irsol.usi.ch/it/data-archive/second-solar-spectrum-ss2-atlas>

Gandorfer, A., 2000, The Second Solar Spectrum: A high spectral resolution polarimetric survey of scattering polarization at the solar limb in graphical representation. Vol I: 4625 to 6995 Å. Zurich: VdF

Gandorfer, A., 2002, The Second Solar Spectrum: A high spectral resolution polarimetric survey of scattering polarization at the solar limb in graphical representation. Vol II: 3910 to 4630 Å. Zurich: VdF

Gandorfer, A., 2005, The Second Solar Spectrum: A high spectral resolution polarimetric survey of scattering polarization at the solar limb in graphical representation. Vol III: 3160 to 3915 Å. Zurich: VdF

Stenflo, J.O., 2014, in R. Ramelli (ed.), on line at https://www.irsol.usi.ch/data/data_archive/#ss2

Stenflo, J.O., 2015, FTS atlas of the Sun's spectrally resolved center to limb variation, *Astron. Astrophys.*, 573, 74

Line identification table

Moore, C., Minnaert, M., Houtgast, J., 1966, the solar spectrum 2835-8770 Å, second revision of Rowland's preliminary table of solar spectrum wavelengths, monograph 61, US department of commerce, national bureau of standards







































































































