**Atmospheric
Chemistry
and Physics
Discussions**

Interactive
Comment

Interactive comment on "Uncertainties of parameterized near-surface downward longwave and clear-sky direct radiation" *by* S. Gubler et al.

Anonymous Referee #1

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General comments:

The authors evaluated the parameterizations of one shortwave and diverse incoming longwave radiation using high quality measurements of ASRB station in Switzerland. The results could be useful for the selection of longwave parameterization models. The methods and results are described clearly but are rather technical. It would be nice if the authors could explain some physics and statistics background of each parameterization used in the paper. It is not clear to me that the uncertainties of the calculated shortwave and longwave radiation are due to the parameterizations or due to the input data. Can the authors explain the uncertainties according to the radiative transfer theory?

Specific comments:

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Interactive Discussion

Discussion Paper

Title.

'direct radiation' is not a proper term. You can use shortwave direct radiation or broadband direct solar radiation. In the title, it is better to use 'clear-sky shortwave radiation'. I would write the 'shortwave radiation' first, then 'longwave radiation' in the title. In the paper you also present the results of the shortwave radiation first, then the longwave radiation. Is it important to use 'near-surface' instead of 'surface' in the title?

Page 3359, line 9-10

Are the parameterizations used in this paper take into account the surface elevation?

Page 3359, line 19-20

How accurate is the Iqbal model in W/m2? Can you give some numbers according to the literature?

Page 3361,line 18

How many clear-sky hours are there in the 113976 data points?

Page 3362, line 12

The visibility at Jungfraujoch could be different from other stations at lower altitude. Are there other aerosol measurements available? Have you checked the AERONET data and aerosol products from satellites, for example MODIS?

Page 3363, line 4

Is the screen-level temperature the same as the 2m temperature? Some readers might not know the term 'screen-level'.

Page 3363, line 17

There are ozone data from satellite measurements, for example on the TEMIS website (www.temis.nl).

Page 3364 3.1.1

How accurate is the clear-sky SDR calculation if the input data are perfect?

Page 3365, line 12

'...at screen-level height temperature T' Should T be T* ?

Page 3365, line 14-19

Could you give more information about the parameterizations in Table 3? Are they applicable for any clear-sky situations? What are the advantage and limit of these parameterizations?

Page 3365, Eq.(4)

What is 'e' in Eq.(4)? It is not explained.

Page 3367, line 10

Why do you select the path length of 4.3 for the sensitivity study? Is the path length calculated using A5 or A6? The solar zenith angle for this path length is about 75 degree. Is the mean path length so large at Jungfraujoch?

Page 3370, line 4-5

There are cloud mask data from SEVIRI/MSG or Meteosat for day and night. Is it possible to use night time cloud fraction and cloud optical thickness to derive night time cloud transmissivity or cloud factor instead of the interpolation of the day time values?

Page 3371, line 17-20

It seems that the parameterization for the diffuse SDR behaves differently to the measurements. What is the reason for that? Are there any physics missing in the parameterization?

Page 3372, line 12-15

Is it possible that in Fig. 2 the points at the upper left corner are influenced by clouds?

Page 3373, line 9-10

'... a clear positive correlation of uncertainty with the path length'

Do you mean path length or surface elevation (surface height)? What are the differences in path length between the 7 stations? I think you use local path length (Eq. A6) in the calculations, the main difference may be the surface elevation.

Page 3374, line 12

'For global radiation, a clear distinction is observed for the high and the low elevation sites ...'

Could you give an explanation for it?

Page 3375, line 10

'... only uses one parameter estimate ...'

Could you clarify this sentence?

Page 3377, section 4.2.2

Are the same data set of T^* and P_v are used to derive the parameters in Table 3 and used in the calculation of LDR in the validation? Will it cause any compensation error?

Page 3381, line 24-25

'In general, the global Iqbal radiation perform satisfyingly'

I think that the uncertainties of the parameterizations are rather large. What is the requirement for the accuracy of the shortwave and longwave radiation simulations in climate or agriculture related models? Where do you use the parameterizations?

Technical comments

Is Fig. 6 referred to in this paper?

Page 3373, line 3

Change 'ozon' to 'ozone'

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 3357, 2012.