Supplement to: Modelled and measured effects of clouds on UV Aerosol Indices on a local, regional and global scale by M. Penning de Vries and T. Wagner

We have performed an analysis to try and quantify and understand the differences between the measured and modeled UVAI that are most clearly seen in Fig. 8. Because cloudUVAI depends on cloud fraction in a complicated way, a regression-type analysis of the data is not possible. Instead, we made histograms of measured and modelled UVAI. In Fig. S1 the histograms of measured UVAI and modelled cloudUVAI (thick cloud assumption only) for three selections of viewing angles(-20° to -10°; -10° to 10°; +10° to +20°) and for SZA between 30° and 40° are shown. These results are representative of the whole range of SZA and viewing angles.

Measured UVAI appears to be in agreement with cloudUVAI on the whole, but is overlapped with Gaussian-shaped noise of some kind. This might be of instrumental (problems with polarisation or general instrument calibration) or geophysical origin (ocean colour, white caps, aerosols), or it might be due to types of clouds that are not well represented by the models we assumed for cloudUVAI calculation.

Figure S2 depicts the differences between measured and modelled UVAI as a function of viewing angle and sorted by cloud fraction and SZA. The same pattern as described above can be seen, with two more interesting findings: (1) the viewing-angle dependence varies with cloud fraction; and (2) the agreement between measurement and model becomes better with increasing SZA. These results may point to remaining inaccuracies in the cloud model (in particular in the phase function), but do not rule out instrument problems.

In short, there are clearly several discrepancies between measured and modelled cloudUVAI that need to be investigated and corrected in the future. Nevertheless, as already seen in Fig. 8 (and the other two studies presented in the manuscript) the agreement on average is quite good, which indicates that the modelling approach is, in principle, correct.

1 Figures

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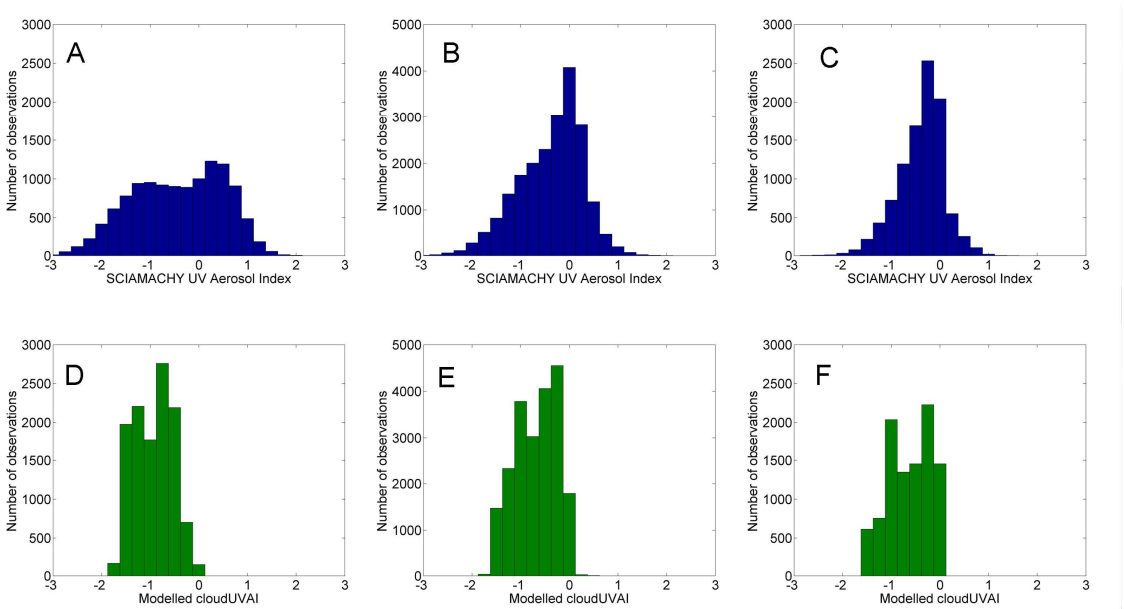

3

4 Fig. S1. Histograms of measured UVAI (A-C) and modelled cloudUVAI (thick cloud
5 assumption, D-F) for the region and time range of the data shown in Fig 8 (20°-40°S /
6 100° - 180° W, January-March 2005). Data are for SZA 30°-40° and are sorted by
7 viewing angle: A and D, -20° to -10°; B and E, -10° to +10°; C and F, +10° to +20°.

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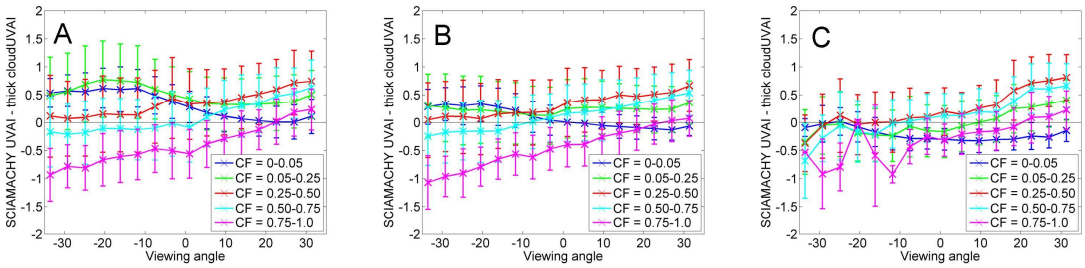

Fig. S2. Mean differences between measured UVAI and modelled cloudUVAI (thick cloud assumption) for the region and time range of the data shown in Fig 8 (20°-40°S / 100° - 180° W, January-March 2005). Data are sorted into cloud fraction bins, as indicated in the figure legend. The panels contain data from SZA range corresponding to those in Fig. 8: A, 30°- 40°; B, 40°- 50°; C, 50°- 60°. Error bars denote one standard deviation.