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Interactive comment on "Experimental and modeled UV erythemal irradiance under overcast conditions: the role of cloud optical depth" *by* M. Antón et al.

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The manuscript addresses an important problem dealing with the role of cloud optical depth in modifying surface UV at the earth's surface. The problem in equating models to measurements of UV irradiance in cloudy conditions has not been totally resolved given the complexity and variability of cloud properties in time and space. This study provides an interesting study of parameters that influence surface irradiance in cloudy conditions and also shows that AERONET-derived optical depth can lead to errors if used to calculate surface erythemal irradiance. These two results are quite interesting and innovative.

There are a few issues that must be examined or at least discussed in the paper. Firstly, the model underestimation of clear sky erythemal irradiance needs more of a discussion. A low single scattering albedo (SSA) for aerosol is will give rise to lower irradiances. Estimation of SSA at 440 nm by the Cimel radiometer is not necessarily a good estimate of the SSA for erythemal wavelengths (Petters et al., 2003; Kazantzidis et al., 2001; Bais et al., 2005, Nunez et al., 2010). Not using a lower SSA in the UVSPEC model will produce relatively lower UVER compared to measurements. These lower UVER value will of course not appear in empirical models of UVER as in equation 2 of this paper.

Secondly, it is probably somewhat misleading to say that the Cimel radiometer only provides information on cloud properties at the local zenith. The method is based on the difference between two zenith radiances in the visible and infrared wavelengths (440, 870 nm). While the visible radiance comes from the base of the cloud, the contribution from infrared radiance comes from the ground surface which reflects highly due to vegetation and is further reflected by the cloud base into the radiometer. The extra infrared radiance comes from the entire sky hemisphere and which is reflected by the vegetated surface (Marshak et al., 2000; Barker and Marshak, 2001). How much vegetation is in the experimental area?

While the paper discusses the possible spatial variability of the cloud regime, there is little mention of cloud type. Altostratus or cirrostratus clouds are expected to be homogeneous in their spatial variability, but cumulus or stratocumulus are expected to be highly variable as they are influenced by boundary layer processes (Nunez et al., 2005). The authors need to provide some indication of dominant cloud types in their study area.

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