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Global distribution of 10-year daily mean shortwave and longwave radiation at one degree spatial resolution

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Modelling the Earth's radiation budget, both shortwave (SW) and longwave (LW) radiation, is essential for improving our understanding of the Earth's climate and possible climatic changes. The estimation of this budget has to be achieved at the highest possible accuracy and resolution, by performing computations with accurate radiation transfer models and input data, at high temporal and spatial resolution. In this study, the global distribution of the SW and LW radiation budgets for the 10-year period 1985-1995 was computed using detailed spectral radiative transfer models, using 115 wavelengths in the ultraviolet-visible range (0.2-0.85 μm), 3 wavelengths and 10 spectral intervals from 0.85 to 5 μm, and 28 intervals in the thermal infrared, along with climatological data for surface and atmospheric parameters that are of importance to the transfer of radiation within the Earth-atmosphere system. The model input data were taken from the NASA-Langley dataset and were supplemented by others (e.g. aerosol optical properties from the Global Aerosol Data Set, GADS). The mean daily 1-degree latitude-longitude resolution fluxes were computed at the top of the atmosphere (TOA), within the atmosphere and at the Earth's surface. Averaged values were also derived in terms of monthly mean, zonal mean, hemispherical and global mean quantities. The net all-wave radiation budget components were finally computed, which constitute the major part of the energy budget of the Earth, affecting

directly its climate. Special emphasis was given to comparisons with previous similar, but lower resolution (e.g. monthly and 2.5-degrees latitude-longitude), budgets. The results of our study show significant features related to the spatial-temporal resolution of fluxes, which are of importance for the climate dynamics of the Earth. Emphasis was also given to the validation of the computed fluxes against high-quality measurements from the Baseline Surface Radiation Network (BSRN) and Global Energy Balance Archive (GEBA) networks.