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Radiation budget estimates over Africa and surrounding oceans: inter-annual comparisons

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Abstract. Three independent datasets of Radiation Budget at the top of the atmosphere (TOA) spanning two decades are compared: the Scanner Narrow Field of View data (from ERBE, ScaRaB, and CERES instruments, 1985–2005), the ERBS Nonscanner Wide Field of View data (1985–1998) and the simulated broadband fluxes from the International Satellite Cloud Climatology Project (ISCCP-FD, 1983–2004). The analysis concerns the shortwave (SW) reflected flux, the longwave (LW) emitted flux and the net flux at the Top Of the Atmosphere (TOA) over Africa and the surrounding oceans (45° S–45° N/60° W–60° E), a region particularly impacted by climate variability. For each month, local anomalies are computed with reference to the average over this large region, and their differences between the 2002–2005 and 1985–1989 periods are analysed. These anomalies are, for a large part, independent on the general observed trends (about 2.5 W m^{-2} per decade), which may be affected by possible calibration drifts. Although the regional flux anomalies can be related to calibration through the scene identification and the choice of the anisotropy correction, this effect is limited if the calibration drifts remains reasonable. Large inter-annual variations are observed locally. Over a part of the South East Atlantic (35°–10° S/10° W–10° E), including the marine low cloud area off Angola, there is a decrease of the yearly means of net flux estimated to 2.2, 3 and 6 W m^{-2} respectively for the Scanner, Nonscanner and ISCPP-FD data. Over a narrow strip of the Sahel Zone, the net flux increases by about 5 W m^{-2}. We believe that these observations are real. They could be due to the impact of calibration drift but only if the drifts were significant (>4%) and correlated between the datasets, which is highly improbable.

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