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Changes in global net radiative imbalance 1985-2012

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Combining satellite data, atmospheric reanalyses and climate model
simulations, variability in the net downward radiative flux imbalance at the top of Earth's atmosphere (N) are reconstructed and linked to recent climate change. Over the period 1985-2012 we estimate N=0.47$\pm$0.54 Wm$-$2 (uncertainties at 90% confidence level). Variability relates primarily to the eruption of Mt. Pinatubo in 1991 and variability relating to El Nino with good agreement between the monthly reconstruction and atmospheric simulations using prescribed sea surface temperature and radiative forcings (r$\sim$0.6). Combining with a simple energy balance climate model we argue that increased ocean heat uptake below the mixed layer is required to reconcile changes in N and surface temperature since 1985.