Geophysical Research Abstracts
Vol. 12, EGU2010-11856, 2010
EGU General Assembly 2010

50th Anniversary of Radiation Budget Measurements from Satellites

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The "space race" between the USA and the Soviet Union supported rapid developments of instruments to measure properties of the atmosphere from satellite platforms. The satellite Explorer 7 (launch on 13 October 1959) was the first to carry sensors which were sensitive to the fluxes of solar (shortwave) and terrestrial (longwave) radiation leaving the Earth to space. Improved versions of those sensors and more complicated radiometers were flown on various operational and experimental satellites of the Nimbus, ESSA, TIROS, COSMOS, and NOAA series. There results, although often inherent to strong sampling insufficiencies, provided already a general picture on the spatial distribution and seasonal variability of radiation budget components at the Top of the Atmosphere, which finally could be refined with the more recent and more accurate and complete data sets of the experiments ERBE, CERES and ScRaB. Numerical analyses of climate data complemented such measurements to obtain a complete picture on the radiation budget at various levels within the atmosphere and at ground. These data is now used to validate the performance of climate models.