



Measurement of the Earth Radiation Budget - A review and future perspectives.

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The Earth Radiation Budget (ERB) at the top of the atmosphere quantifies how the earth gains energy from the sun and loses energy to space. It is of fundamental importance for climate and climate change. In this paper the current state of the art of the satellite measurements of the Earth Radiation Budget is reviewed. Combining all available measurements, the most likely value of the Total Solar Irradiance at solar minimum is 1362 W/m^2 , the most likely earth albedo is 29.8 % and the most likely annual mean Outgoing Longwave Radiation is 238 W/m^2 . We highlight the link between long term changes of the Outgoing Longwave Radiation, the strengthening of El Nino in the period 1985-1997 and the strengthening of La Nina in the period 2000-2009. The current ERB measurements have sufficient stability to track the temporal variability of the Earth Energy Imbalance (EEI) driving climate change, but they can not measure its absolute value with sufficient accuracy. We introduce the Low Earth Orbit Novel Advanced Radiation Diurnal Observation (LEONARDO) concept which aims at making the first ever significant measurement of the EEI from space, and which will be submitted to the currently open ESA call for ideas for a new Earth Explorer mission.