



Terrestrial albedo from ground-based earthshine measurements

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Terrestrial global albedo is one of the most important factors in determining Earth's climate - in nature and in climate models. Establishing accurate, long-term observational data series describing the reflective behaviour of Earth is therefore a matter of high priority. For long-term data series to be useful for climate research, the stability of the data must be as good as possible, i.e. any systematic errors should be small and invariant with time.

We here present a novel design for an earthshine telescope to be used in a dedicated global network of ground-based automatic systems observing, simultaneously, the dark and bright sides of the Moon. The ratio between these two is proportional to terrestrial albedo, amongst other things, and varying influences from atmospheric absorption or degrading optics are effectively accounted for by using the dark-bright ratio as the primary observable - thereby allowing so called common mode rejection. Matching of the registered illumination levels on the bright and dark side furthermore reduces the effect of detector non-linearity. The simultaneous acquisition of the dark and bright sides is central to the telescope design, which is optimized to effectively suppress any internally scattered light that may pollute the dark-side observations.

The project is a collaboration between the Danish Meteorological Institute and Lund Observatory in Sweden.