5. The SZA dependence of desert and vegetation albedos

Most land surface models (e.g., those based on a fraction of solar and terrestrial radiation absorbed at the land surface) naturally extrapolate the MODIS BRDF and albedo data into black-sky conditions for SZA > 78°. This is often referred to as the "cosine law" assumption, which may be incorrect at solar zenith angles beyond 78°. The fundamental reason for this is that the cosine law only applies to black-sky conditions where the incident and reflected radiative fluxes are in phase. At high SZA, the cosine law is no longer valid, and the relationship between the albedo and SZA becomes more complex.

6. Conclusions

The MODIS BRDF and albedo data provide a unique opportunity to evaluate and improve the parameterization of the SZA dependence of land surface properties in land surface models. The SZA dependence of desert and vegetation albedos can be adequately approximated by a two-parameter model, which can be used to improve the representation of the SZA dependence of vegetation albedo in land surface models. However, further work is needed to evaluate the accuracy of this model over different environments and under different meteorological conditions.