

Anmeldung eines Themas für eine Bachelorarbeit

Thema	Sensitivity of the vegetation albedo to forest biodiversity parameters and cloudiness
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Kurzbeschreibung:	<p>One of the important interaction processes between vegetation biodiversity and climate is via radiation fluxes. In the solar spectrum, the key quantity for this is the albedo of the surface/vegetation system that governs the amount of solar radiation reflected back to the atmosphere and, therefore, influences the Earth radiation budget. In addition, clouds - a prime atmospheric determinant of radiation fluxes - can also modulate the surface albedo depending on cloud amount and properties.</p> <p>The Bachelor's thesis has three goals:</p> <ol style="list-style-type: none"> 1) Quantify the albedo of the surface/vegetation system using the canopy radiation model (SCOPE2^[1]) and explore the role of forest biodiversity parameters, e.g., leaf angle distribution, leaf structure parameter, leaf area index, and spectral characteristics of leaves. 2) Estimate the role of clouds depending on their properties for surface radiation fluxes using a coupled system of SCOPE2 and the atmosphere radiative transfer solver libRadtran^[2]. 3) Explore and quantify effects of biodiversity parameter variations on the surface albedo considering clouds to advance previous sensitivity studies^[3]. <p>Ultimately, this may allow to quantify the effect a change in forest characteristics (deforestation or afforestation, and change in forest species diversity) has on the surface/vegetation albedo and, in consequence, on the Earth radiation budget and thus climate.</p>
Literatur:	<p>[1] Yang, P. / Prikaziuk, E. / Verhoef, W. / van der Tol, C., SCOPE 2.0: a model to simulate vegetated land surface fluxes and satellite signals, 2021, Geosci. Model Dev. , Vol. 14, No. 7, p. 4697-4712, 10.5194/gmd-14-4697-2021</p> <p>[2] Emde, C. / Buras-Schnell, R. / Kylling, A. / Mayer, B. / Gasteiger, J. / Hamann, U. / Kylling, J. / Richter, B. / Pause, C. / Dowling, T. / Bugliaro, L. The libRadtran software package for radiative transfer calculations (version 2.0.1) 2016 , Geosci. Model Dev. , Vol. 9, No. 5, p. 1647-1672, 10.5194/gmd-9-1647-2016</p> <p>[3] Jacquemoud, S. / Verhoef, W. / Baret, F. / Bacour, C. / Zarco-Tejada, P. J. / Asner, G. P. / François, C. / Ustin, S. L., PROSPECT+SAIL models: A review of use for vegetation characterization, 2009, Remote Sens. Environ. , Vol. 113, p. S56-S66, 10.1016/j.rse.2008.01.026</p>