Geophysical Research Abstracts
Vol. 14, EGU2012-10686, 2012
EGU General Assembly 2012


# Merging high resolution land cover maps with MODIS images to infer albedo of different vegetation types

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Here, we present a method, how you can use MODIS data to understand and predict the albedo of different vegetation types at a lower spatial scale. This is important since albedo is known to be both spatially and temporally very variables. Most boreal and temperate areas are complex mosaics of different land use types. To estimate the albedo feedback of these landscapes to climate it would be desirable to understand how different land classes and forests reflect short wave irradiance. We used the MODIS MCD43A, a 16 day composite albedo product for this. However in the areas vegetation and land uses vary typically at the scale of less than 100 m, while pixes sizes in the MODIS albedo product are 500 m. For these reasons we underlied the albedo picture with a high resolution multi source land use information map (the MSI-NFI map available for Finland). The methods were tested boreal mosaic of mainly forests with some field and lakes around Hyytiälä, Central Finland (61°50'40"N 24°17'13"E) using an area of about 100 km2.
We used multiple regression approaches to infer the average albedos for different land use types and to understand seasonal differences of albedo for different land use types. We present different ways of analyzing the data, that will use both simple land use classes or also quantitative data from the forest maps (as biomasses).
For example, when using the albedo using a linear model with area covered by each tree species and land use we found that the errors for albedo estimates for each main land use category had standard errors of less than 0.008 (typically less than 0.003). About half of the albedo for each Modis pixel could be explained by land use using these simple models. Estimated albedo values were similar to values in our field measurements. Furthermore, the data helped us to understand the temporal variability of snow covered winter albedos. For example the albedo for spruce forests increased from summer values of 0.10 to values around 0.27 in the winter when the canopy was snow covered.