Geophysical Research Abstracts
Vol. 13, EGU2011-6815, 2011
EGU General Assembly 2011

Use of MODIS satellite data to map the growing season in northern Fennoscandia

Stein Rune Karlsen (1), Anne Tolvanen (2), Kjell Arild Høgda (1), Lars Eklundh (3), Natalia Polikarpova (4), Olga Makarova (4), and Birger Ulf Hansen (5)

(1) Northern Research Institute Tromsø (Norut), Tromsø, Norway. (stein-rune.karlsen@norut.no), (2) Finnish Forest Research Institute, Muhos, Finland. (Anne.Tolvanen@metla.fi), (3) Lund University, Lund, Sweden. (lars.eklundh@nateko.lu.se), (4) Pasvik State Nature Reserve, Nikel Murmanskoy, Russia. (polikarpova-pasvik@yandex.ru), (5) University of Copenhagen, Cophenhagen, Denmark.(buh@geogr.ku.dk)

The study area of northern Fennoscandia is an ecologically heterogeneous region in the arctic/alpine-boreal transition area and includes northern Norway, Sweden, Finland, and Kola Peninsula in north-western Russia. Changes in the timing of the growing season (phenology) are among the most sensitive indicators of changes in temperatures in the northern areas.

The aim of this study is to map the trends, extreme years, and mean date in onset, end and length of the growing season in the study area. To map the growing season we use MODIS data, the MOD09A1 product, with 8-days composites, 500m resolution and 7-bands reflectance for the 2000 to 2010 period.

Close cooperation between north-western Russia and the Nordic countries within phenological research has been established in the region, and most of the field data are harmonized and can be compared across the borders. Phenological in-situ data, on the deciduous trees birch (Betula pubescens) and rowan (Sorbus aucuparia), as well as the dominated field species cowberry (Vaccinium vitis-idaea) and bilberry (Vaccinium myrtillus) were used interpret the MODIS based measuring of the growing season.

First we studied the spectral reflectance of the MODIS data of different land cover types during the growing season, this to identify which band combinations that best monitor the onset and end of the growing season. The extensive calibration process includes visual evaluation of the cloud cover of each 8-days period and smoothing of different indices curves with the TIMESAT program. Finally, a combined pixel-specific threshold and decision rule-based mapping method was used to determine the onset and end of the growing season.

In spring, NDVI map the onset of the growing season well. In autumn, indices based on combination of a band in the visible part with a band in the short-wave infrared part best map the end of the season. The preliminary results show large variations in the onset of growing season from year-to-year during the last 11 years. The resulting phenological maps can be used in a broad range of ecological and climate change studies.