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Indicators of Northern Eurasia's Land Cover change Trends from SPOT-VEGETATION Time Series Analysis 1998-2005

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The Boreal and Tundra ecosystems of the mid-high latitudes provide sensitive indicators of environmental impacts both of climate change and human activities. A number of studies have emphasized changes and trends in Eurasia due to drivers of natural and human induced land cover dynamics, in particular for the period 1982-1999. The investigations of this study focuses on the very recent years of 1998-2005 and cover the whole boreal ecosystems of Northern Eurasia with its geographical dimensions of 42˚N to 75˚N and 5˚E to 180˚E. This northern hemispheric belt includes to its most extent the national territory of Russia but also partly its abutter nations, the Scandinavian Nations and the central and south-European nations, as well as, Mongolia. The study focuses on linear trends from 1998-2005 using inter-annual and inter-seasonal trends in the SPOT-VGT mosaics.

Significant trends could be detected in the NDVI and NDWI time series from 1998-2005. The trends differ by season (spring, summer, fall), land cover type and latitude. The spring trends show significant positive NDVI regression slopes and strong negative NDWI slopes over the evergreen needleleaf-, needleleaf/broadleaf-, and mixed forests of the Russian and Scandinavian boreal zone, which indicates an onset of the vegetation green-up dates (NDVI trends) over eight years linked with earlier snowmelt (NDWI trends). Most affected are the forests in high altitudes like the Ural region, the central Siberian forests and the forests of middle Sweden. Similar vegetation dynamics can be exposed in the fall. Positive NDVI slopes over nearly all vegetation classes indicate a longer durance of the vegetation period. Contrary trends were detected in the tundra. The tundra ecosystems of the northern Eurasia latitudes seemed to be affected by trends of negative NDVI and positive NDWI slopes. The significant trends could be acquired in the prostrate shrub tundra followed by sedge and shrub tundra. This may be explained by earlier snowmelt and increasing amounts of surface water from positive temperature anomalies but these results would require further detailed study consolidations. The estimates over these mainly climate controlled processes can be consolidated by analyzing the surface temperature anomalies from 1998 to 2005. In comparison with the base from 1951 to 1998, positive surface temperature anomalies are observed particular in spring and fall season.