

Method for Monitoring Forest Regrowth with Satellite Imagery

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The lag time between stand-replacing forest disturbance and the re-establishment of forest cover varies greatly depending on disturbance type and severity, site conditions, availability of seeds, secondary disturbance events, etc. The relative importance of these factors across the vast forest zone of Russia is largely unknown and represents a major source of uncertainty in projections of the future of Russian boreal forest. To correlate the change in spectral signatures of recently disturbed forests with attributes that reflect the progression of regeneration process (stocking density, basal area, tree height, and biomass) we used 1992 ground survey data for 199 forest stands in the St. Petersburg region. The chronosequence of forest recovery included 10 burned stands, 28 clearcuts, 25 open-canopy (young) plantations, and 136 forest stands ranging from 5 to 25 years old. The chronosequence-based spectral trajectories were developed from 1994 imagery (Landsat TM path 184 row 18) and compared with the actual change observed on the available imagery for years 1988, 1992, 1994, 2000, and 2002 (after geometric, atmospheric, and radiometric correction to 1994 image). The rate of decline in the tasseled cap (TC) index of brightness was linked to the increase in stocking density during the first 5-10 years following disturbance, whereas biomass accumulation correlated better with the TC index of wetness. The patterns of change over time varied significantly due to seasonal differences between images.