Progress in the use of coarse-resolution satellite data for environmental monitoring, phenology and carbon

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The high frequency of observation from coarse-resolution sensors enables studies of dynamic vegetation variations. We have developed methodology and studied the use of vegetation indices from sensors like NOAA/AVHRR and Terra/MODIS. To generate smooth time-series from noisy input data we have developed curve-fitting methods implemented in the TIMESAT package [1]. We have furthermore tested how these data relate to variations in fractionally absorbed photosynthetically active radiation (fAPAR) [2]. This is one component in the computation of net primary production (NPP) together with variations in PAR flux [3] and the light use efficiency factor [4]. Based on data from carbon flux towers we are developing methods for computation of NPP and the net carbon balance for Nordic forests [5], wetlands [6], and for semi-arid areas [7]. The high time-resolution of the data enables their use for environmental monitoring. By integrating remotely sensed data with output from a mechanistic ecosystem model, the LPJ-GUESS, we have investigated the driving forces for the Sahelian drought [8]. This has enabled better understanding of the climate – human interaction in these ecosystems. A further area of research is the use of coarse-resolution data for phenology and phenology variations [9]. Of relevance to the Nordic countries is to investigate how visible phenological events in needle-leaf forests are in remote sensing data since temperature strongly regulates the biochemical processes that determine phenology. Also, disturbance of the phenological cycle due to insect attack is an important application field [10].

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