

We present an evaluation of the operational MODIS Leaf Area Index (LAI) product over two temperate deciduous forests and focus on the seasonal variation. Two EUROFLUX beech (*Fagus sylvatica*) sites, Hesse, France and Sorø, Denmark, were selected for this evaluation. The local LAI seasonal courses from the years 2001 to 2003 were retrieved based on a local radiative transfer model using above and below canopy radiation measurements. The MODIS LAI time series for the same years was created by downscaling the downloaded MODIS LAI data and filtering with the associated quality flags. Validation of MODIS LAI in the temporal scale included the traditional absolute value check and more importantly, the pattern check. Although MODIS LAI has generally lower absolute values than the local model, it is able to resemble the general patterns of the LAI seasonal trajectory of typical temperate deciduous forests. However, some obvious discrepancies are also noted in the two LAI time series. The MODIS LAI time series tends to rise early, to have a relatively short period of leaf constant period, and to have a much longer LAI decreasing period in the leaf senescent period as compared with the local LAI seasonal courses. The onset dates detected through MODIS LAI are significantly earlier than the local LAI determinations, which lead to the longer growing season length. It remains unclear if this apparent anticipation of canopy greening is caused by understorey or herbal layer greening, that is known to occur earlier in European Beech forests or by other factors. The results indicate that MODIS LAI retrieval in these complex multi-layer deciduous forests is not unequivocal even with advanced sensors and algorithms, and care should be taken before using MODIS LAI retrieval for regional scale modeling applications