

Project acronym: DYPFLU

Project title: Dynamics of photosynthetic pigment in subarctic plants under fluctuating light conditions

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Discipline: Earth Sciences & Environment

Station(s): Hyytiälä Forest Research Station SMEAR-II (Finland)

Plant photosynthetic responses are astonishingly poorly characterised in arctic and sub-arctic ecosystems despite their relevance on global carbon cycles. Particularly, composition and dynamics of photosynthetic pigments are absolutely understudied as recently revealed by our group (Esteban et al 2015). In this meta-analysis about plant pigment composition and dynamics, only 3 out of 525 revised publications had been conducted at latitude above 60°. On a daily scale, cycles of synthesis/degradation of antenna components (chlorophylls) (Fukushima et al 2009) and inter-conversion of xanthophylls within the violaxanthin (V) cycle (Demmig-Adams and Adams 1996) occur. This cycle modulates the efficiency of light energy conversion by the photosynthetic apparatus, being able to reduce plant productivity up to 20% under fluctuating light conditions (Kromdijk et al. 2016), and its detection by reflectance measurements can be used as a proxy to estimate photosynthetic activity by remote sensing (Porcar-Castell et al 2014).

Thus, DYPFLU project aims at characterising daily changes in chlorophyll and carotenoid composition in species representative of the main functional groups in boreal ecosystems, under long day-light photoperiod (around summer solstice). This includes at least one tree (*Pinus sylvestris*), one dwarf tree (*Betula*), one shrub (*Vaccinium*), one herb (*Eriophorum*), one moss (*Sphagnum*) and one lichen (*Bryoria*). Sampling collection for pigment analyses and chlorophyll fluorescence measurements will be conducted at Hyytiälä Forest Research Station (SMEAR II), Finland. From this study new light on the functioning of boreal ecosystems is expected as well as new knowledge relevant for the correct interpretation of remote sensing data.