

# Phenology cameras observing boreal ecosystems of Finland

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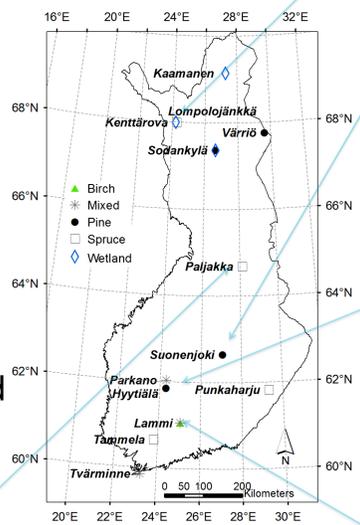
## Network

We established a network of cameras that are observing phenological changes in boreal ecosystems of Finland. Sites include intensively monitored eddy-covariance sites, LTER and ICP II sites and other sites with phenological monitoring.

Presently, 26 cameras at 14 sites take images at 30 min intervals.

Sites include spruce, pine, wetland, and mixed species sites.

Sites have 1-3 cameras positioned above canopies, crown level, and/or at ground level.



Figs: Kenttäröva spruce (top) and Suonenjoki pine (left) sites.



Fig: Ground camera monitors understorey green-up and snow cover in Hyytiälä.



Fig: Camera at Lammi LTER offers various elements for image analyses.

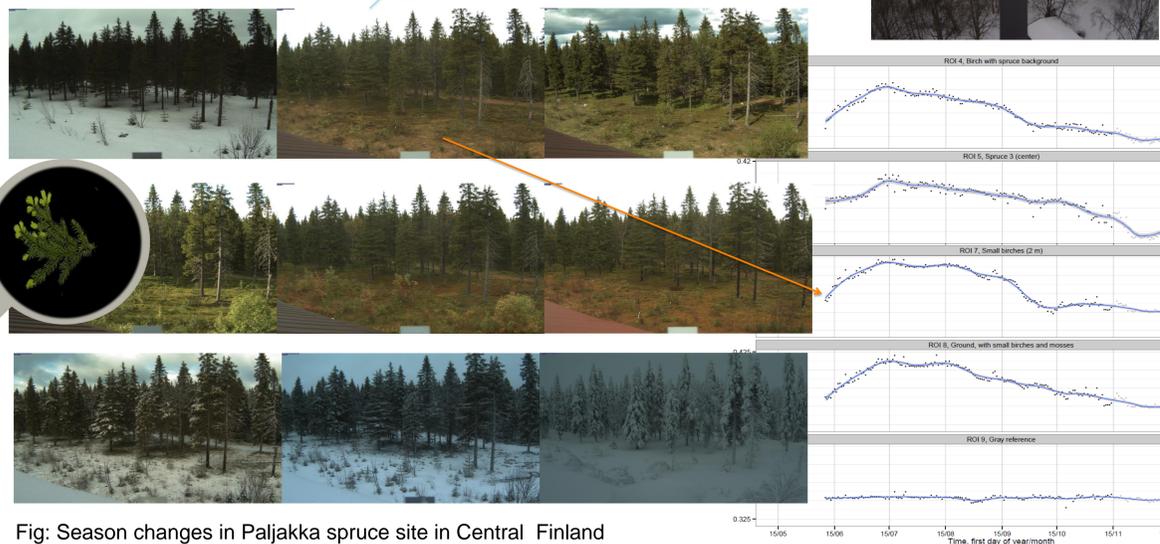


Fig: Season changes in Paljakka spruce site in Central Finland

## Questions and examples

How useful are cameras in the timing of phenological events and the seasonal development of photosynthesis?

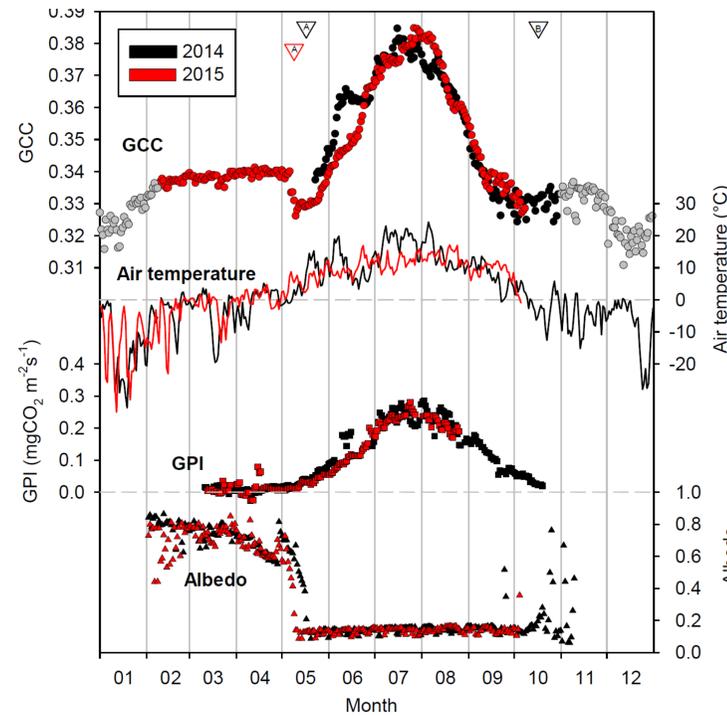
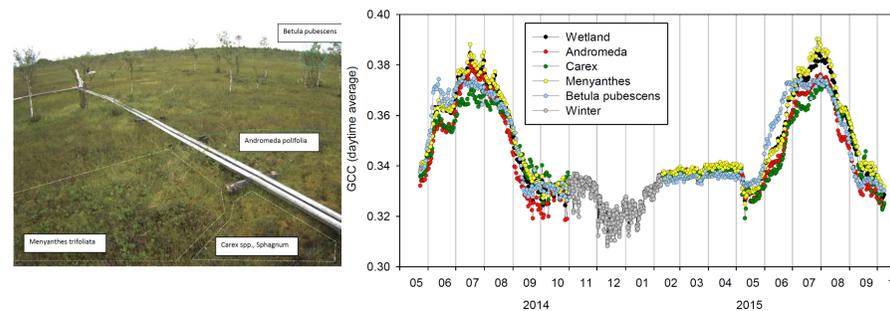


Fig: Average GCC (top panel) of Sodankylä wetland (see figure Ibelow), and air temperature, photosynthetic index (GPI), and albedo of the same site. Gray circles suffer from low light during the winter (Linkosalmi et al., manuscript).



Figs: GCC changes by vegetation patch in Sodankylä wetland (Linkosalmi et al., manuscript).

Can camera derived information be used in improving EO-products of phenology and snow cover?

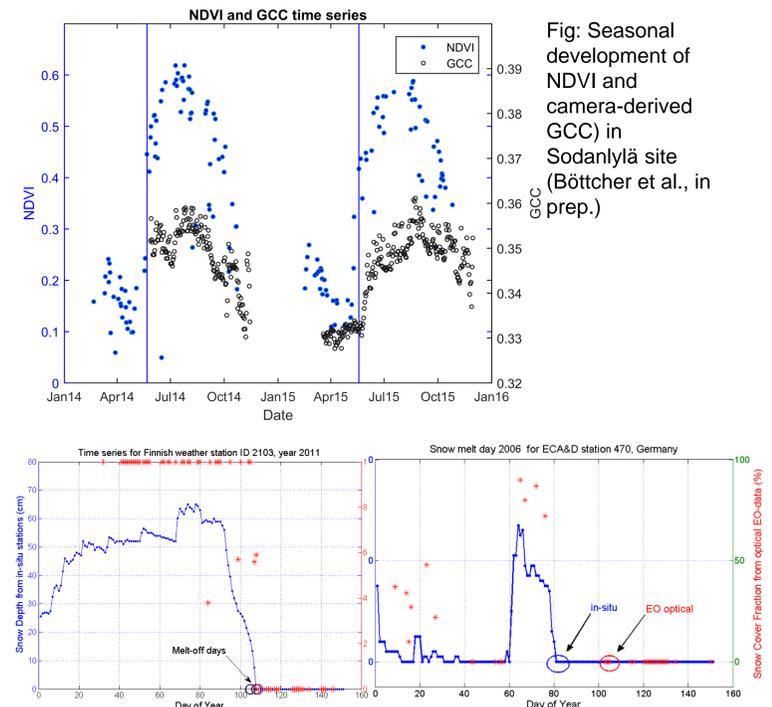


Fig: Estimates of end of snow cover based on EO-observations. Estimates are accurate when sky is clear and EO image time series is continuous (left). Melt-off days can be severely biased (right) when there are cloud gaps in the EO image time series (Metsämäki et al., in prep.).



Figs: Left: Original image. Right: identified snow covered (gray) and snowless (white) areas. Blackened area was excluded from the analysis. Tanis et al. in prep..