BalanC

Project status and progress

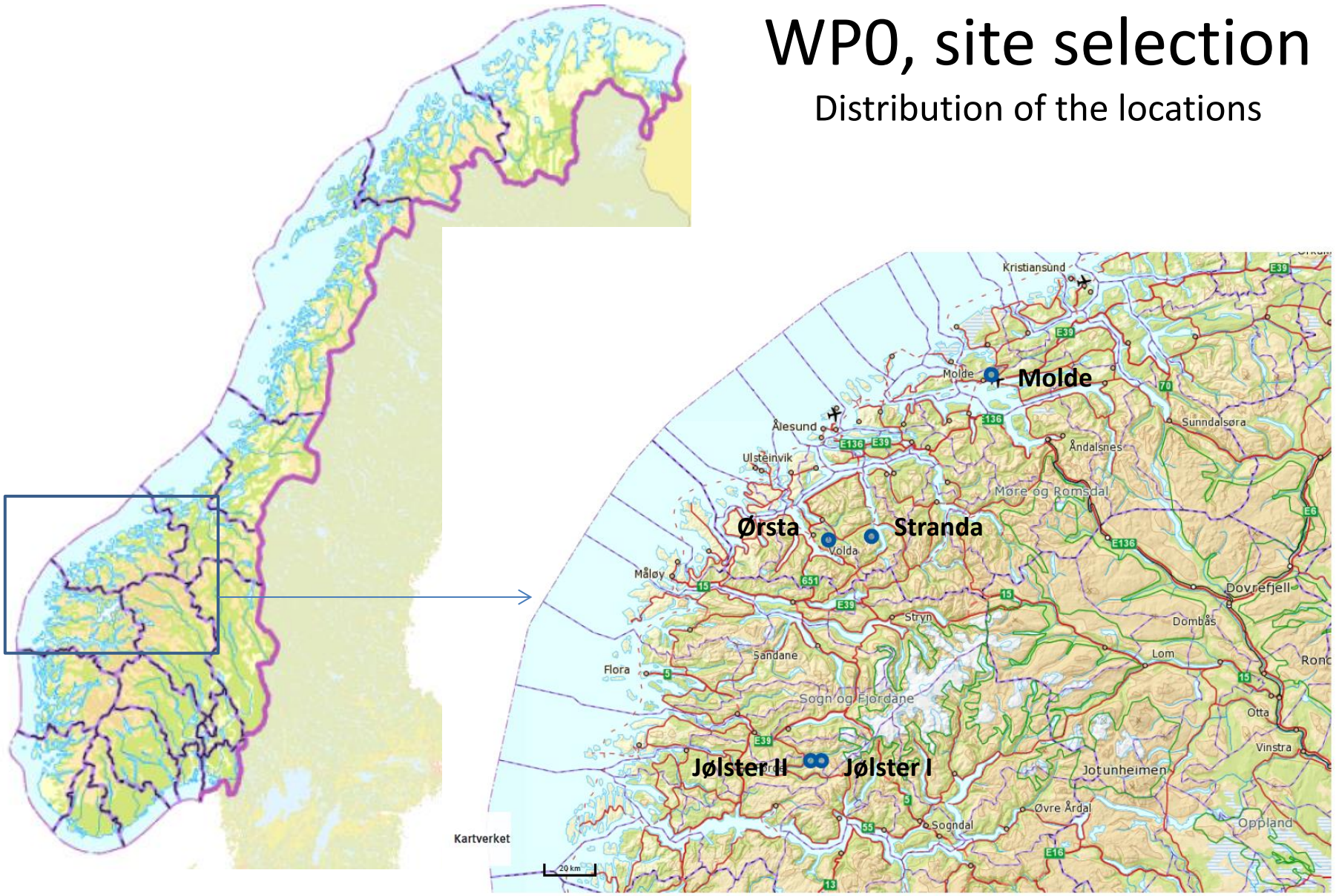
09.11.2016

O. Janne Kjønaas

Photo: O.Janne Kjønaas

WP0, site selection

Distribution of the locations



Effects of tree species change on the C balance:

The selection of location was limited to effects of tree species change. This included locations where the C stocks in trees, ground vegetation and soil in the spruce stands were affected by a change in tree species from birch to spruce. The C pools in trees, ground vegetation and soil in the paired adjacent birch stands were not subjected any changes related tree species or land use change at the time of or following the spruce planting.

Traces of former birch stands were observed in spruce stands in the form of downed dead branches, standing dead wood or stumps.

According to the government policy to mitigate climate change through planting forest in new areas (Report M26-2013), new areas suitable for planting include, amongst others, regrowth areas and non-managed areas with deciduous forest where forest production may increase through a change in tree species. The definition of regrowth areas include forests that have met the definition of forest for a long time and has no signs of reforestation, but has a lower C uptake potential than what can potentially be achieved in the area by planting of a different tree species.

Photos: O.Janne Kjønaas

Molde

S facing slope
Spruce: cutting class 4, age 40 (?)
Gnr/Bnr: 69/6 (birch), 69/1 (spruce)

New plot 7 spruce replaces plot 6 spruce due to different «proveniens». Both plots were sampled for soil chemistry and tree parameters were recorded.

Photos: O.Janne Kjønaas

Stranda

S facing slope
Spruce: cutting class 4, age 45(?)

Gnr/Bnr: 44/1, 43/1 (birch),
44/2, 43/3 (spruce)

Plot 1 and 2 are situated at the upper eastern part of the spruce stand, plot 3 – 6 are situated at the western part of the spruce stand

Photos: O.Janne Kjønaas

Ørsta

E - NE facing slope
Spruce: Age 60 (planted 1956),
cutting class 4,

Gnr/Bnr: 41/5 (birch), 41/1 (spruce)

Plot 1-4 are situated below the road, - plot 5 and 6 above the road (further west).

Photos: O.Janne Kjønaas

Jølster I

N facing slope
Spuce: Age 60, cutting class 4,

Gnr/Bnr: 39/2 (birch and spruce)
(two owners when planting took place)

Plots are located on the top of ravines cutting through the landscapes

Photos: O.Janne Kjønaas

Jølster II

N facing slope
Spuce: Age 45, cutting class 4,

Gnr/Bnr: 42/6, 42/1 (birch),
42/3 (spruce)

Plot 5 birch and 6 spruce was replaced by new plots 5b and 6b
due to different soil moisture conditions.
Soil samples were collected in all plots.

Plots are located on the top of ravines cutting through the landscape

Photos: O.Janne Kjønaas

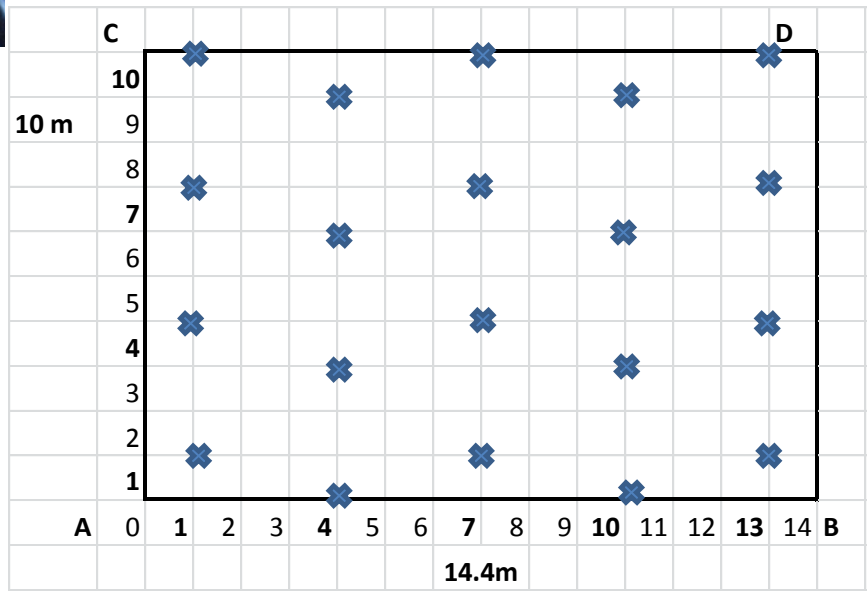
WP2 Soil C stock

Grid sampling (plot size 144 m^2)

- Soil chemistry – C pools
- Soil quality
- DNA fungi + earth worms
- Stone content

1 bulked sample per layer per plot based on
- 20 samples divided into
- 1 humus layer, and 4 mineral layers sampled by depth

Photos: O.Janne Kjønaas



Soil profile

profile description
soil chemistry – soil type
bulk density
stone content

The depth of the soil profile is down to C horizon, or down to 1 m, or to bedrock (Profiles from Jølster I birch and Ørsta spruce)

The vegetation layer including the humus layer is carefully removed and placed on top afterwards

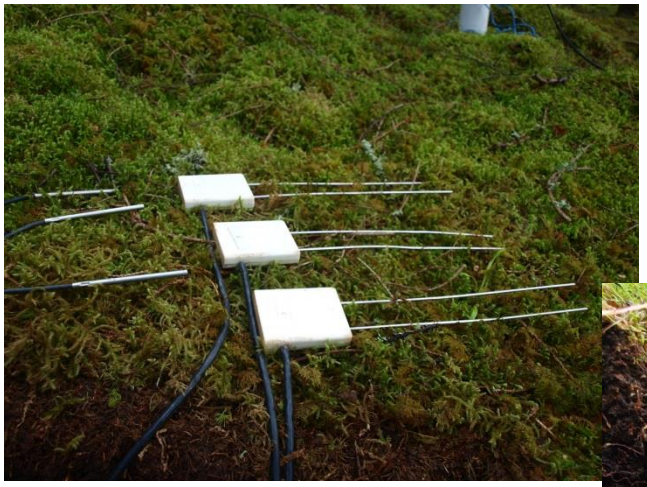
Photos: O.Janne Kjønaas

WP1 Climate data

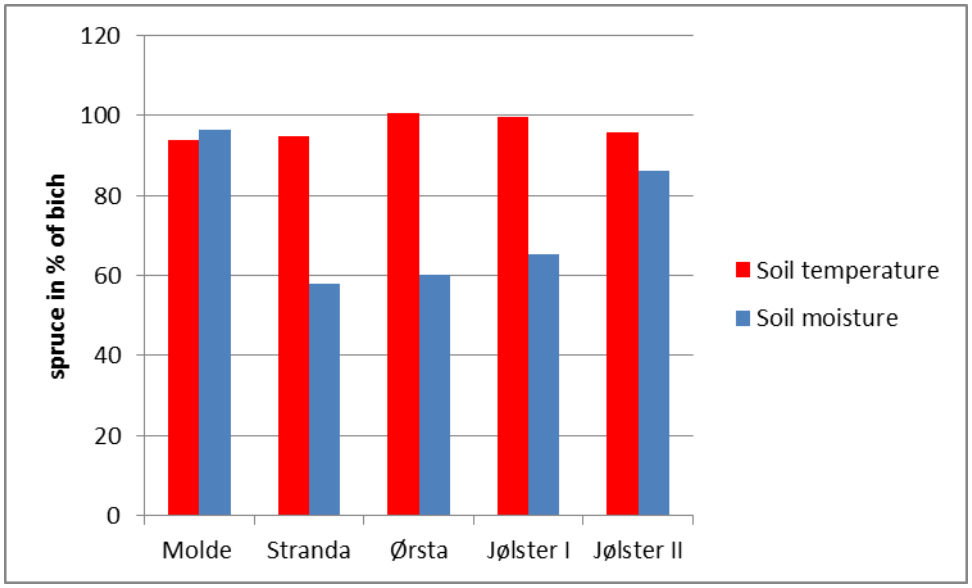
TOMS

Continuous measurements of soil+ air temp. and soil moisture at each soil respiration point

Climate stations, continuous measurements of radiation , air temperature, and soil temperature and moisture at 3 depths in each soil profile



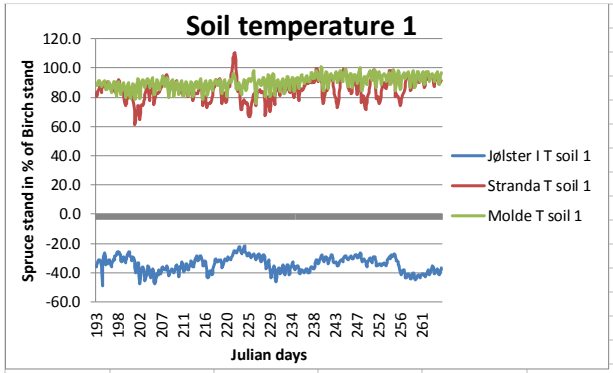
Photos: O.Janne Kjønaas

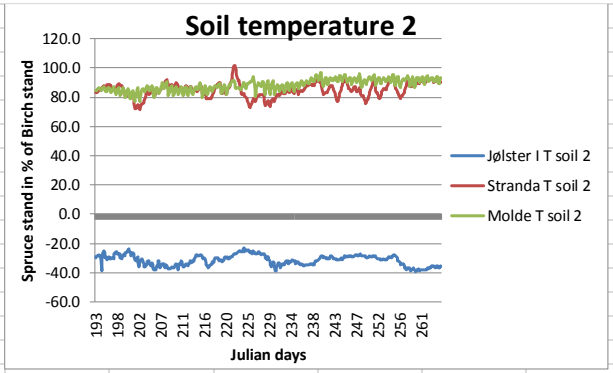


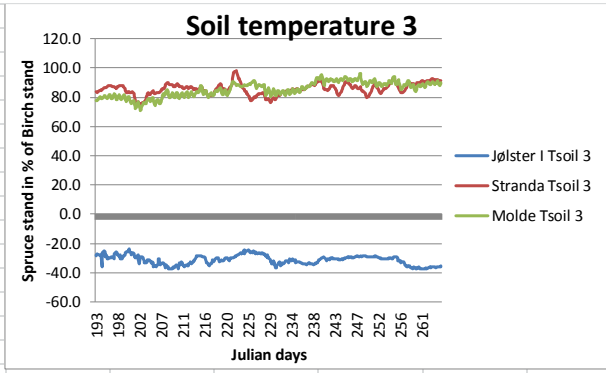
WP 1 Soil temperature and soil moisture

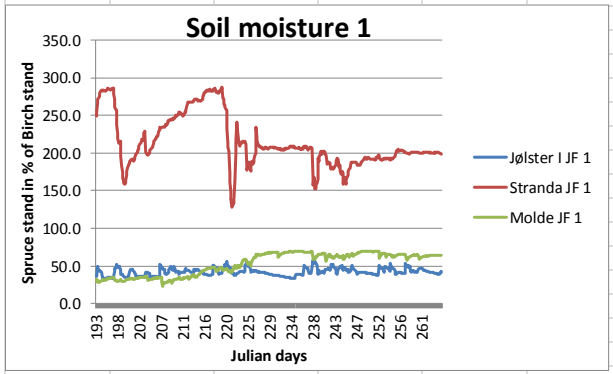
Spruce in % of birch - *very preliminary results*

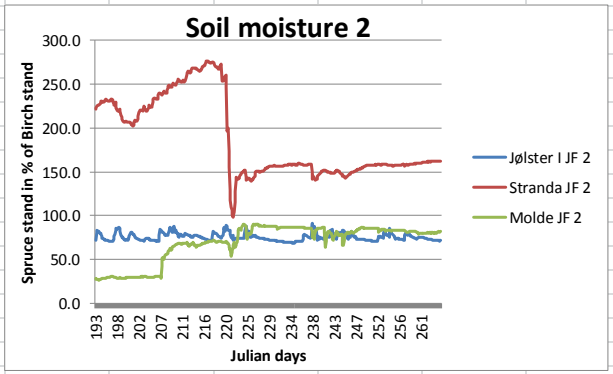
Spatial vaiability - mean of 12 EGM points pr plot in September (left)
Temporal variability from climate stations (below)
(Jølster soil temperature sensors out of order)

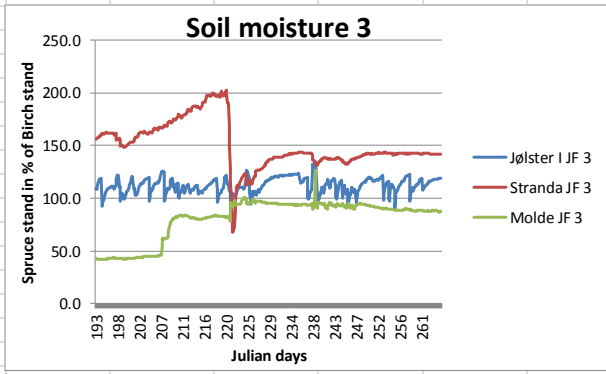










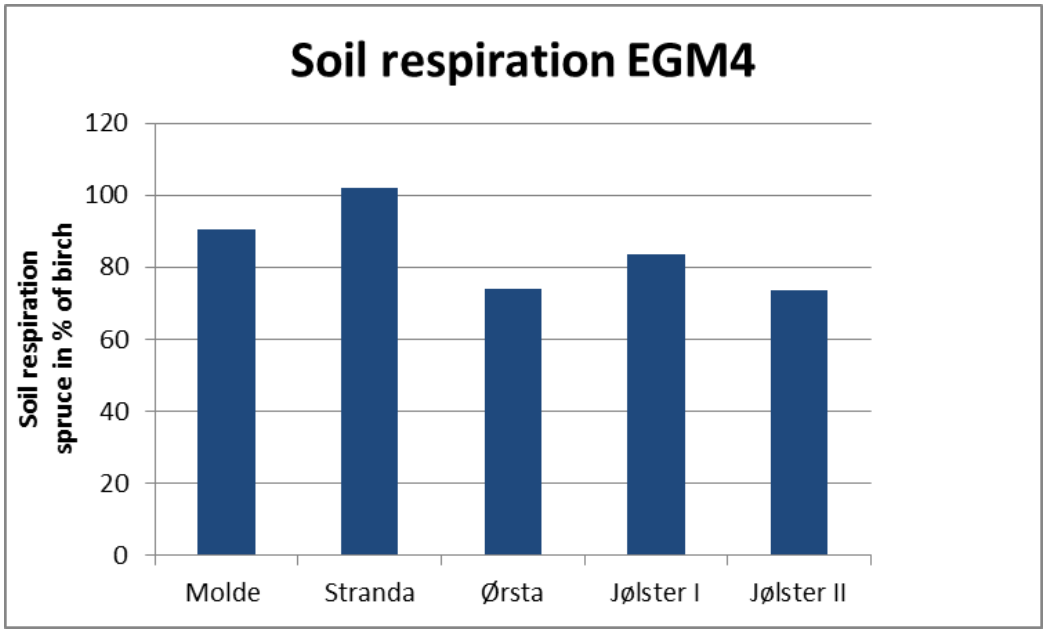


WP 1 Soil respiration

Spatial variability in soil respiration by use of EGM4 – measured in all plots at all locations (n=12)

Temporal variability in soil respiration measured by continous eos$FDCO_2$
(Forced diffusion chamber) at Jølster I

Photos: O.Janne Kjønaas

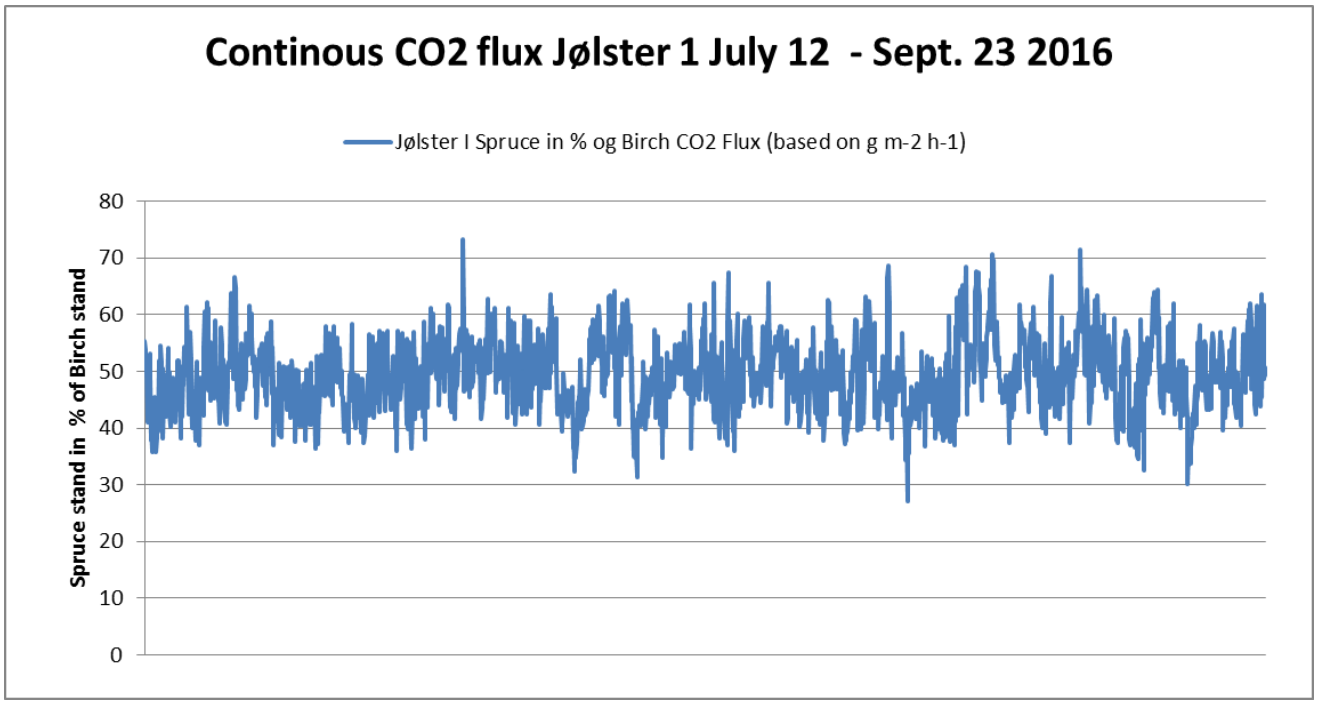


Soil respiration

Very preliminary results

Soil respiration in spruce stand in % of in birch stand

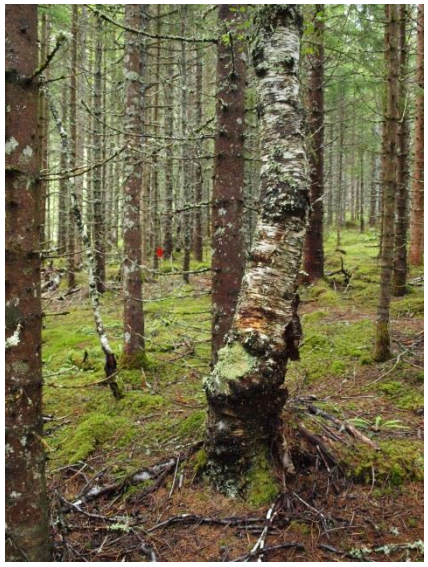
EGM4:
n=36 (3x12) pr stand at each location, measured in September 2016



eosFDCO$_2$:
n=1 in one birch and spruce plot at Jølster I between July and September 2016.

Tree biomass

Photos: O.Janne Kjønaas



At all locations, diameter and height were measured on all trees in the 144 m^2 plots and in an additional area of 106 m^2 (total of 250 m^2).
Tree species were recorded.
Standing dead and downed dead biomass was measured, and the stage of decay was recorded. Living trees were cored to determine age based on tree rings.
Provenance of spruce trees was recorded (bark color, bark structure)

Ground vegetation biomass

Samplet at Jølster I and Jølster II in 2016:

% Coverage of dominating ground vegetation species was recorded in 0.5x0.5 m plots and ground vegetation biomass was harvested.

Photos: O.Janne Kjønaas

Upcoming tasks 2017

- The processing of the soil samples for DNA studies will start in January.
- Soil respiration will be measured 3 times during the growing season, starting in May, and soil will be sampled for lab incubation etc in September.
- Studies on soil quality will start in November - following the collection of soil samples at the soil respiration points in September.
- Ground vegetation biomass will be harvested in Ørsta, Stranda and Molde in August. Biomass samples will be sorted, dried and weighted.
- Product value chain – survey; analyze main end-use products and current Norwegian sawmills industry systems; - detailed scenarios for analyses and dynamic model for forest carbon cycle.
- Presentation of preliminary results on soil and tree C pools, soil respiration and climate data at the IUFRO conference in Freiburg.