Carbon photoassimilation by dominant species of mosses and lichens in pine forests of Central Siberia

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Objectives

- to determine the stocks of moss-lichen stratum;
- to study the photoassimilation activity of its dominant species during the growing season;
- to identify the reaction of CO_2 exchange of dominant mosses and lichens from relansionship the enviromental factors: temperature, photosynthetically active radiation (PAR) and CO_2 concentration.

Methods

•To assess the phyto (bio) mass stocks the grass-shrub and moss-lichen layers were sampled in 100 replicates in each type of forest from 20x25 cm subplots (S = 50 cm^2).

• The intensity of CO_2 photoassimilation was determined in situ by Walz GFS-3000 (Heinz Walz GmbH, Effeltrich, Germany) infrared gas analyzer.

•. Photosynthetic activity was measured during the growing season of 2018 in June, July, August and September around the mid-day time.

• For every time point we also analyzed CO_2 exchange dependence from temperature, PAR and CO_2 concentration.

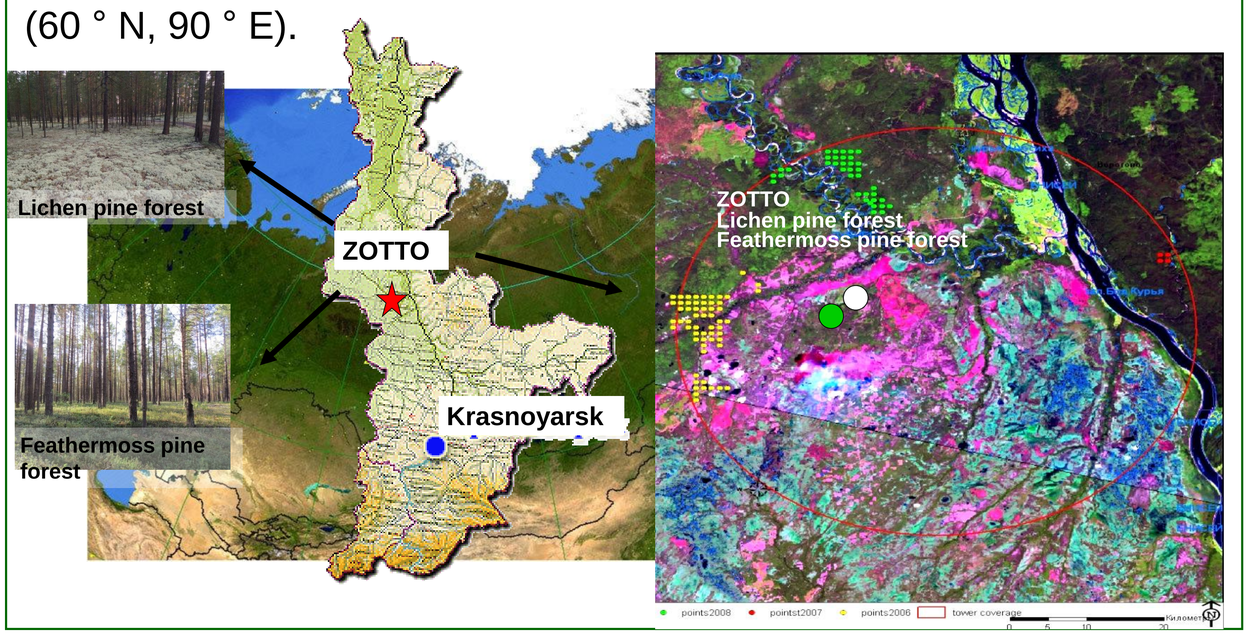
A portable open-flow infrared gas analyzer (GFS-3000, Walz, Effeltrich, Germany).

Conclusions

- The stock of the phyto (bio) mass of the moss-lichen layer in the pine forests of the study area are comparable to the photosynthesis phytomass of the tree layer.
- The moss-lichen layer accounts for 78-96% of the total phytomass of the ground cover in pine forests of Central Siberia.
- The dominants of the moss-lichen layer retained high photoassimilation activity throughout the growing season when the studies were carried out (June-September 2018).
- The rate of photosynthesis mosses and lichens showed log growth with increasing light, CO_2 concentrations and temperature.

Study area

Central Siberia - near by the Zotino tall tower observation ZOTTO (60 ° N, 90 ° E).



Results

Fig. 1 Stocks of organic matter of subordinate layers of vegetation and phytomass of the tree layer

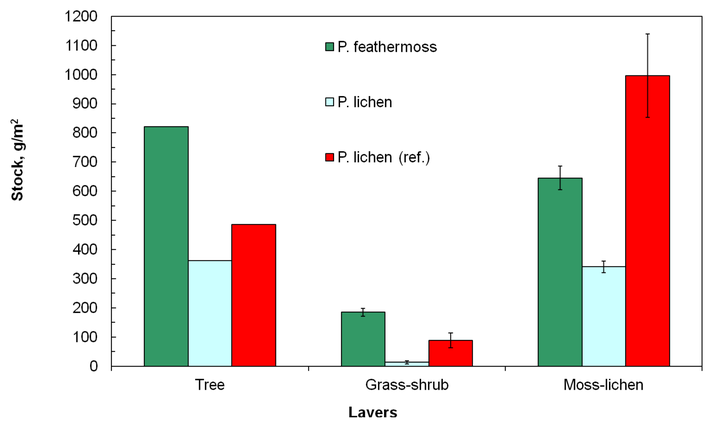


Fig. 2 Photoassimilation activity of the dominant moss (a) and lichen (b) species in pine ecosystems the during growing season different days of growing season

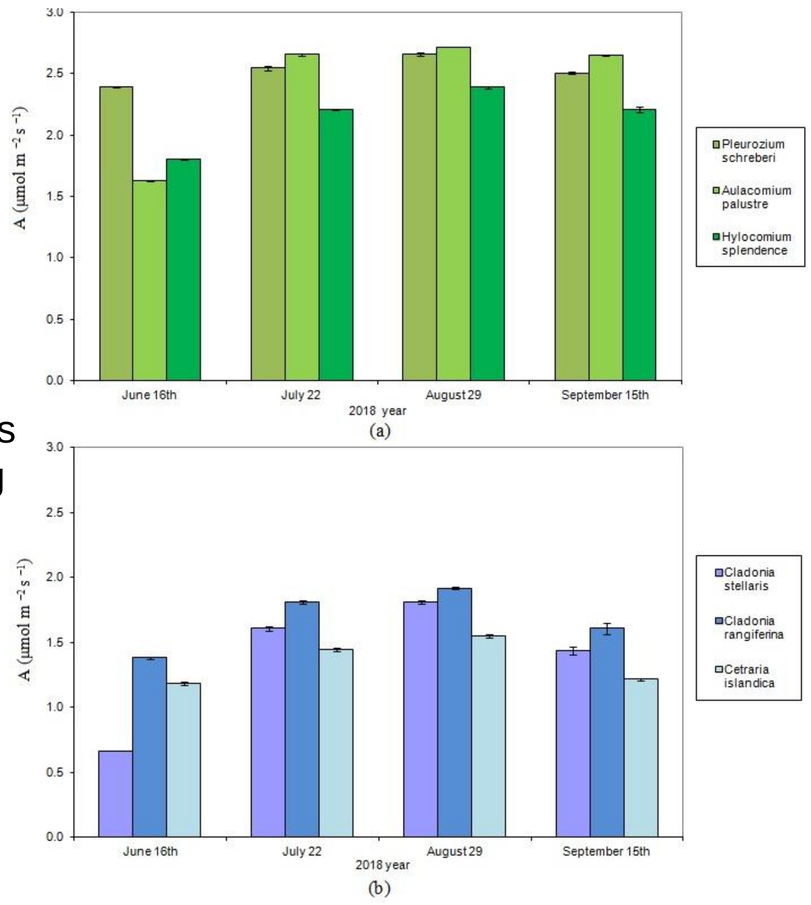
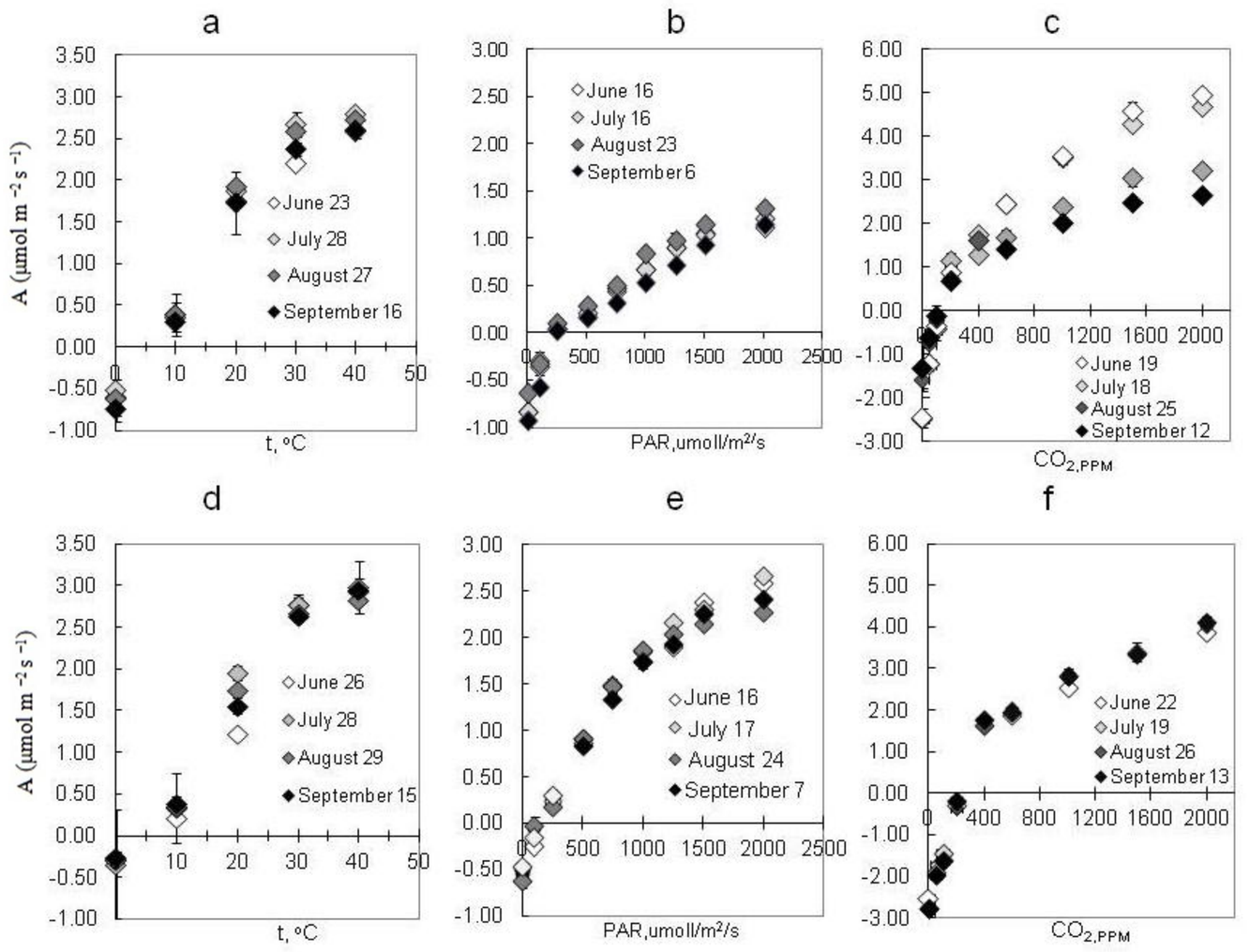


Fig. 3 The response of photoassimilation intensity (A, μmol m $^{-2}$ s $^{-1}$) of *Cladonia stellaris (Opiz)* and *Pleurozium schreberi (Brid.) Mitt.* to air temperature (a and d), PAR (b and e), CO_2 concentration (c and f) at different days of growing season



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