Pfeiffer, E.M., Vybornova, O., Kutzbach, L., Fedorova, I., Knoblauch, C., Tsibizov, L. & Beer, C. (2021) Focus Siberian Permafrost – Terrestrial Cryosphere and Climate Change, International Online Symposium, Institute of Soil Science – Universität Hamburg March 24 –25, 2021

Berichte zur Polar- und Meeresforschung - Reports on Polar and Marine Research, 750, 112 pp.
https://doi.org/10.48433/BzPM_0750_2021

Erratum p 54 Kashkevich et al. and p 86 Shibistova et al.

GEOECOLOGICAL STUDIES OF THE TUNKINSKAYA DEPRESSION (BURYATIA, RUSSIA)

Marina Kashkevich[1], Olga Galanina[1], Nadezhda Voropay[2,3], Tatyana Parshina[1], Irina Fedorova[1]

[1]Saint Petersburg State University, St. Petersburg, Russia
[2]V.B. Sochava Institute of Geography SB RAS, Irkutsk, Russia
[3]Institute of Monitoring of Climatic and Ecological Systems SB RAS, Tomsk, Russia

The Tunkinskaya depression is situated in Buryatia western Baikal Lake. Geology of the depression is a paleolake bottom, it had periods of volcanism 10-12 kyr BP. Currently the Tunkinskaya Depression is a lowland with a sporadic permafrost, the local landscapes have been changed due to irrigation (drying for agriculture during the second part of XX century) with wetlands recovering last 30 years. First observations of the Tunkinskaya Depression's overwatering specific were carried out. Geophysical, hydrological and peat studies had been made in 2020 in additional to the previously obtained soil sample and data on temperature dynamic since 2011. Borehole automatic soil temperature loggers have 3.2-5 m dept. The temperature varies in the range of -0.5/-3.5 °C during the year (mainly wetlands) in the areas of isolated permafrost. In summer, the depth of active layer does not exceed 1-1.2 m.

Ground Penetrating Radar (GPR) profiles clear show the permafrost table on 60-65 cm around studied lake with wetland catchment and 90-95 cm – in forest landscape nearby a river. Permafrost bottom has been determined by GPR at the depth about 5 m. GPR measurements are confirmed by the drilling results. However, anthropogenic modified soil and burned landscapes do not have permafrost table in 10-15 m according to the geophysical (GPR) data.

Koymorskiye wetlands are characterizes by mineral groundwater springs that effect on plant cover and, therefore, peat deposit type. Salt water welling up is quite easy can be recognized due to loss of georadar signal that had been supported by measurements of aquifer electrical conductivity. So, at the edge of the forest (the boarder of overwatered lake catchment), aquifer mineralization was 417 mg/l, between the lake and the forest in the swampy area - 1056 mg/l, closer to the lake - 206 mg/l and in the lake itself - 150 mg/l. According to groundwater income, the lake has quite good cycling; nutrients from peatland catchment support to intensive grow of macrophytes, water oxidizing and ecosystem self-cleaning. The peat thickness varies from 20-30 cm in margin of catchment and reached 63 cm – in a central part near the overgrown lake. The wetland got a sandy bottom. Peculiarities of mineral nutrition support fen peat accumulation. The decomposition of peat is 35-40%. Peat accumulation had two stages. The upper layer of peat (0-13 cm) is characterized by predominance of lesser tussock sedge *Carex diandra* in plant remnants. Peat deposits consist of different sedges, grasses and green mosses. Sedge peat and hypnum moss-sedge peat were identified. Palaeoecologic conditions were rather similar during the peat forming period. Investigations of Koymorskiye wetlands in the Tunkinskaya Depression will be continued. Changes of permafrost table and active layer thickness due to climate change or/and anthropogenic impact caused recent landscape transformation as well as some dynamics of water regime of the studied area.

Acknowledgments
Field studies of 2020 were carried out with the financial support of Rosneft Oil Company (donation agreement from 21.06.2019).

BIOTA AS DRIVER OF MINERAL WEATHERING AND SOIL FORMATION IN MARITIME ANTARCTICA

Olga Shibistova[1,2], Jens Boy[1], Georg Guggenberger[1,2]	[1]Institute of Soil Science, Leibniz Universität Hannover, Germany
	[2]VN Sukachev Institute of Forest, SB-RAS, Krasnoyarsk, Russian Federation
Díana Boy[3]	[3]Institute of Microbiology, Leibniz Universität Hannover, Germany
Mauricio Aguirre Morales[4]	[4]École Polytechnique Fédérale de Lausanne, Switzerland
Roberto Godoy[5]	[5]Universidad Austral de Chile, Valdivia, Chile

Mineral weathering is of ultimate importance for soil formation and nutrient supply to plants, and during the last decades, the perception emerged that biota is strongly involved in this process. Here, we hypothesized that the appearance of higher plants causes an enhanced biotic attack on minerals due to the translocation of photosynthetically produced organic carbon belowground as an easily available energy source to soil microorganisms. To test this hypothesis, we investigated a glacier retreat ecosystem chronosequence in Antarctica, defining phototrophic community succession from (i) bare soils colonized by microalgae and cyano bacteria, to (ii) soils covered by mosses and (iii) a mix of mosses and the higher plant *Deschampsia antarctica* to (iv) a pure *D. antarctica* site.

Soil organic carbon contents as well as the microbial biomass carbon contents increased along with the phototrophic community succession. The presence of vascular plants was also reflected by increasing CO_2 fluxes, indicating a higher energy provision to the trophic chain in form of reduced carbon. A ^{13}C pulse labelling revealed a fast allocation of organic carbon belowground and a tight link between photosynthesis and soil respiration at *D. antarctica* site. Despite phospholipid fatty acids assigned to bacteria were dominating, most of the ^{13}C was allocated to microbial phospholipid fatty acids of fungal origin, indicating the prominent role of fungi in belowground biotic activity. Mineral mescosms consisting of biotite and muscovite incubated in the soils *in situ* for one year, also showed coverage and weathering channels primarily by fungi in case of *D. antarctica*. A close relationship between the gross primary production and the fungal colonization of the minerals suggests that freshly assimilated carbon appears the major energy source of biotic weathering. Untargeted metabolom analysis further revealed that this goes along with a strong increase of Krebs cycle acids, which are mineral weathering agents.

Overall, our results indicate that the occurrence of higher plants mark a tipping point for mineral weathering and soil development of Maritime Antarctica.