Data Article

Data on chemical characteristics of waters in two boreal Sphagnum mires (North-Western Russia)

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A R T I C L E   I N F O

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A B S T R A C T

The dataset contains chemical parameters of waters in different mire water bodies (fen strip, bog stream, Sphagnum hollows, hollow-pools, intra-mire lakes, drainage way). Data were collected once a month from May till September 2012 and in May, July and September 2013 and 2014 in Shichengskoe and Alekseevskoe-1 mires (Vologda Region, Russia). Water samples were kept in a cooling bag and transported to the laboratory within a day. Prior to analyses, water samples were filtered (pore size 90 μm). Colour of water, pH, permanganate value, dry residues, and total iron, manganese, carbonate, phosphate, sulphate and nitrate ion concentrations were measured. Data were obtained by the atomic absorption spectrometry and spectrophotometric and titrimetric methods. The pH values varied from 3.7 in Sphagnum hollows to 6.9 in a bog stream and 7.2 in a primary intra-mire lake. The minimum permanganate value of 5.6 mg O/L was registered in a bog stream, the maximum of 150.4 mg O/L in a weakly waterlogged Sphagnum hollow. Dry residue values varied in a range of 35 mg/L in a large hollow-pool to 315 mg/L in a flow-through fen strip. The data are useful for investigating chemical composition of waters in different mire water bodies and the heterogeneity of these abiotic factors.

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1. Data

Table 1 provides general description of the sampling sites located in two wetlands, Shichengskoe and Alekseevskoe-1 mires. Table 2 presents data on colour of water, pH, permanganate value, dry residues, concentrations of total iron, manganese, and carbonate, phosphate, sulphate and nitrate ions in water samples collected in a fen strip, a bog stream, and a Sphagnum hollow in Shichengskoe mire in 2012 and 2013. Table 3 summarizes hydrochemical data for a fen strip, a bog stream, Sphagnum hollows, hollow-pools, intra-mire lakes, and a drainage way in Shichengskoe and Alekseevskoe-1 mires in 2014. Figs. 1–3 show the general view of the mires.

2. Experimental design, materials, and methods

Water level (or depth in a stream, hollow-pools and lakes) was measured by a steel ruler or a rope-weight gauge. Five measurements were made per sampling plot; min and max values are given in the article (Table 2, Table 3). Temperature in the water surface layer was measured using a standard mercury filled centigrade thermometer. Water samples were collected in clean plastic bottles, kept in a cooling bag and delivered to the laboratory within a day. Water samples were then filtered through a 0.90 μm filter.
Table 1
Sampling sites and dates of sampling.

| Data collection area                              | Mire waterbody                           | Sampling site ID | Coordinates          | Sampling date         |
|--------------------------------------------------|------------------------------------------|------------------|----------------------|-----------------------|
|                                                  |                                          |                  |                      | May       | June       | July       | August     | September  |
| **Vologda Region, Syamzha District, Shichengskoe Mire** | flow-through fen strip                   | S1               | 59°56'51" N 41°17'09" E | 2012-05-27  | 2012-06-27  | 2012-07-27  | 2012-08-27  | 2012-09-27  |
|                                                  |                                          |                  |                      | 2013-05-26  | 2013-06-27  | 2013-07-15  | 2013-08-18  | 2013-09-19  |
|                                                  |                                          |                  |                      | 2014-05-23  | 2014-06-27  | 2014-07-15  | 2014-08-27  | 2014-09-19  |
|                                                  | Sphagnum hollow (weakly waterlogged)     | S2               | 59°56'31" N 41°16'54" E | 2012-05-27  | 2012-06-27  | 2012-07-27  | 2012-08-27  | 2012-09-27  |
|                                                  |                                          |                  |                      | 2013-05-26  | 2013-06-27  | 2013-07-15  | 2013-08-18  | 2013-09-18  |
|                                                  |                                          |                  |                      | 2014-05-23  | 2014-06-27  | 2014-07-18  | 2014-08-27  | 2014-09-18  |
|                                                  | bog stream                               | S3               | 59°56'26" N 41°16'05" E | 2012-05-27  | 2012-06-27  | 2012-07-27  | 2012-08-27  | 2012-09-27  |
|                                                  |                                          |                  |                      | 2013-05-26  | 2013-06-27  | 2013-07-15  | 2013-08-18  | 2013-09-18  |
|                                                  |                                          |                  |                      | 2014-05-23  | 2014-06-27  | 2014-07-18  | 2014-08-27  | 2014-09-18  |
|                                                  | Lake Shichengskoe (primary intra-mire lake) | S4               | 59°56'59" N 41°19'15" E | –          | –          | 2012-07-28  | –          | –          |
|                                                  |                                          |                  |                      | –          | –          | 2014-07-16  | –          | –          |
|                                                  | Lake Polyanok (primary intra-mire lake)  | S5               | 59°55'58" N 41°31'41" E | –          | –          | 2014-07-14  | –          | –          |
| **Vologda Region, Sokol District, Alekseevskoe-1 Mire** | Sphagnum hollow (weakly waterlogged)     | A1               | 59°27'09" N 40°30'36" E | 2014-05-25  | –          | 2014-07-20  | –          | 2014-09-21  |
|                                                  | Sphagnum hollow (moderately waterlogged) | A2               | 59°27'11" N 40°30'46" E | 2014-05-25  | –          | 2014-07-20  | –          | 2014-09-21  |
|                                                  | Sphagnum hollow (strongly waterlogged)   | A3               | 59°27'11" N 40°30'55" E | 2014-05-25  | –          | 2014-07-20  | –          | 2014-09-21  |
|                                                  | hollow-pool (small)                      | A4               | 59°27'12" N 40°30'58" E | 2014-05-25  | –          | 2014-07-20  | –          | 2014-09-21  |
|                                                  | hollow-pool (medium)                     | A5               | 59°27'11" N 40°30'59" E | 2014-05-25  | –          | 2014-07-20  | –          | 2014-09-21  |
|                                                  | hollow-pool (large)                      | A6               | 59°27'07" N 40°31'03" E | 2014-05-25  | –          | 2014-07-20  | –          | 2014-09-21  |
|                                                  | drainage way                             | A7               | 59°27'10" N 40°30'32" E | 2014-05-25  | –          | 2014-07-20  | –          | 2014-09-21  |
Table 2
Chemical characteristics of water in different mire water bodies of Shichengskoe mire in 2012 and 2013.

| Parameter, units | Sampling date (see Table 1) | 2012 | 2013 |
|------------------|-----------------------------|------|------|
|                  | Sample ID                   | S1   | S2   | S3   | S4   | Sample ID | S1 | S2 |
| Colour of water, PCU | May                         | 269  | 89   | 258  | –    | 162       | 75 | 236 |
|                   | June                        | 210  | 121  | 350  | –    | –         | –  | –   |
|                   | July                        | 286  | 124  | 432  | 119  | 328       | 118| 249 |
|                   | August                      | 310  | 127  | 210  | –    | –         | –  | –   |
|                   | September                   | 173  | 115  | 369  | –    | 153       | 102| 137 |
| pH               | May                         | 4.9  | 4.3  | 6.4  | –    | 5.6       | 4.6| 6.2 |
|                   | June                        | 5.5  | 4.1  | 6.1  | –    | –         | –  | –   |
|                   | July                        | 5.3  | 4.1  | 6.9  | 7.1  | 5.7       | 4.4| 6.3 |
|                   | August                      | 5.2  | 4.  | 6.5  | –    | –         | –  | –   |
|                   | September                   | 5.1  | 4   | 5.9  | –    | 5.8       | 4.9| 6.7 |
| Permanganate value, mg O/L | May                    | 45.6 | 32  | 43.2 | –    | 27.2      | 19.6| 32 |
|                   | June                        | 46.4 | 39.2| 5.6  | –    | –         | –  | –   |
|                   | July                        | 64.8 | 64.8| 64.8 | 64.8 | 72.8      | 22.8| 49.6|
|                   | August                      | 96.8 | 68.8| 50.4 | –    | –         | –  | –   |
|                   | September                   | 45.2 | 45.6| 71.2 | –    | 84        | 88 | 50.4|
| Dry residues, mg/L | May                         | 77   | 94   | 49   | –    | 90        | 85 | 107 |
|                   | June                        | 114  | 104  | 103  | –    | –         | –  | –   |
|                   | July                        | 171  | 144  | 162  | 128  | 315       | 242| 244 |
|                   | August                      | 205  | 162  | 237  | –    | –         | –  | –   |
|                   | September                   | 118  | 86   | 144  | –    | 184       | 215| 303 |
| Total iron, mg/L  | May                         | 5.35 | 0.12 | 0.56 | –    | 1.38      | 0.05| 0.41|
|                   | June                        | 4.2  | 0.19 | 0.92 | –    | –         | –  | –   |
|                   | July                        | 9.7  | 0.2  | 1.6  | 0.3  | 16.9      | 0.22| 3.99|
|                   | August                      | 2.5  | 0.13 | 2.4  | –    | –         | –  | –   |
|                   | September                   | 1.4  | 0.08 | 0.9  | –    | 2.81      | <0.1| 6.2 |
| Manganese, mg/L   | May                         | 0.21 | <0.01| 0.02 | –    | 0.32      | 0.02| 0.01|
|                   | June                        | 0.34 | <0.01| 0.02 | –    | –         | –  | –   |
|                   | July                        | 0.49 | 0.03 | 0.11 | 0.04 | 0.48      | 0.02| 0.75|
|                   | August                      | 0.29 | 0.03 | 0.49 | –    | –         | –  | –   |
|                   | September                   | 0.24 | 0.02 | 0.06 | –    | 0.4       | 0.03| 0.68|
| Carbonate ions, mg/L | May                       | 9    | 6    | 21   | –    | 12        | 18 | 21  |
|                   | June                        | 6    | 3    | 45   | –    | –         | –  | –   |
|                   | July                        | 12   | 6    | 30   | 6    | 78        | 30 | 138 |
|                   | August                      | 18   | 12   | 162  | –    | –         | –  | –   |
|                   | September                   | 9    | 3    | 9    | –    | 42        | 24 | 237 |
| Phosphate ions, mg/L | May                       | 0.14 | <0.05| 0.28 | –    | <0.05     | <0.05| <0.05|
|                   | June                        | <0.05| 0.11 | 0.16 | –    | –         | –  | –   |
|                   | July                        | 0.39 | 0.07 | 0.24 | 0.18 | <0.05     | <0.05| 0.12|
|                   | August                      | 1.51 | <0.05| 3.25 | –    | –         | –  | –   |
|                   | September                   | 0.23 | 0.07 | 0.25 | –    | <0.05     | <0.05| 0.58|
| Nitrate ions, mg/L | May                         | 0.2  | 0.2  | 0.3  | –    | 0.5       | 0.4 | 0.4 |
|                   | June                        | 0.9  | 0.5  | 0.6  | –    | –         | –  | –   |
|                   | July                        | 0.4  | 0.3  | 0.4  | 0.4  | 0.4       | 0.3 | –   |
|                   | August                      | 1.1  | 1.1  | 0.5  | –    | –         | –  | –   |
|                   | September                   | 0.3  | 0.3  | 0.3  | –    | 0.5       | 0.6 | 0.3 |
| Temperature, °C   | May                         | 13   | 14   | 9    | –    | 15        | 16 | 11  |
|                   | June                        | 16   | 18   | 17   | –    | –         | –  | –   |
|                   | July                        | 18   | 22   | 16   | 24   | 19        | 23 | 17  |
|                   | August                      | 13   | 16   | 12   | –    | –         | –  | –   |
|                   | September                   | 9    | 11   | 9    | –    | 12        | 13 | 12  |
| Water level, cm   | May                         | 10   | 0    | 35   | 120  | 15        | 0  | 55  |
|                   | Min                         | 20   | 2    | 125  | 230  | 25        | 5  | 145 |
|                   | Max                         | 5    | –4   | 30   | 120  | –         | –  | –   |
|                   |                             | 10   | –1   | 120  | 230  | –         | –  | –   |
|                   |                             | 1    | –5   | 25   | 120  | –5        | –5 | 20  |
|                   |                             | 5    | –3   | 115  | 230  | –3        | –5 | 110 |
|                   |                             | –5   | –12  | 20   | 120  | –         | –  | –   |
|                   |                             | 0    | –10  | 110  | 230  | –         | –  | –   |
Table 2 (continued)

| Parameter, units | Sampling date (see Table 1) | 2012 | 2013 |
|------------------|----------------------------|------|------|
|                  | Sample ID | S1   | S2   | S3   | S4   | Sample ID | S1   | S2   | S3   |
|                  |           |      |      |      |      |           |      |      |      |
|                  |           | 2012 | 2013 |      |      |           |      |      |      |
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|                  |           | S1   | S2   | S3   | S4   | S1   | S2   | S3   |
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Colour of water was measured by the Platinum–Cobalt method (e.g. Ref. [2]) at 413 nm using a UNICO-1201 spectrophotometer (INICO, USA). The pH was measured using a Sartorius Basic Meter PB-11 (Sartorius, USA). Permanganate value was determined by a modification of the standard procedure [3]. Water samples were incubated with acidified potassium permanganate for 10 minutes at 100 °C. The remaining unreduced permanganate is determined by addition of excess oxalic acid and back titration with potassium permanganate. The content of dry residues in water samples was obtained after evaporation at 100 °C. Analyses of total iron and manganese were carried out by atomic absorption spectrometry using a Spektr-5 spectrometer (Soyuzsvetmetavtomatika JSC, Russia). Carbonate content was measured as carbonate alkalinity by the potentiometric titration up to pH 5.4. Phosphate ion concentrations was determined by the photometric procedure with ammonium...
orthomolybdate at 690 nm. Sulphate ion concentrations was measured by the turbidimetric procedure at 650 nm. Nitrate ion concentrations was measured by the photometric procedure with salicylic acid at 410 nm. A UNICO-1201 spectrophotometer was used for these analyses.

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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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