**SUPPLEMENTARY MATERIALS – ДОПОЛНИТЕЛЬНЫЕ МАТЕРИАЛЫ**

**CONTENTS AND DISTRIBUTION OF 137Cs IN PODZOLS IN THE LOCATION AREA OF THE KOLA NUCLEAR POWER PLANT**

**СОДЕРЖАНИЕ И РАСПРЕДЕЛЕНИЕ 137Cs В ПОДЗОЛИСТЫХ ПОЧВАХ В РАЙОНЕ РАСПОЛОЖЕНИЯ КОЛЬСКОЙ АТОМНОЙ ЭЛЕКТРОСТАНЦИИ**

M.B. Popova, D.V. Manakhov, A.N. Kizeev, S.F. Ushamova, D.N. Lipatov, A.Yu. Chirkov, P.S. Orlov, S.V. Mamikhin

**Попова М.Б., Манахов Д.В., Кизеев А.Н., Ушамова С.Ф., Липатов Д.Н., Чирков А.Ю.,**

**Орлов П.С., Мамихин С.В.**

**Eurasian Soil Science.**

**Почвоведение.**

**Table S1.** Physical and chemical properties of podzols in the location area of the

Kola nuclear power plant.

**Таблица S1.** Физико-химические показатели подзолов в зоне влияния

Кольской атомной электростанции.

|  |  |  |  |
| --- | --- | --- | --- |
| Horizon pH H2O | pH KCl | Loss onignition, Corg.,% | Exchangeable Mobile Base Particle size fractionsTotal acidity, cations K2O, saturation,cmol(+)/kg Ca2+ Mg2+ mg/100 g % <0.001 mm <0.01 mmcmol(+)/kg % |
|  |  |  |  |  |  | F (site) |  |  |  |  |  |
| О | 4.3 | 2.8 | 85.76 |  | 123.70 | 16.50 | 3.83 | 64.29 | 14.92 | - | - |
| АО | 4.3 | 2.8 | 61.36 |  | 105.60 | 7.96 | 1.59 | 57.14 | 9.25 | - | - |
| E | 4.7 | 3.1 |  | 0.44 | 3.13 | 0.19 | 0.01 | 0.71 | 6.44 | 0.95 | 8.55 |
| B1f | 4.8 | 4.4 |  | 1.41 | 4.52 | 0.24 | 0.02 | 0.96 | 6.01 | 1.45 | 10.90 |
| B2f | 5.0 | 4.7 |  | 1.26 | 2.07 | 0.14 | 0.01 | 0.76 | 7.61 | 1.33 | 10.72 |
| BC | 5.6 | 5.0 |  | 0.10 | 1.06 | 0.10 | 0.01 | 0.83 | 10.62 | 1.23 | 9.59 |
| C | 5.7 | 5.0 |  | 0.05 | 0.87 | 0.07 | 0.02 | 0.64 | 11.46 | 1.54 | 10.10 |
|  |  |  |  |  |  | S1 |  |  |  |  |  |
| О | 4.3 | 3.0 | 81.45 |  | 65.9 | 7.12 | 1.92 | 103.57 | 14,57 | - | - |
| АО | 4.5 | 3.2 | 27.08 |  | 34.3 | 3.47 | 0.65 | 39.29 | 12,63 | - | - |
| E | 4.7 | 3.4 |  | 0.27 | 1.98 | 0.17 | 0.01 | 0.76 | 9,14 | 0.20 | 2.93 |
| B1f | 5.6 | 4.7 |  | 0.65 | 3.33 | 0.34 | 0.04 | 0.90 | 10,67 | 0.31 | 2.75 |
| B2f | 6.0 | 5.1 |  | 0.17 | 1.63 | 0.14 | 0.01 | 0.59 | 9,00 | 0.20 | 1.12 |
| BC | 6.0 | 4.8 |  | 0.16 | 1.28 | 0.07 | 0.00 | 1.11 | 7,10 | 0.50 | 2.41 |
|  |  |  |  |  |  | S2 |  |  |  |  |  |
| ОL | 4.5 | 3.8 | 96.01 |  | 50.3 | 15.14 | 9.43 | 135.71 | 35,32 | - | - |
| OF | 3.9 | 2.8 | 82.54 |  | 82.5 | 7.71 | 1.63 | 75.00 | 11,71 | - | - |
| АО | 4.0 | 2.7 | 29.67 |  | 48.1 | 1.38 | 0.55 | 46.43 | 5,72 | - | - |
| E | 4.3 | 3.0 |  | 0.51 | 2.86 | 0.17 | 0.05 | 1.07 | 7,77 | 0.48 | 5.32 |
| B1f | 4.7 | 4.0 |  | 1.78 | 10.8 | 0.20 | 0.08 | 1.57 | 2,85 | 1.73 | 9.38 |
| B2f | 4.9 | 3.9 |  | 1.50 | 9.84 | 0.22 | 0.03 | 1.21 | 2,73 | 1.69 | 10.73 |
|  |  |  |  |  |  | P-1 |  |  |  |  |  |
| О | 4.2 | 2.7 | 54.85 |  | 52.6 | 7.40 | 0.79 | 50.00 | 14,97 | - | - |

%

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| АО | 4.1 | 2.6 | 50.85 |  | 64.4 | 4.29 | 0.54 | 53.57 | 8,48 | - | - |
| E | 4.4 | 2.8 |  | 0.49 | 3.56 | 0.20 | 0.22 | 0.79 | 10,92 | 0.27 | 2.90 |
| B1f | 5.1 | 4.7 |  | 1.84 | 2.25 | 0.27 | 0.08 | 0.55 | 13,75 | 0.10 | 1.59 |
| B2f | 5.6 | 4.8 |  | 0.23 | 1.03 | 0.12 | 0.08 | 0.21 | 16,76 | 0.05 | 0.40 |
| BC | 5.8 | 4.9 |  | 0.19 | 0.89 | 0.14 | 0.02 | 0.21 | 15,72 | 0.07 | 0.28 |
| C | 6.0 | 4.8 |  | 0.05 | 0.72 | 0.12 | 0.02 | 0.28 | 17,37 | 0.03 | 0.12 |
| P-2 |
| О | 4.2 | 2.9 | 86.37 |  | 82.5 | 14.48 | 1.42 | 114.29 | 18,18 | - | - |
| АО | 4.4 | 2.7 | 41.29 |  | 48.1 | 6.45 | 0.69 | 42.86 | 14,33 | - | - |
| E | 4.3 | 3.0 |  | 0.50 | 2.68 | 0.10 | 0.04 | 1.08 | 5,51 | 0.53 | 7.59 |
| B1f | 5.0 | 4.2 |  | 0.98 | 4.92 | 0.29 | 0.01 | 1.38 | 6,36 | 1.34 | 11.02 |
| B2f | 5.2 | 4.6 |  | 0.65 | 1.94 | 0.18 | 0.01 | 0.83 | 9,75 | 1.00 | 11.88 |
| P-3 |
| О | 4.1 | 2.8 | 84.36 |  | 82.5 | 11.75 | 1.50 | 50.00 | 14,78 | - | - |
| АО | 4.4 | 2.7 | 46.18 |  | 61.6 | 4.31 | 1.01 | 35.71 | 8,98 | - | - |
| E | 4.4 | 3.0 |  | 0.51 | 3.19 | 0.17 | 0.01 | 1.11 | 6,05 | 0.91 | 6.96 |
| B1f | 4.5 | 3.8 |  | 1.14 | 8.45 | 0.24 | 0.02 | 1.26 | 3,36 | 1.20 | 8.32 |
| B2f | 5.3 | 4.8 |  | 0.36 | 2.35 | 0.13 | 0.01 | 0.67 | 6,07 | 0.82 | 2.01 |
| BC | 5.3 | 4.7 |  | 0.11 | 1.53 | 0.14 | 0.01 | 0.52 | 9,59 | 0.43 | 1.86 |
| C | 5.5 | 4.5 |  | 0.09 | 1.63 | 0.07 | 0.02 | 0.74 | 6,47 | 0.13 | 1.15 |
| P-4 |
| О | 4.1 | 2.9 | 88.44 |  | 94.4 | 23.92 | 2.42 | 96.43 | 23,12 | - | - |
| АО | 4.2 | 2.7 | 59.36 |  | 108 | 8.51 | 0.71 | 35.71 | 8,46 | - | - |
| E | 4.2 | 2.8 |  | 0.78 | 2.68 | 0.19 | 0.02 | 0.89 | 7,93 | 0.67 | 7.75 |
| B1f | 4.4 | 3.6 |  | 2.46 | 12.8 | 0.40 | 0.01 | 1.07 | 3,27 | 1.77 | 12.23 |
| B2f | 5.1 | 4.5 |  | 0.45 | 2.41 | 0.19 | 0.01 | 1.04 | 8,49 | 1.56 | 2.57 |
| BC | 5.6 | 4.4 |  | 0.14 | 1.34 | 0.14 | 0.01 | 0.67 | 10,83 | 0.54 | 1.69 |
| C | 5.7 | 4.4 |  | 0.11 | 1.26 | 0.11 | 0.01 | 0.74 | 9,99 | 0.45 | 1.13 |
| P-5 |
| О | 4.3 | 3.3 | 89.61 |  | 113 | 10.42 | 0.46 | 96.43 | 10,27 | - | - |
| АО | 4.5 | 2.9 | 81.80 |  | 120.9 | 3.61 | 1.11 | 75.00 | 4,96 | - | - |
| E | 4.3 | 2.9 |  | 0.39 | 2.25 | 0.22 | 0.04 | 1.07 | 11,12 | 0.85 | 9.77 |
| B1f | 4.6 | 4.2 |  | 1.40 | 3.71 | 0.26 | 0.05 | 0.83 | 8,17 | 1.65 | 11.43 |
| B2f | 4.9 | 4.6 |  | 0.50 | 2.31 | 0.14 | 0.01 | 1.10 | 6,90 | 1.39 | 2.30 |
| BC | 5.4 | 4.7 |  | 0.15 | 0.97 | 0.10 | 0.01 | 1.38 | 12,89 | 0.72 | 2.27 |
| C | 5.3 | 4.6 |  | 0.12 | 1.43 | 0.10 | 0.00 | 0.97 | 7,78 | 0.59 | 1.48 |
| К-I |
| О | 4.2 | 3.2 | 76.56 |  | 96.5 | 7.40 | 0.79 | 42.86 | 8,62 | - | - |
| АО | 4.5 | 3.3 | 45.16 |  | 82.5 | 4.29 | 0.54 | 28.57 | 6,18 | - | - |
| E | 4.6 | 3.3 |  | 0.35 | 2.11 | 0.12 | 0.02 | 0.54 | 7,07 | 0.29 | 3.90 |
| B1f | 4.9 | 4.4 |  | 1.11 | 3.71 | 0.20 | 0.01 | 1.69 | 6,25 | 0.76 | 5.11 |
| B2f | 5.3 | 4.9 |  | 0.35 | 1.63 | 0.20 | 0.00 | 1.19 | 12,03 | 0.68 | 5.10 |
| К-II |
| О | 3.9 | 2.8 | 93.31 |  | 126.5 | 18.64 | 1.63 | 128.57 | 15,39 | - | - |
| АО | 3.7 | 2.7 | 56.72 |  | 94.4 | 6.21 | 1.74 | 60.71 | 8,92 | - | - |
| AE | 4.1 | 2.7 | 8.88 |  | 22.9 | 1.57 | 0.26 | 8.52 | 8,09 | - | - |
| E | 4.1 | 2.9 |  | 0.89 | 4.42 | 0.20 | 0.01 | 1.24 | 5,09 | 0.49 | 5.43 |
| B1f | 4.5 | 4.1 |  | 1.66 | 6.53 | 0.31 | 0.01 | 1.57 | 5,23 | 0.92 | 11.90 |
| B2f | 4.6 | 4.3 |  | 1.08 | 2.57 | 0.14 | 0.01 | 1.14 | 6,26 | 0.82 | 11.34 |
| К-III |
| О | 3.9 | 2.7 | 95.57 |  | 113 | 10.50 | 0.77 | 78.57 | 10,28 | - | - |
| АО | 3.8 | 2.7 | 43.38 |  | 120.9 | 6.04 | 1.45 | 50.00 | 6,61 | - | - |
| E | 4.3 | 3.1 |  | 0.34 | 4.52 | 0.16 | 0.01 | 0.55 | 3,78 | 0.39 | 5.58 |
| B1f | 4.6 | 4.4 |  | 0.69 | 6.25 | 0.28 | 0.04 | 1.52 | 5,25 | 1.78 | 11.22 |
| B2f | 5.2 | 5.1 |  | 0.32 | 2.62 | 0.20 | 0.02 | 1.21 | 8,63 | 1.13 | 8.36 |
| BC | 5.4 | 4.9 |  | 0.17 | 2.11 | 0.14 | 0.01 | 0.79 | 7,31 | 1.49 | 9.26 |
| C | 5.7 | 4.8 |  | 0.10 | 1.94 | 0.10 | 0.01 | 0.79 | 5,99 | 1.15 | 6.19 |
| К-IV |
| О | 4.0 | 2.9 | 76.13 |  | 113 | 13.90 | 2.02 | 85.71 | 13,57 | - | - |
| АО | 3.9 | 2.7 | 32.10 |  | 90.2 | 4.86 | 1.02 | 53.57 | 7,22 | - | - |
| E | 4.3 | 2.9 |  | 0.28 | 3.96 | 0.19 | 0.02 | 1.14 | 5,70 | 0.24 | 4.72 |
| B1f | 4.9 | 4.6 |  | 1.88 | 6.69 | 0.25 | 0.01 | 1.79 | 4,34 | 0.97 | 13.99 |
| B2f | 5.1 | 4.9 |  | 0.71 | 3.26 | 0.10 | 0.02 | 1.08 | 4,26 | 1.05 | 10.68 |
| BC | 5.1 | 4.8 |  | 0.08 | 2.52 | 0.07 | 0.01 | 0.67 | 3,86 | 0.59 | 4.86 |

Notes:

Dash - not measured

**Table S2. Contamination density and the specific activities of 137Cs in the genetic horizons of the researched soils.**

**Таблица S2.** Плотность загрязнения и удельные активности 137Cs в генетических горизонтах исследованных почв

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Site | S1 | S2 | P-1 | P-2 | P-3 | P-4 | P-5 | К-I | К-II | К-III | К-IV | F |
| Contamination density with137Cs of the rootzone (0-30 sm layer) | kBq/m2 | 0.75 | 1.04 | 1.27 | 2.46 | 0.81 | 1.03 | 0.97 | 0.53 | 1.87 | 0.92 | 1.46 | 1.03 |
| Contamination density with137Cs of the for organogenic layers | 0.15 | 0.25 | 0.18 | 0.27 | 0.33 | 0.18 | 0.13 | 0.12 | 0.33 | 0.21 | 0.13 | 0.11 |
| Specific activities of 137Cs | O | Bq/kg | 30.1 | 47.2 | 43.5 | 86.6 | 103.7 | 66.5 | 72.5 | 80.5 | 92.0 | 51.2 | 43.9 | 65.3 |
| AO | 51.7 | 14.1 | 35.3 | 24.3 | 57.3 | 13.6 | 44.1 | 43.5 | 48.9 | 27.4 | 26.5 | 68.9 |
| E | 2.5 | 2.6 | 4.3 | 5.2 | 3.0 | 7.2 | 8.0 | 1.2 | 12.5 | 3.4 | 3.8 | 7.2 |
| B1f | 1.0 | 3.7 | 3.4 | 7.5 | 3.8 | 2.4 | 1.0 | 1.2 | 2.3 | 1.1 | 5.4 | 2.3 |
| B2f | 0.4 | 2.9 | 0.7 | 1.3 | <0.7 | 1.1 | <0.8 | 0.2 | 1.0 | <0.7 | 2.6 | 0.9 |

A B

**Fig. S1.** Wind recurrence, % (a) and average wind speed, m/s (b) in the location area of the Kola nuclear power plant for 2012-2016 according to the KNPP weather station AMS-1.

**Рис. S1.** Повторяемость ветров, % (а) и средняя скорость ветра, м/с (б) в районе размещения Кольской атомной электростанции за 2012-2016 гг. по данным метеостанции АМС-1 АСКРО КоАЭС.