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Effects of volume change on the unsaturated hydraulic conductivity of *Sphagnum* moss

V. Golubev, P. Whittington

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1 **Effects of volume change on the unsaturated hydraulic conductivity of**

2 *Sphagnum* moss

3 Golubev V., Whittington* P.

4 Department of Geography, Brandon University, 270-18th street, Brandon, MB, Canada R7A 6A9

5 * whittingtonp@brandonu.ca

6 **Abstract**

7 Due to the non-vascular nature of *Sphagnum* mosses, the capitula (growing surface) of the moss
8 must rely solely on capillary action to receive water from beneath. Moss subsides and swells in
9 accordance with water table levels, an effect called “mire-breathing”, which has been thought to be a
10 self-preservation mechanism, although no systematic studies have been done to demonstrate exactly
11 how volume change affects hydrophysical properties of moss. In this study, the unsaturated
12 hydraulic conductivity (K_{unsat}) and water content of two different species of *Sphagnum* moss were
13 measured at different compression rates, up to the maximum of 77%. The findings show that the
14 K_{unsat} increases by up to an order of magnitude (10x) with compression up to a certain bulk density
15 of the moss, after which higher levels of compression result in lowered unsaturated hydraulic
16 conductivity. This was coupled with an increase in soil water retention with increased compression.
17 The increase of the K_{unsat} with compression suggests that the mire-breathing effect should be
18 considered a self-preservation mechanism to provide sufficient amount of water to growing moss in
19 times of low water availability.

20 **Keywords**

21 unsaturated hydraulic conductivity; peat; moss; compression

22 **Abbreviations:**

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