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Hydrol. Earth Syst. Sci., 6, 375-382, 2002

www.hydrol-earth-syst-sci.net/6/375/2002/

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## Dynamic nitrogen deposition thresholds during forest stand development in a Douglas fir forest analysed with two nitrogen models SMART2 and MERLIN

A. Tietema<sup>1</sup>, J. P. Mol-Dijkstra<sup>2</sup>, J. Kros<sup>2</sup>, and W. De Vries<sup>2</sup>

<sup>1</sup>Centre for Geo-ecological Research (ICG), Institute for Biodiversity and Ecosystem Dynamics (IBED)-Physical Geography, University of Amsterdam, Nieuwe Achtergracht 166, 1018 WV Amsterdam, The Netherlands

<sup>2</sup>Alterra-Green World Research, P.O. Box 47, 6700 AA Wageningen, The Netherlands

Email for corresponding author: atietema@science.uva.nl

**Abstract.** This study focuses on spatial variability of throughfall water and chemistry and forest floor water content within a Douglas fir (*Pseudotsuga menziesii*, Franco L.) forest plot. Spatial patterns of water and chemistry ( $\text{NH}_4^+$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{Cl}^-$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Na}^+$  and  $\text{K}^+$ ) were compared and tested for stability over time. The spatial coefficient of variation (CV) was between 18 and 26% for amounts of throughfall water and ions, and 17% for forest floor water content. Concentrations and amounts of all ions were correlated significantly. Ion concentrations were negatively correlated with throughfall water amounts, but, except for  $\text{NH}_4^+$ , there was no such relation between throughfall water and ion amounts. Spatial patterns of throughfall water fluxes and forest floor water contents were consistent over time; patterns of ion fluxes were somewhat less stable. Because of the spatial variability of forest floor thickness and drainage, it was not possible to relate patterns in throughfall water directly to patterns in water content. The spatial variability of throughfall nitrogen and forest floor water contents can cause significant variability in  $\text{NO}_3^-$  production within the plot studied.

**Keywords:** nutrient throughfall, forest floor water, spatial variability, time-stability, nitrogen

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Citation: Tietema, A., Mol-Dijkstra, J. P., Kros, J., and De Vries, W.: Dynamic nitrogen deposition thresholds during forest stand development in a Douglas fir forest analysed with two nitrogen models SMART2 and MERLIN, Hydrol. Earth Syst. Sci., 6, 375-382, 2002. [Bibtex](#) [EndNote](#) [Reference Manager](#)

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