

Home

Online Library HESS

- Recent Final Revised Papers
- [Volumes and Issues](#)
- Special Issues
- Library Search
- Title and Author Search

Online Library HESSD

Alerts & RSS Feeds

General Information

Submission

Review

Production

Subscription

Comment on a Paper

Impact
Factor
2.270

ISI
indexed



[Volumes and Issues](#) [Contents of Issue 4](#) [Special Issue](#)

Hydrol. Earth Syst. Sci., 7, 552-560, 2003

www.hydrol-earth-syst-sci.net/7/552/2003/

© Author(s) 2003. This work is licensed under a Creative Commons License.

Modelling sulphate stream concentrations in the Black Forest catchments Schluchsee and Villingen

A. Prechtel¹, M. Armbruster², and E. Matzner¹

¹Department of Soil Ecology, BITÖK, University of Bayreuth, D-95440 Bayreuth, Germany

²Institute of Soil Science, Technical University of Dresden, D-01735 Tharandt, Germany

Abstract. The sulphate (SO_4) released by mineralisation and desorption from soil can play an important role in determining concentrations of SO_4 in streams. The MAGIC model was calibrated for two catchments in the Black Forest, Germany (Schluchsee and Villingen) and SO_4 concentrations in the streams for the years 2016 and 2030 were predicted. Special emphasis was placed on the dynamics of soil sulphur (S) pools. At Schluchsee, 90% of soil S is stored in the organic S (S_{org}) pool, whereas at Villingen, 54% is in the inorganic (S_{inorg}) pool. The Villingen stream chemistry was modelled successfully by measured Langmuir isotherm parameters (LIPs) for S_{inorg} . Schluchsee data could not be modelled satisfactorily using measured or freely adapted LIPs only, as the S_{inorg} pool would have to be more than five times larger than what was measured. With $60.5 \text{ mmol}_c \text{ SO}_4 \text{ m}^{-2} \text{ yr}^{-1}$ as internal soil source by mineralisation and the measured LIPs, stream data was modelled successfully. The modelling shows that in these two catchments pre-industrial concentrations of SO_4 in runoff can be reached in the next two decades if S deposition decreases as intended under currently agreed national and international legislation. S_{org} is the most likely dominant source of SO_4 released at Schluchsee. Mineralization from the S_{org} pool must be included when modelling SO_4 concentrations in the stream. As the dynamics and the controlling factors of S release by mineralisation are not yet clear, this process remains a source of uncertainty for predictions of SO_4 concentrations in streams. Future research should concentrate on dynamics of S mineralisation in the field, such that mathematical descriptions of long-term S-mineralisation can be incorporated into biogeochemical models.

Keywords: sulphate release, organic S, mineralisation, acidification, recovery, modelling, MAGIC, catchments, predictions, Germany, forest

[Final Revised Paper](#) (PDF, 599 KB)

Citation: Prechtel, A., Armbruster, M., and Matzner, E.: Modelling sulphate stream concentrations in the Black Forest catchments Schluchsee and Villingen, Hydrol. Earth Syst. Sci., 7, 552-560, 2003. [Bibtex](#) [EndNote](#) [Reference Manager](#)

Search HESS

Library Search

Author Search

News

- New Service Charges
- Financial Support for Authors
- ISI Impact Factor: 2.270

Recent Papers

01 | HESSD, 12 Mar 2009: Distributed modeling of land surface water and energy budgets in the inland Heihe river basin of China

02 | HESSD, 12 Mar 2009: Comparison of six algorithms to determine the soil thermal diffusivity at a site in the Loess Plateau of China

03 | HESS, 11 Mar 2009: Large-scale lysimeter site St. Arnold, Germany: analysis of 40 years of precipitation, leachate and evapotranspiration

