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- [Volumes and Issues](#)
- Special Issues
- Library Search
- Title and Author Search

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Production

Subscription

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- [Volumes and Issues](#)
- [Contents of Issue 1](#)
- [Special Issue](#)

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Combined modelling of shortwave and thermal radiation for one-dimensional SVATs

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Abstract. Expressions for the upwelling and downwelling fluxes of optical and thermal radiation between soil, vegetation and the sky are derived, under certain simple assumptions. These are that interception of radiation by the vegetation is a purely geometric effect, while scattering is isotropic, with a strength given by a single-scattering albedo in the optical part of the spectrum, and by Kirchhoff's Law in the thermal. The soil is assumed to be a lambertian reflector, also scattering according to an albedo and Kirchhoff's Law. The model, called RM, conserves energy exactly. As part of a SVAT, it is driven by measured insolation instead of radiation, with little increase in computational cost and number of parameters.

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