

## ***Interactive comment on “Snow physics as relevant to snow photochemistry” by F. Domine et al.***

**R. Essery (Referee)**

rie@aber.ac.uk

Received and published: 11 June 2007

Domine and his coauthors provide an excellent overview that will provide a valuable reference for researchers interested in modelling snow chemistry. This review is strongly related to that of Grannas et al. (2007), and this connection should be more clearly stated in the introduction. Otherwise, I have only minor comments to make.

p5943 LAI may be much lower than SSA, but vegetation canopies have much higher porosity than snowpacks. Snow can be intercepted in canopies, with possible implications for snow chemistry (Pomeroy et al. 1999). Snow in turbulent suspension is even better ventilated (Pomeroy et al. 1993).

p5955 Density is variously quoted in kg/m<sup>3</sup>, g/m<sup>3</sup> (incorrectly) and g/cm<sup>3</sup> in this one paragraph.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

p5956 Many models use even simpler density parametrizations, e.g. Verseghy 1991.

p5962 Equations (2.3-4) and (2.3-5) would be clearer as  $\exp[\dots]$  rather than  $e^{\dots}$

p5964 It might make sense to have sections 2.5 - 2.9 preceding 2.4.

p5968 Use of the symbol rho here clashes with its more general use to represent snow density in this paper

p5980 A useful review of remote sensing of snow is given by Dozier and Painter (2004). As you have already given 5 - 25 cm as the e-folding depth, a 5 cm snow layer is not semi-infinite in the visible.

p5990 There are certainly tens of snow models in common use, and hundreds of models and model variants may well have been developed, but "literally thousands"?

p5992 I believe that the PHANTAS model of Kenjiro Toyota includes physical and photochemical processes in snow, but I have not yet seen published model descriptions or results.

p5995 The paragraph on heat transfer and porosity would sit better in section 2, and so might the SSA and light flux paragraphs on the next page.

p6032 I think that the last sentence in the caption for Figure 6 actually refers to Figure 7.

The reference list will have to be thoroughly checked. I noticed cases where papers were referred to in the text but not included in the list (e.g. Sturm et al. 2005, Arons and Colbeck 1995) and other references where author names are misspelled.

Dozier, J., and T.H. Painter, 2004. Multispectral and hyperspectral remote sensing of alpine snow properties. *Annual Review of Earth and Planetary Sciences*, 32, 465 - 494.  
Pomeroy, J.W., T.D. Davies, H.G. Jones, P. Marsh, N.E. Peters and M. Tranter, 1999. Transformations of snow chemistry in the boreal forest: accumulation and volatilization. *Hydrol. Processes*, 13, 2257  
Pomeroy, J.W., P. Marsh and L. Lesack, 1993. Relocation

of major ions in snow along the tundra-taiga ecotone. *Nordic Hydrol.*, 24, 151 - 168.  
Verseghy, D.L., 1991. CALSS- A Canadian land surface scheme for GCMs. I. Soil  
model. *Int. J. Climatol.*, 11, 111 - 133.

---

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 7, 5941, 2007.

ACPD

7, S2378–S2380, 2007

---

Interactive  
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

S2380

EGU