Model	Multi-layer ?	Soil model ?	Variable C_H ?	Variable density ?	Albedo f(Temperature)	Albedo f(Age)	Albedo f(Snow type)	Liquid storage ?	References
ACASA	Yes	Yes	Yes	Yes	Yes				Pyles and others (2000)
CLASS		Yes	Yes	Yes		Yes			Verseghy (1991)
CLASS-NSD	Yes	Yes	Yes	Yes		Yes			Verseghy (1991)
COLA-SSiB		Yes	Yes		Yes				Xue and others (1991)
CROCUS	Yes		Yes	Yes		Yes	Yes	Yes	Brun and others (1989)
CSIRO	Yes	Yes	Yes	Yes	Yes	Yes			Kowalczyk, unpublished
ESCIMO						Yes			Strasser (1998)
IAP94	Yes	Yes		Yes		Yes	Yes	Yes	Dai and Zeng (1997)
INM_SM				Yes		Yes		Yes	Fernández (1998)
ISBA-ES	Yes	Yes	Yes	Yes		Yes		Yes	Boone and Etchevers (2001)
ISBA		Yes	Yes	Yes		Yes			Douville and others (1995)
ISO		Yes	Yes			Yes			Bazile, in preparation
MAPS	Yes	Yes	Yes	Yes					Smirnova and others (2000)
MATSIRO	Yes	Yes	Yes		Yes	Yes			Takata and Emori (1999)
MOSES		Yes	Yes				Yes		Cox and others (1999)
NOAH-LSM		Yes	Yes	Yes				Yes	Koren and others (1999)
SNOW-17				Yes				Yes	Anderson (1973)
SNOWPACK	Yes	Yes	Yes	Yes			Yes	Yes	Bartelt and Lehning (2001)
SNTHERM	Yes	Yes	Yes	Yes			Yes	Yes	Jordan (1991)
SPONSOR		Yes	Yes	Yes	Yes			Yes	Shmakin (1998)
SWAP		Yes	Yes	Yes				Yes	Gusev and Nasonova (1998)
TSCM	Yes	Yes		Yes	Yes	Yes		Yes	Yamazaki (2001)
TSCM1					Yes	Yes		Yes	Kondo and Yamazaki (1990)
VISA	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Niu and Yang (2000)

Table 1: participating models (from Essery and Yang, 2001). For each model, the main characteristics are indicated: are several layers used to simulate the snowpack? is an explicit soil model used? Are the turbulent exchange coefficient and the snow density variable? Is albedo a function of snow surface temperature, snow age and/or snow type? Is there liquid water storage in the snow pack? Finally, the main model reference is given.

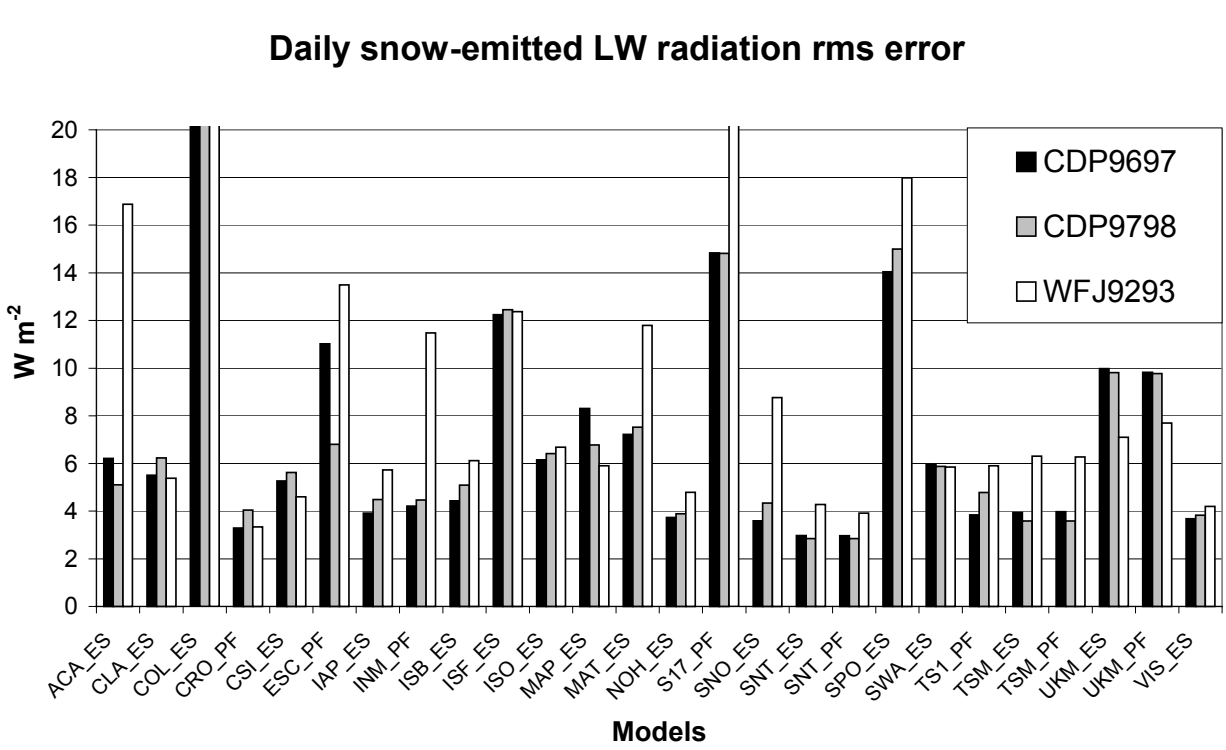

Figure 1 : Daily rms error in LW radiation emitted by snow calculated for the three seasons and each model. The type of simulated soil-snow exchange is indicated by the two letters following the model acronym : PF (Prescribed Flux) or ES (Explicit Soil).

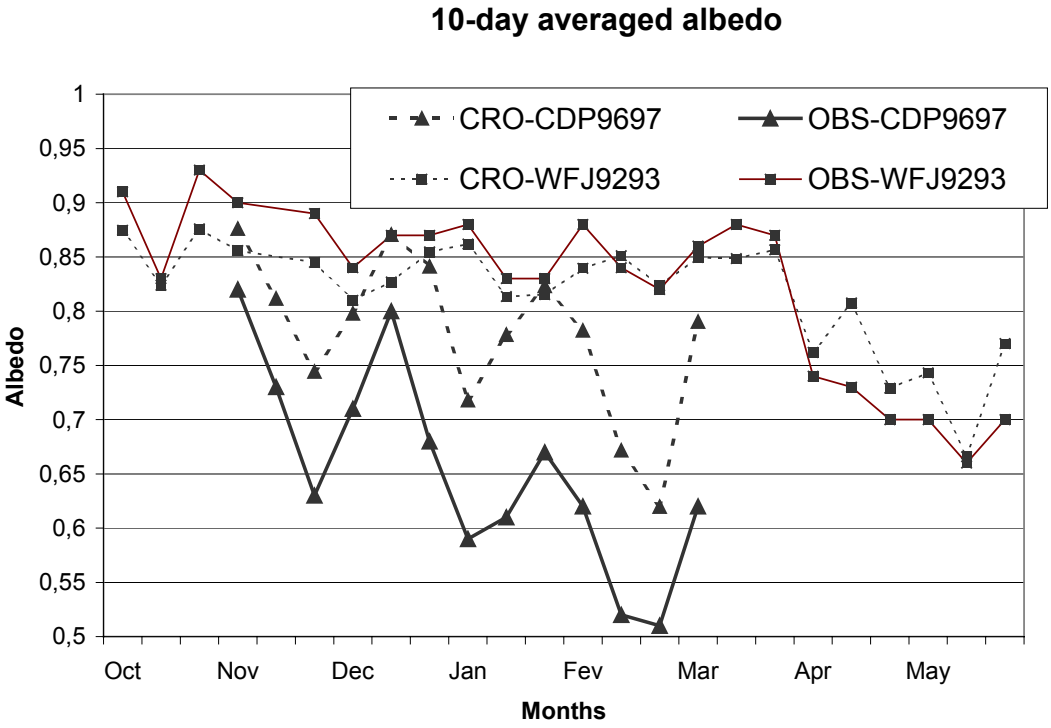

Figure 2 : 10-day averaged albedo observed (plain line) and simulated by the snow model Crocus (dashed line) for CDP (triangles) and WFJ (squares).

	Site	Period	Number of days	Observed albedo (beginning and end)	Observed albedo variation (per day)	Simulated albedo variations : average (per day)	Simulated albedo variations: min-max (per day)
Episode 1	CDP96 97	28/02/97-14/03/97	15	0.63-0.5	-0.0087	-0.01	-0.02/0.005
Episode 2	CDP97 98	24/01/98-20/02/98	28	0.77-0.59	-0.0064	-0.006	-0.01/0.001
Episode 3	CDP97 98	19/04/98-26/04/98	8	0.8-0.53	-0.0338	-0.015	-0.03/0.00
Episode 4	WFJ	13/12/92-02/01/93	21	0.9-0.86	-0.0019	-0.005	-0.01/0.005
Episode 5	WFJ	29/01/03-14/02/93	17	0.91-0.8	-0.0065	-0.008	-0.02/0.00
Episode 6	WFJ	21/04/93-29/04/93	9	0.75-0.74	-0.0011	-0.009	-0.03/0.009

Table 2 : The six periods selected to validate albedo decreases. No precipitation occurred during these episodes. The two last columns contain the average for all models and the minimum/maximum values of the simulated albedo variations.

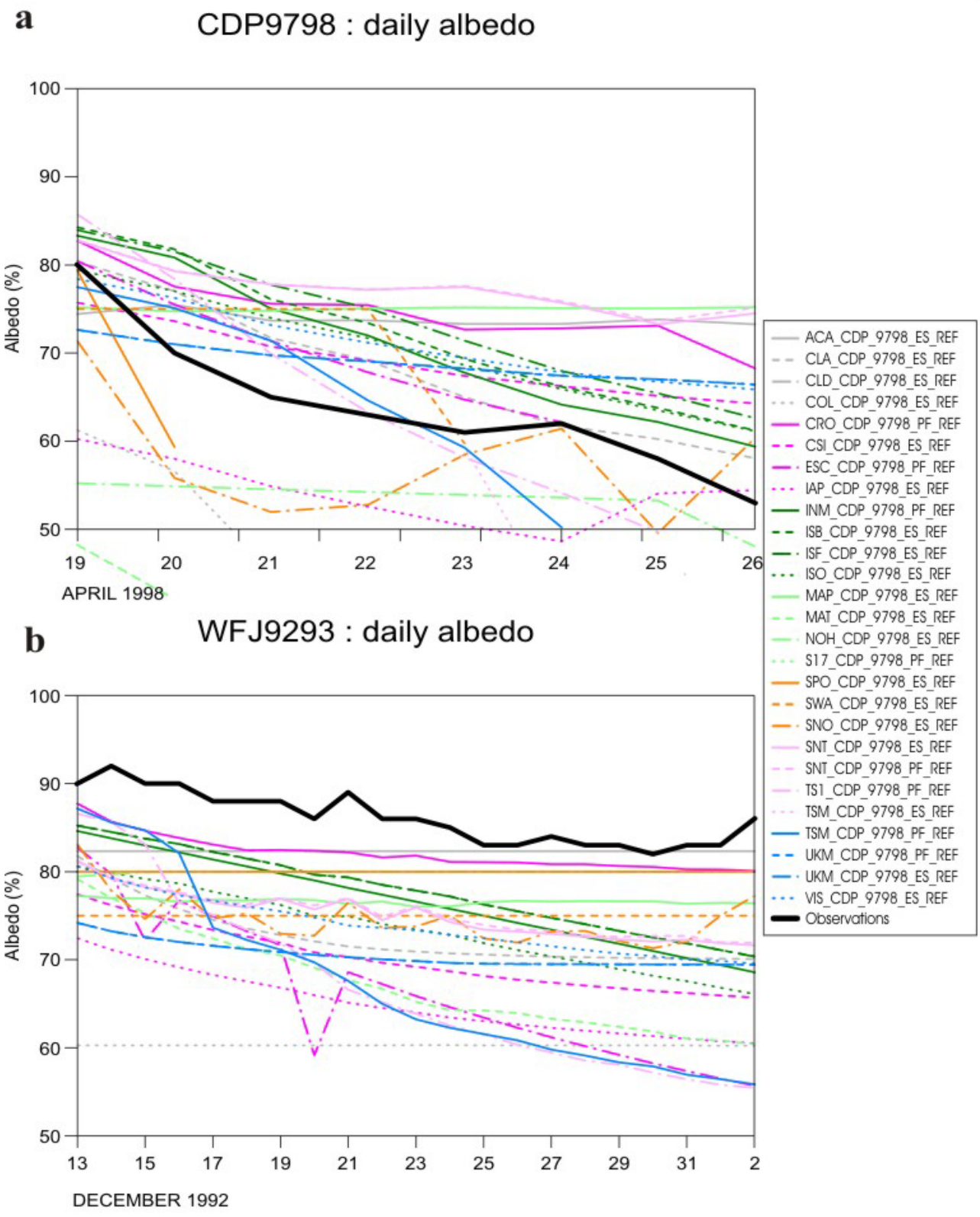

Figure 3 : daily albedo observed (large black line) for (a) episode 3 (CDP site, from 19 to 25 April 1998) and(b) episode 4 (WFJ site, from 13 December 1992 to 2 January 1993). The other coloured lines correspond to the 26 albedo simulations.

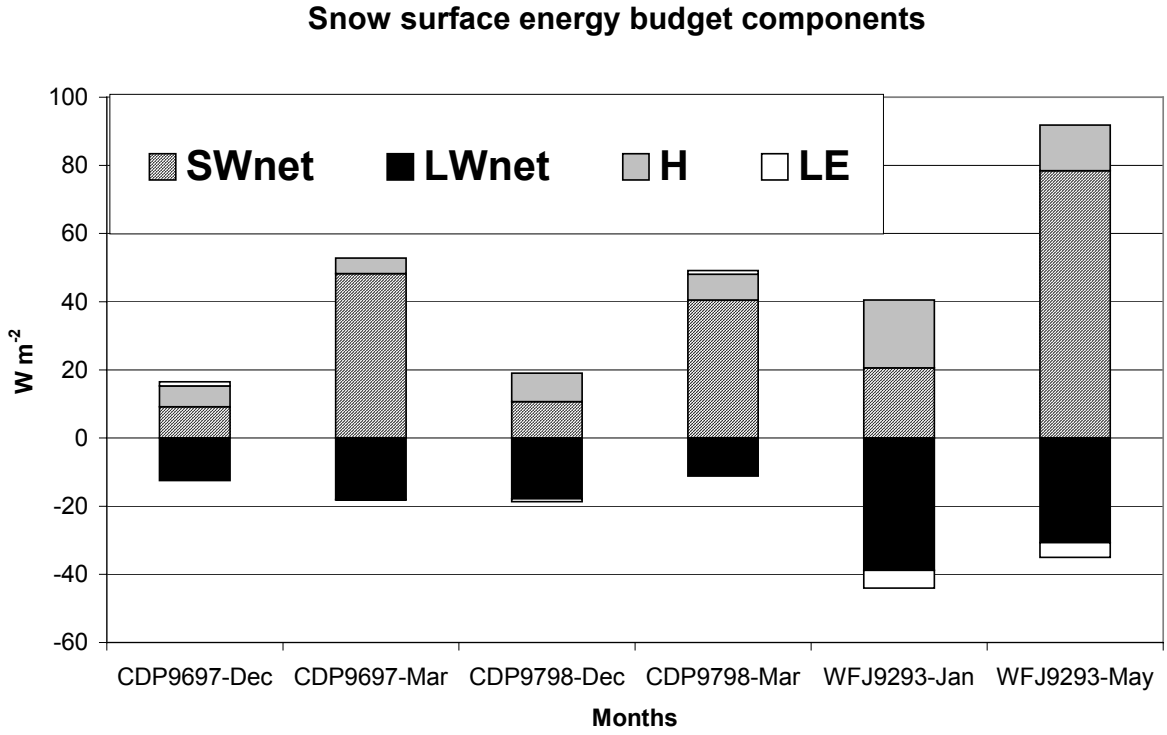

Figure 4 : Monthly components of the surface energy budget (on average for all the models). For each season, a winter and a spring month are presented.

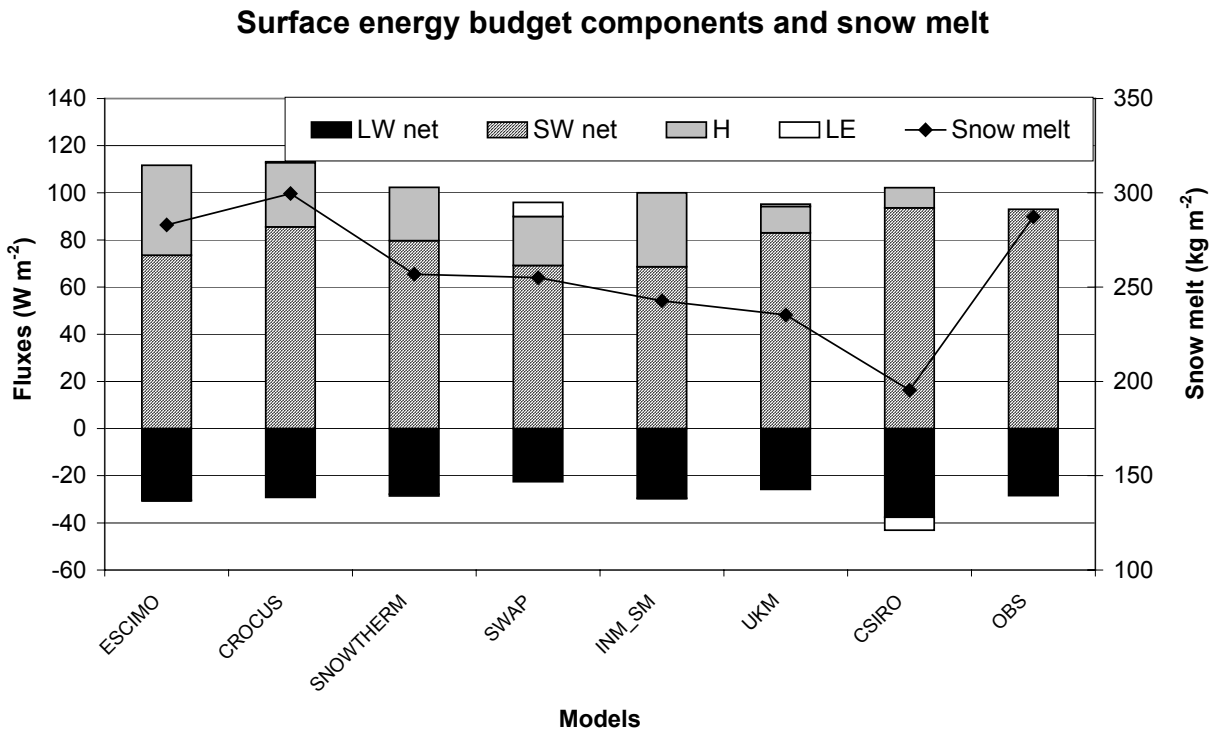

Figure 5 : Components of the surface energy budgets (histograms) and mass variation (diamonds) averaged for the WFJ site between 24 May 1992 and 8 June 1993. Each histogram corresponds to a model, selected for its accuracy in simulating the melt and/or the net short wave radiation. The last histogram on the right presents the observations (melt and net short wave radiation only).