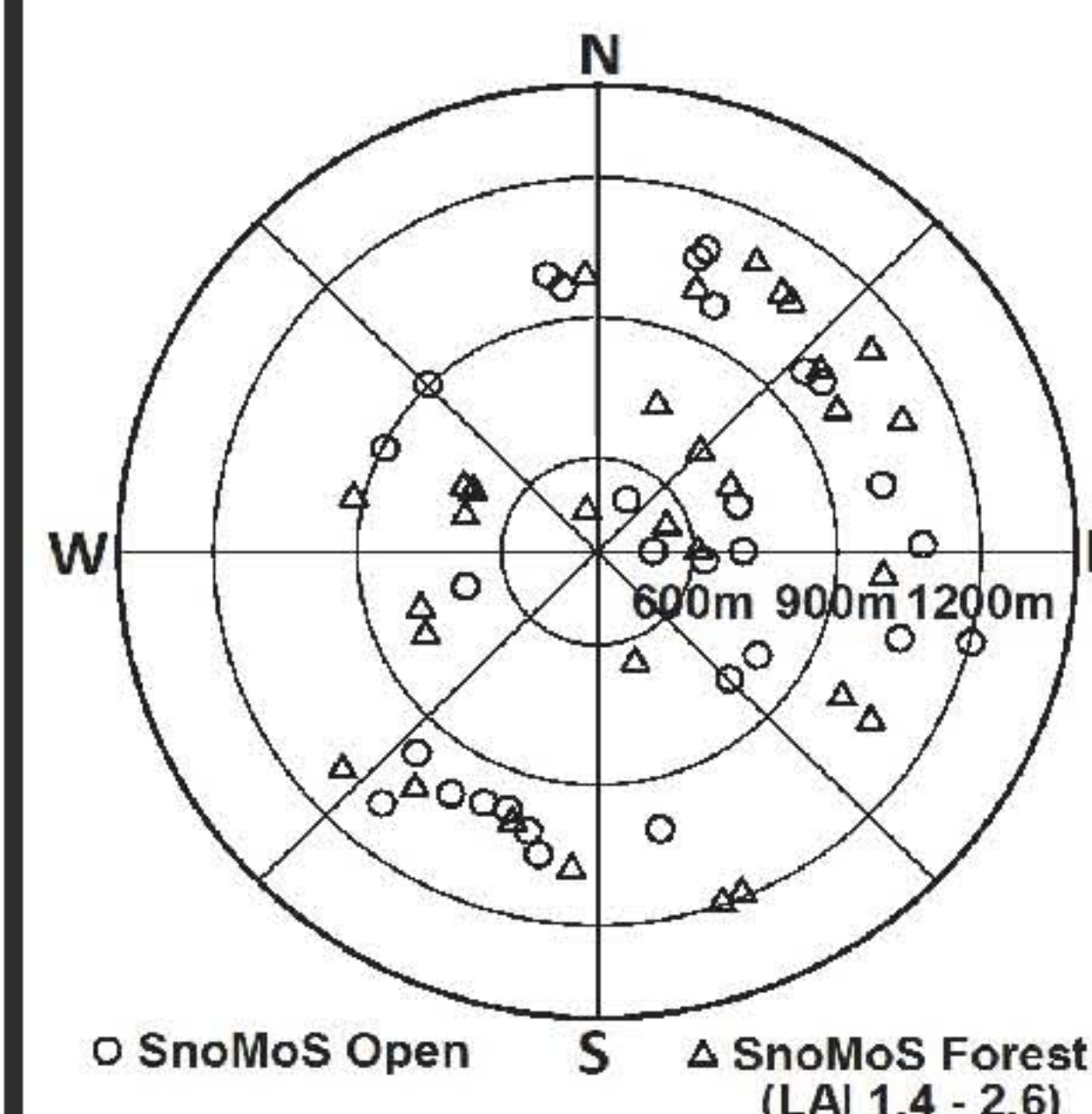


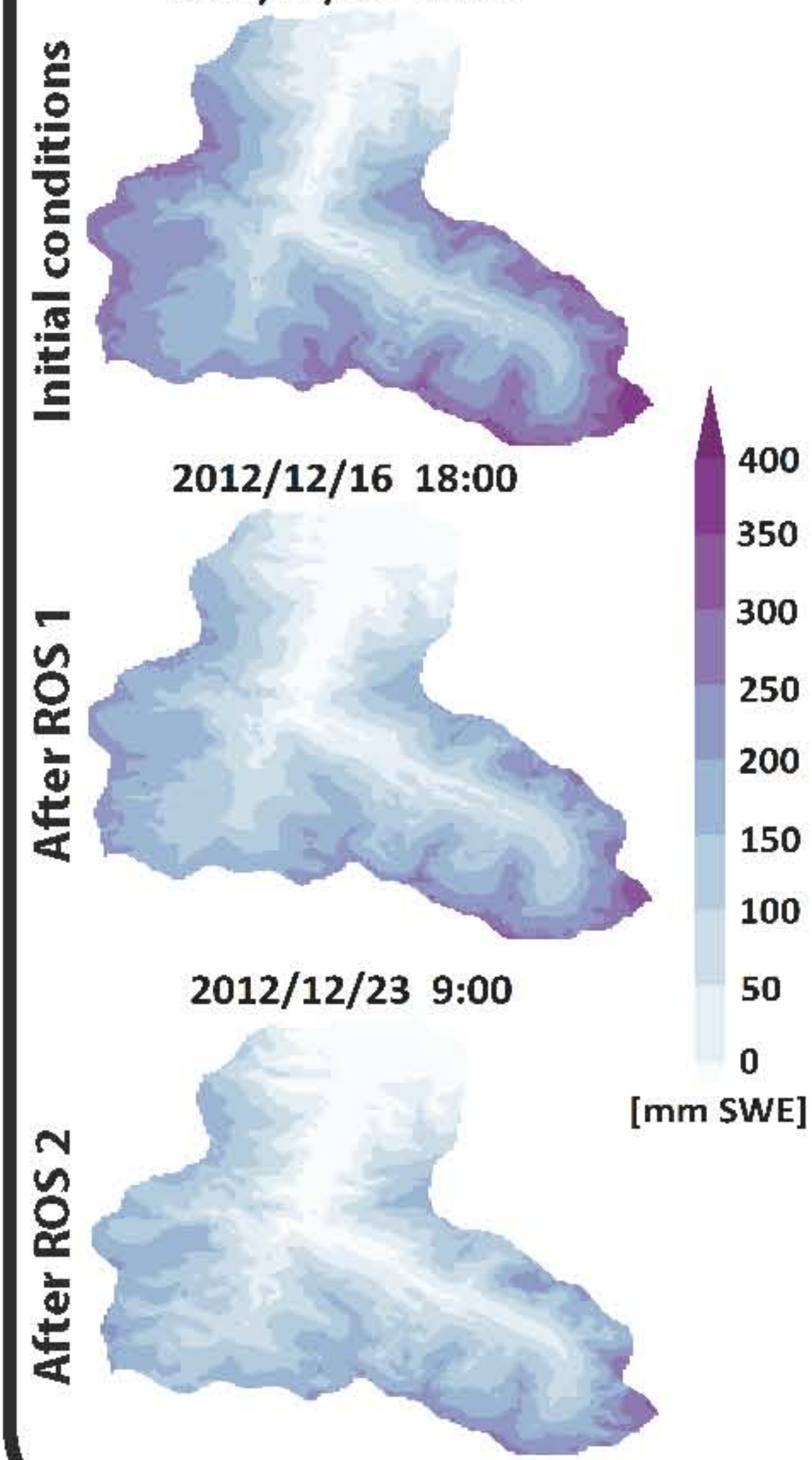
Jakob Garvelmann, Stefan Pohl, Markus Weiler

Introduction



SnoMoS	Additional Information
SW in	Global radiation
SW out	Albedo measured/calculated after Satterlund (1979), additional LW under forest canopy after Essery et al. (2006)
LW in	
LW out	Surface temperature
Sens heat	Air temperature, wind speed, surface temperature, air pressure
Lat heat	Bulk Richardson Number, surface temperature, air pressure
Adv energy	Pressure with Tetens formula

SWE distribution Brugga basin



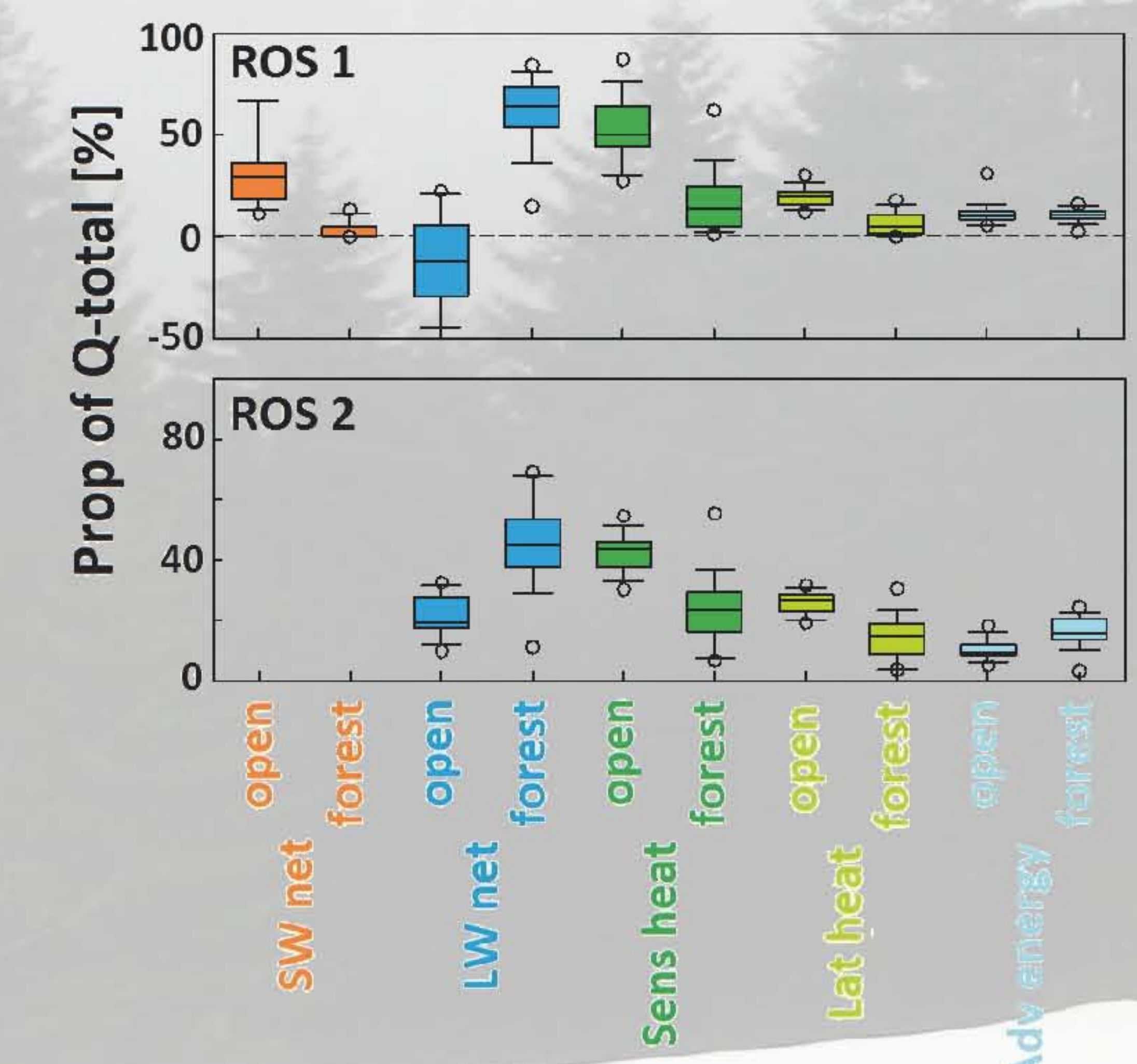
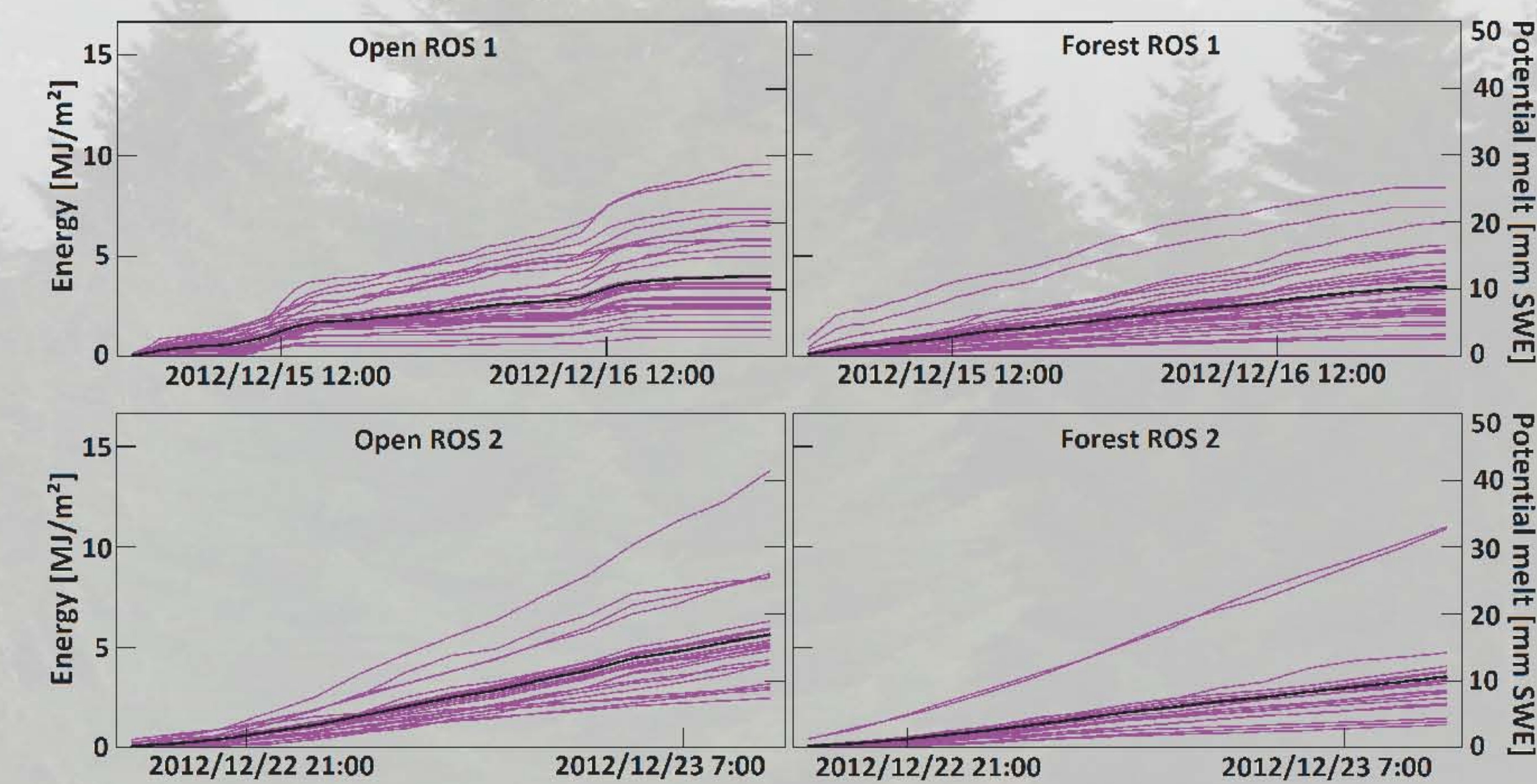
Rain-on-Snow



Research Questions

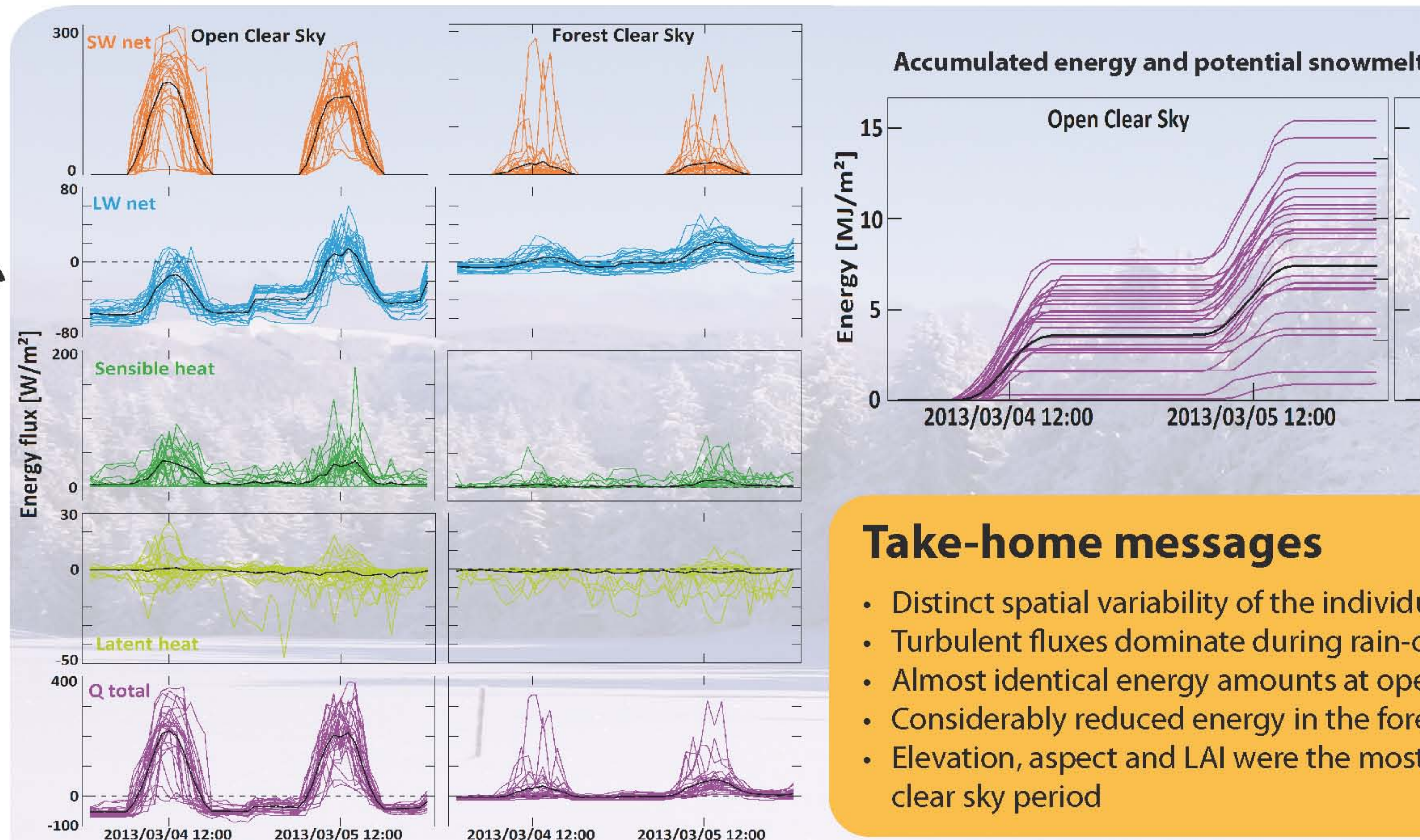
- What are the energy fluxes of the individual surface energy balance components during differing snowmelt conditions?
- What is the spatial and temporal variability of the energy balance terms during rain-on-snow compared to clear sky conditions?
- How does a forest cover and the topography influence the different energy fluxes?

Accumulated energy and potential snowmelt

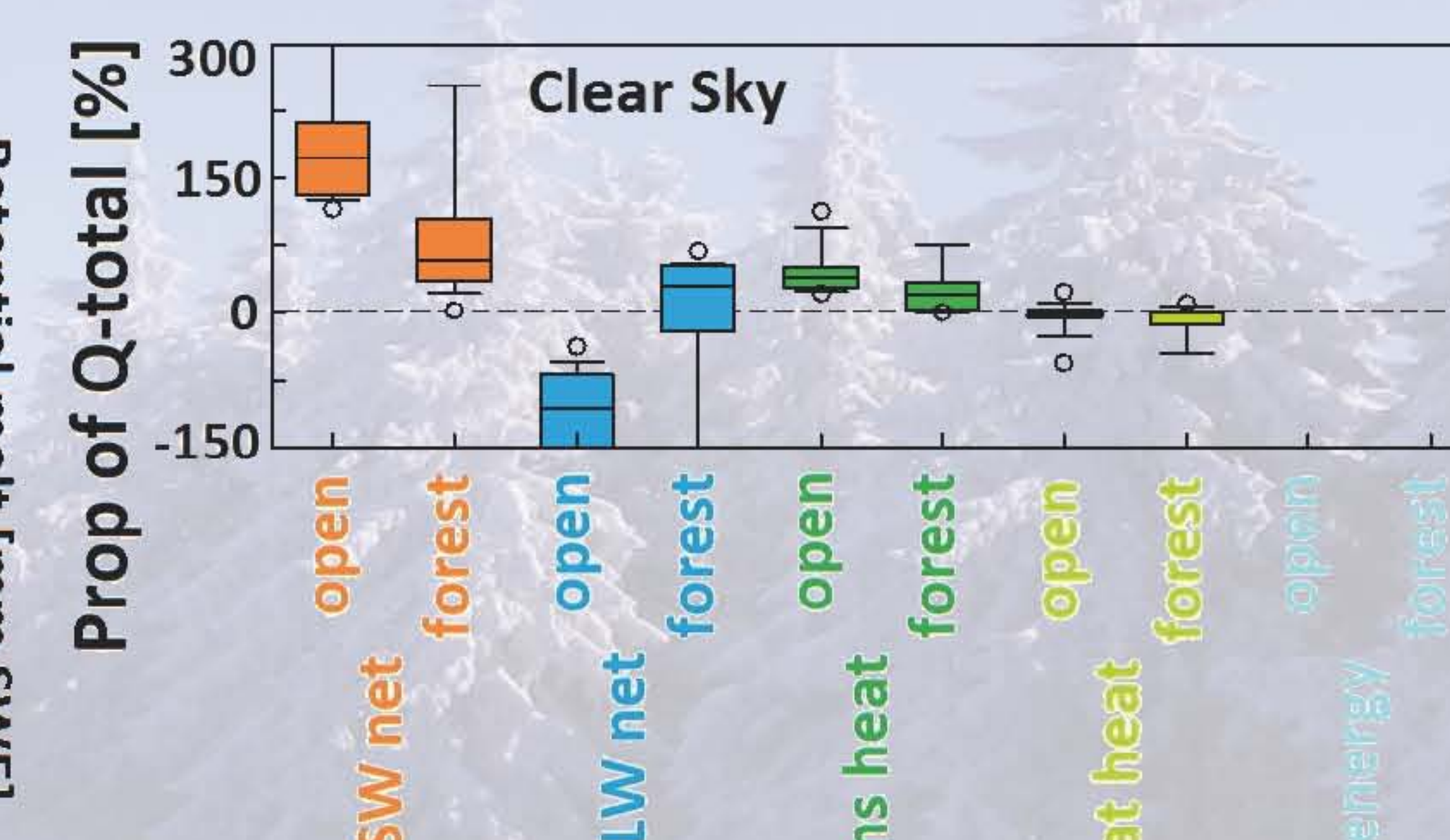
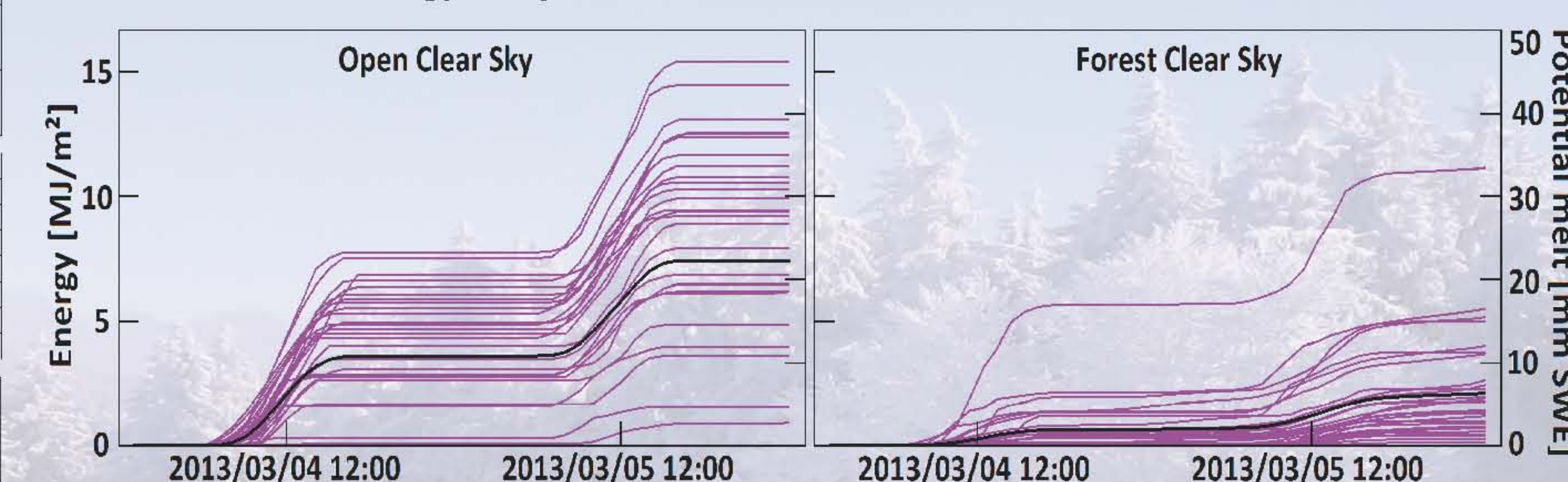


$$Q_{total} = SW_{net} + LW_{net} + Sensible\ heat + Latent\ heat + Advective\ energy$$

Clear Sky



Accumulated energy and potential snowmelt



Take-home messages

- Distinct spatial variability of the individual surface energy balance terms over a relatively small area observed
- Turbulent fluxes dominate during rain-on-snow (ROS), net radiation during clear sky melt
- Almost identical energy amounts at open and forest locations during ROS with a constant positive energy flux even during night
- Considerably reduced energy in the forest and a clear diurnal signal during clear sky
- Elevation, aspect and LAI were the most important predictor variables during ROS, aspect and LAI were most influential during the clear sky period

Influence of vegetation and topography

			Predictor	Landcover	Q-SW	Q-LW	Q-h	Q-e	Q-m	Q-total
Correlation Coefficients	ROS 1	Elevation	Open	-0.62	-0.80	-0.17	-0.52	-0.80	-0.65	
			Forest	-0.23	-0.84	0.35	0.24	-0.85	-0.18	
		Aspect	Open	-0.02	0.02	-0.58	-0.43	-0.15	-0.36	
			Forest	0.08	0.15	-0.51	-0.50	0.16	-0.35	
	ROS 2	LAI	Forest	-0.56	0.15	-0.47	-0.43	0.02	-0.38	
		Elevation	Open	-	-0.57	-0.08	-0.08	-0.26	-0.12	
			Forest	-	-0.25	0.57	0.55	-0.43	0.52	
		Aspect	Open	-	-0.29	-0.61	-0.62	-0.33	-0.61	
	Forest		-	-0.03	-0.50	-0.51	-0.03	-0.50		
	Clear Sky	LAI	Forest	-	0.31	-0.51	-0.51	0.36	-0.47	
		Elevation	Open	0.01	0.61	0.44	-0.36	-	0.23	
			Forest	0.19	0.41	0.47	-0.53	-	0.32	
Aspect		Open	-0.82	-0.25	-0.13	0.13	-	-0.73		
	Forest	-0.28	-0.19	-0.22	0.21	-	-0.29			
	LAI	Forest	-0.74	0.09	-0.40	0.36	-	-0.53		

Multiple Linear Regression Analysis

	Predictors	Q-SW	Q-LW	Q-h	Q-e	Q-m	Q-total
ROS 1	All predictors	0.58	0.72	0.33	0.33	0.16	0.29
	Elevation	0.03	0.24	0.02	0.01	0.13	0.14
	Aspect	0.00	0.01	0.15	0.12	0.02	0.13
	Slope	0.02	0.01	0.01	0.03	0.01	0.01
	LAI	0.53	0.46	0.15	0.17	0.00	0.01
ROS 2	All predictors	-	0.72	0.45	0.49	0.64	0.36
	Elevation	-	0.43	0.06	0.05	0.61	0.01
	Aspect	-	0.01	0.17	0.18	0.01	0.17
	Slope	-	0.00	0.00	0.01	0.02	0.01
	LAI	-	0.28	0.22	0.25	0.00	0.17
Clear Sky	All predictors	0.82	0.90	0.55	0.29	-	0.43
	Elevation	0.00	0.02	0.09	0.19	-	0.04
	Aspect	0.11	0.00	0.02	0.03	-	0.24
	Slope	0.04	0.02	0.02	0.07	-	0.02
	LAI	0.67	0.86	0.42	0.00	-	0.13