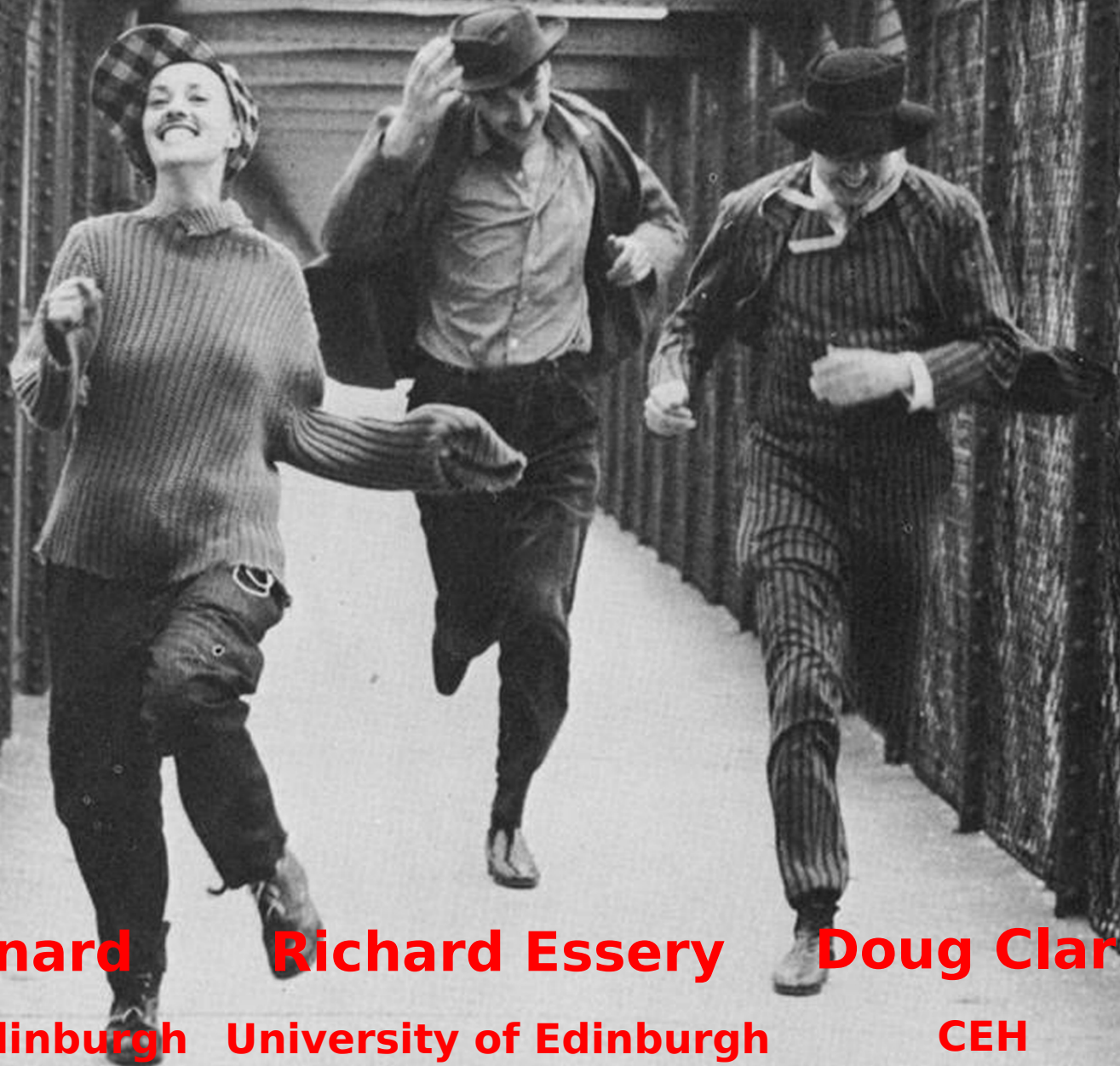


JULES et JIM

... or
why I
dream
of
3SoMs



Cécile Ménard

University of Edinburgh
CEH

Richard Essery

University of Edinburgh

Doug Clark

CEH

Why snow-shrub
interaction?

Aren't shrubs just
small trees??

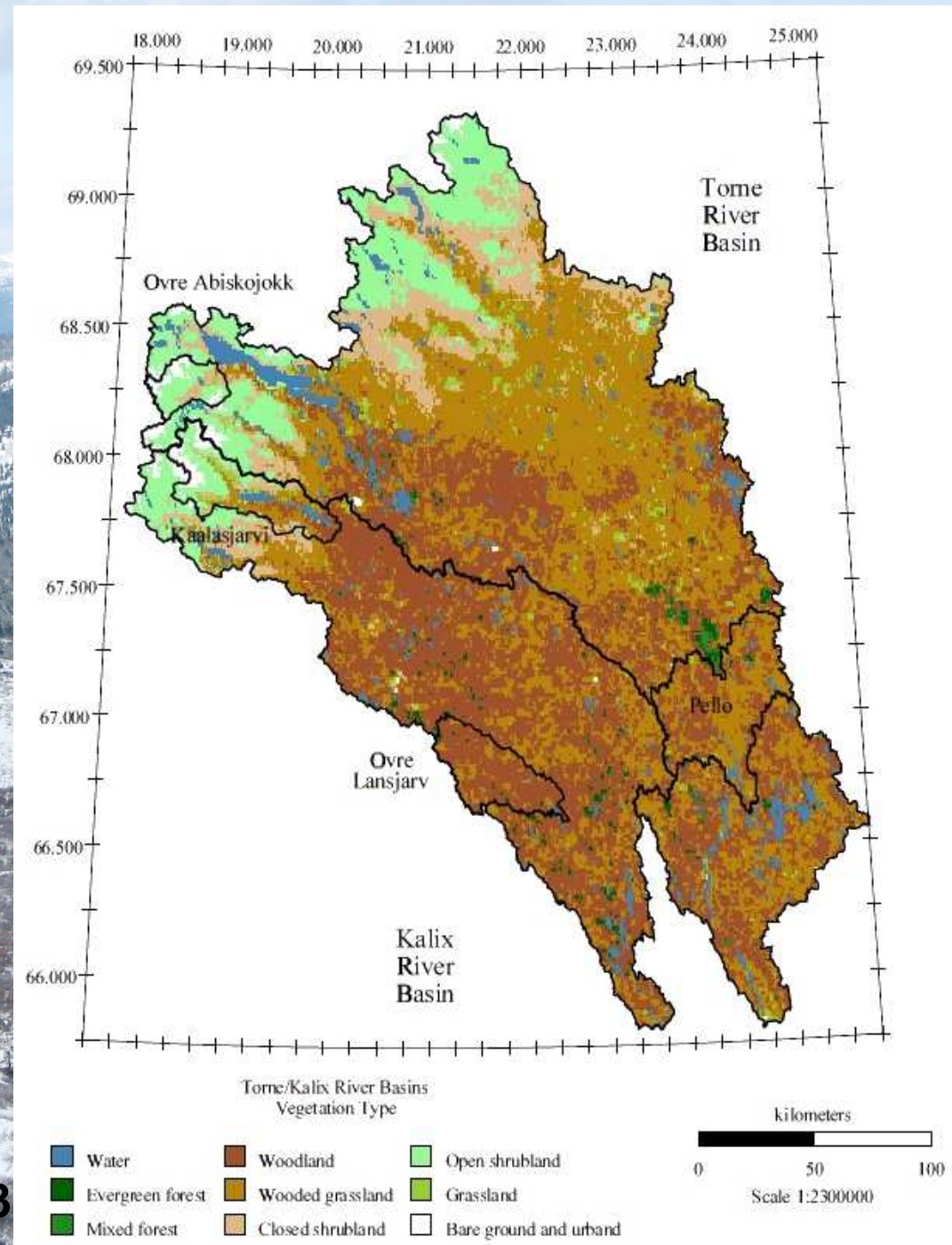


Investigating the effect of shrubs on runoff with JULES

Torne-Kalix river basins

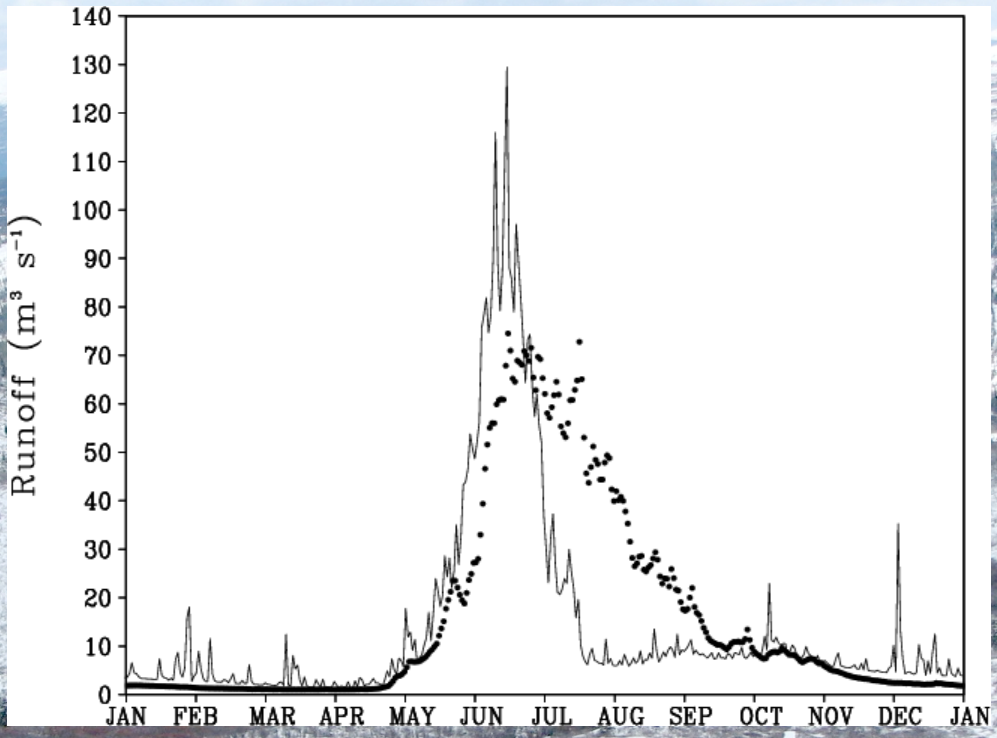
0.25 deg resolution

7 PFT

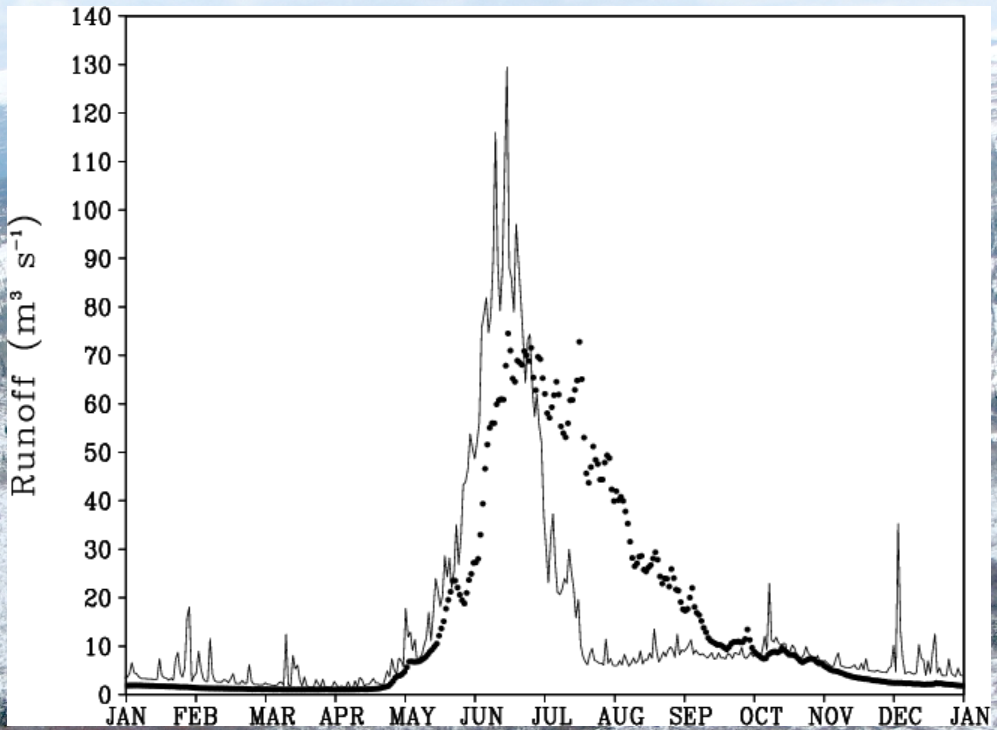


Bowling *et al*, 2003

10 years average (1989-1999) Runoff in Abisko catchment



10 years average (1989-1999) Runoff in Abisko catchment



Elevation, soils (shallow soils, ice content...), late-lying snow drifts (slope, aspect, snow trapping by shrubs, etc...)

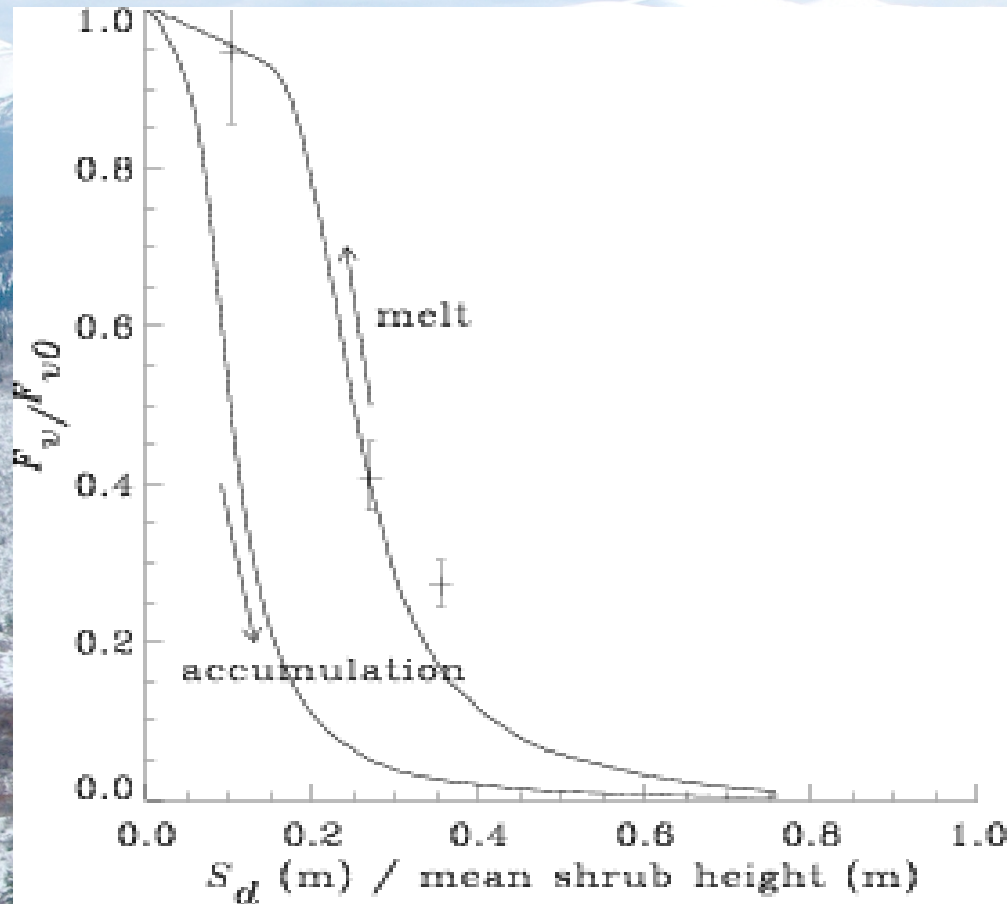
Shrub bending model

[/media/C45C-2747/JULES_Leeds/Movie_0002.avi](#)

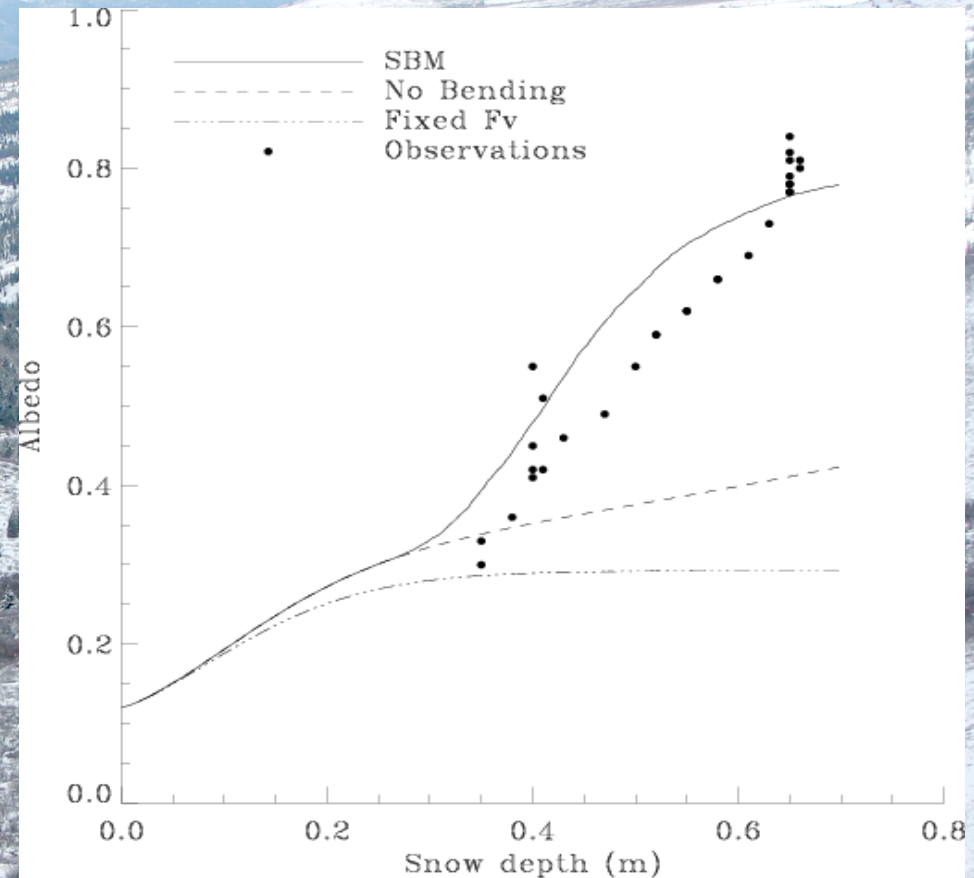


Evaluation of the shrub bending model

against measured vegetation fraction

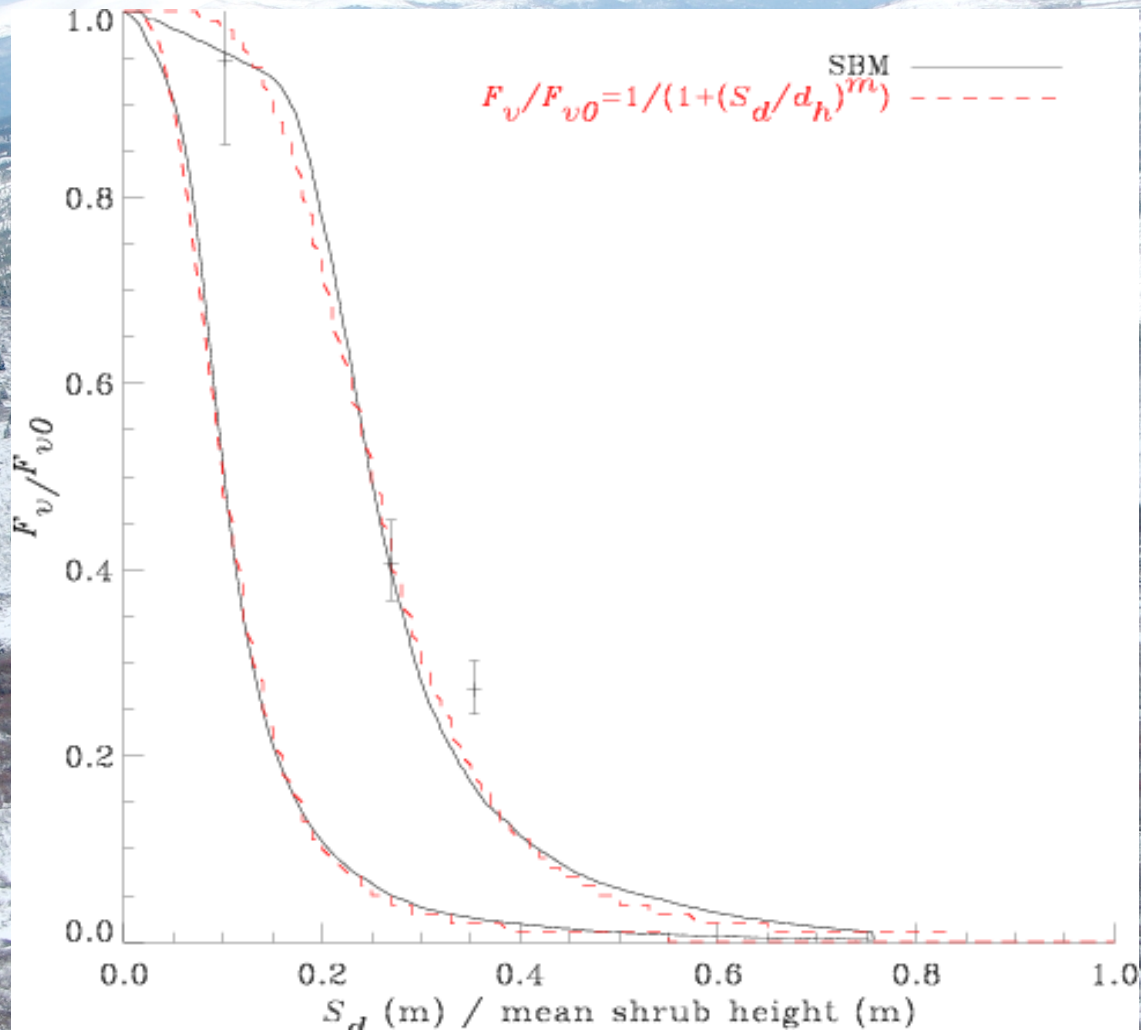


against albedo measurements



Shrub bending model

Vegetation fraction

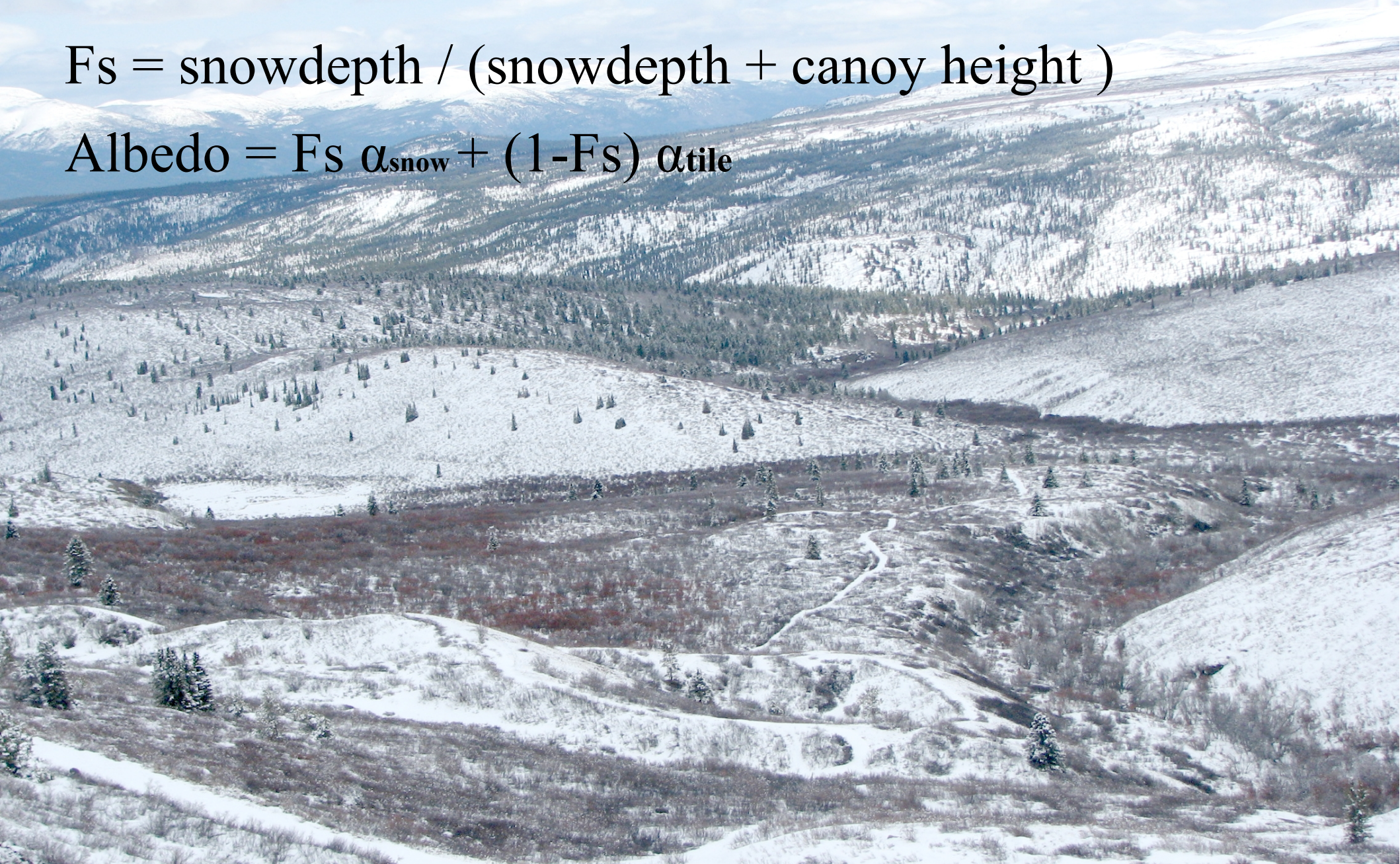


Snow fraction parameterisation

- in JULES

$$F_s = \text{snowdepth} / (\text{snowdepth} + \text{canopy height})$$

$$\text{Albedo} = F_s \alpha_{\text{snow}} + (1 - F_s) \alpha_{\text{tile}}$$



Snow fraction parameterisation

- in JULES

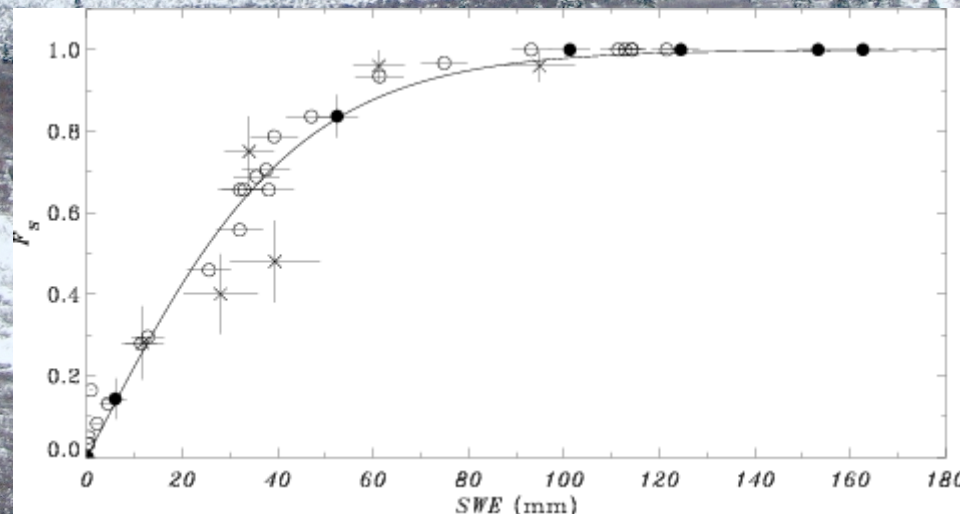
$$F_s = \text{snowdepth} / (\text{snowdepth} + \text{canopy height})$$

$$\text{Albedo} = F_s \alpha_{\text{snow}} + (1-F_s) \alpha_{\text{tile}}$$

- $F_s = (1 - F_v) F_{\text{snow}}$

where $F_{\text{snow}} = \tanh(\text{SWE} / 44)$ (Essery and Pomeroy, 2004)

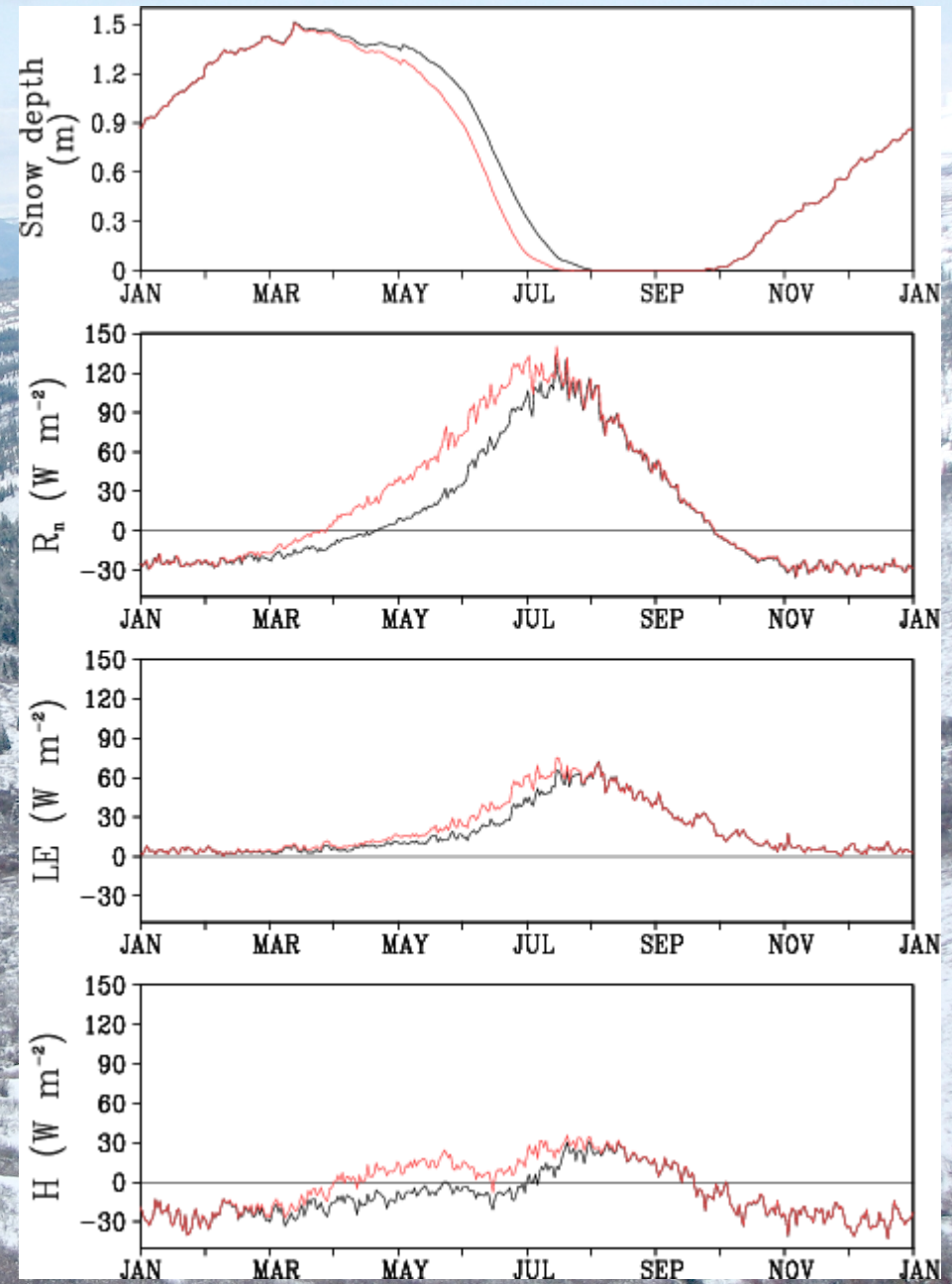
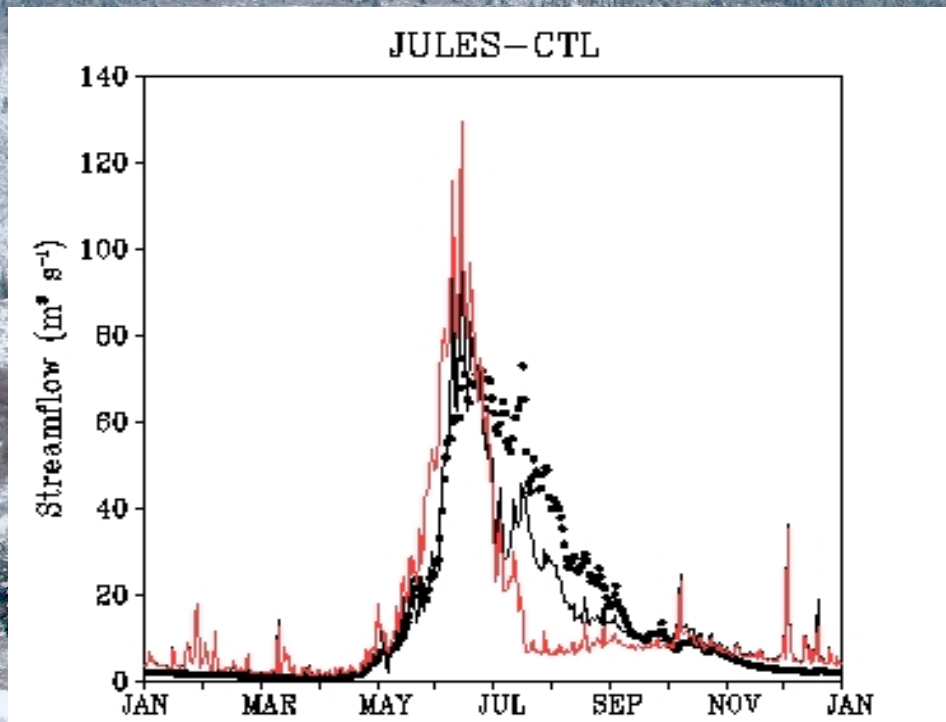
$$\text{Albedo} = F_s \alpha_{\text{snow}} + (1-F_s) \alpha_{\text{tile}}$$



Fsnow in JULES

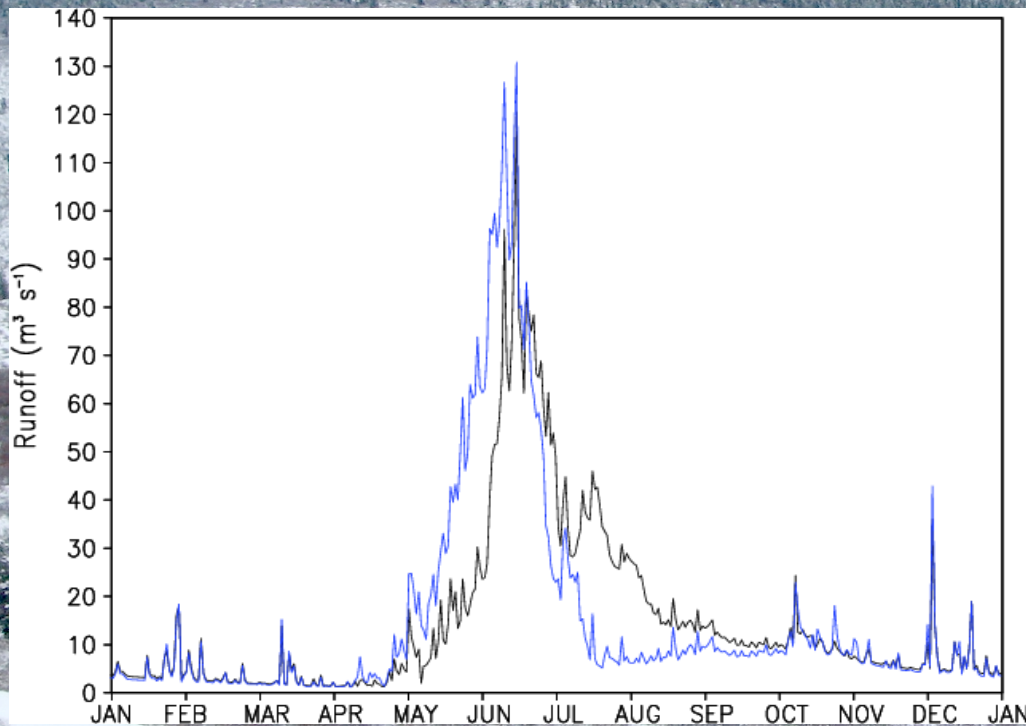
— New Fsnow

— Old Fsnow



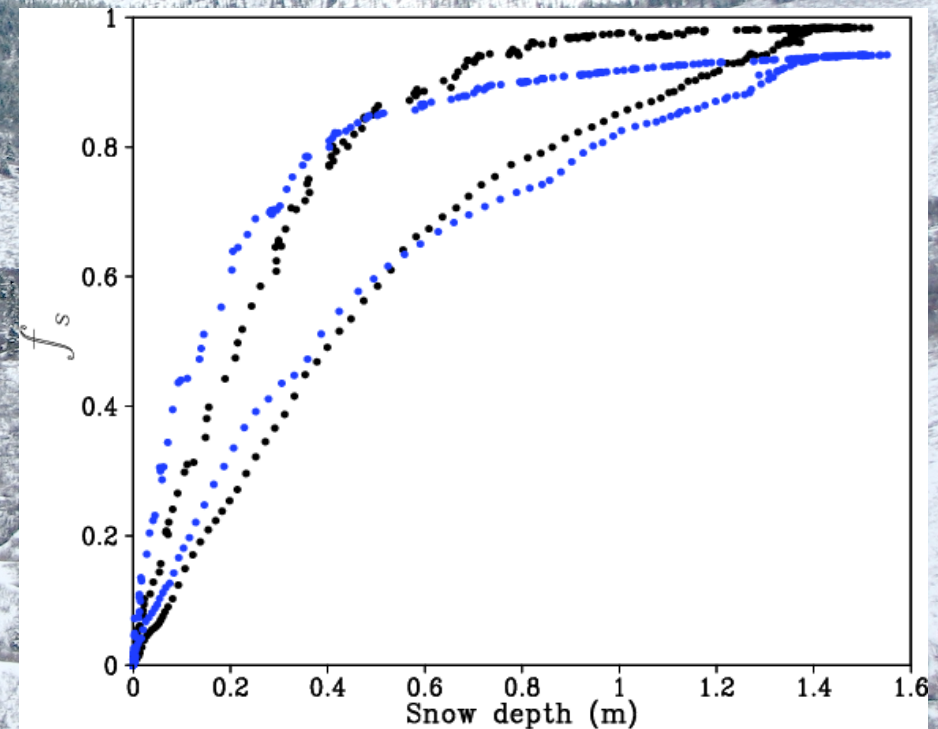
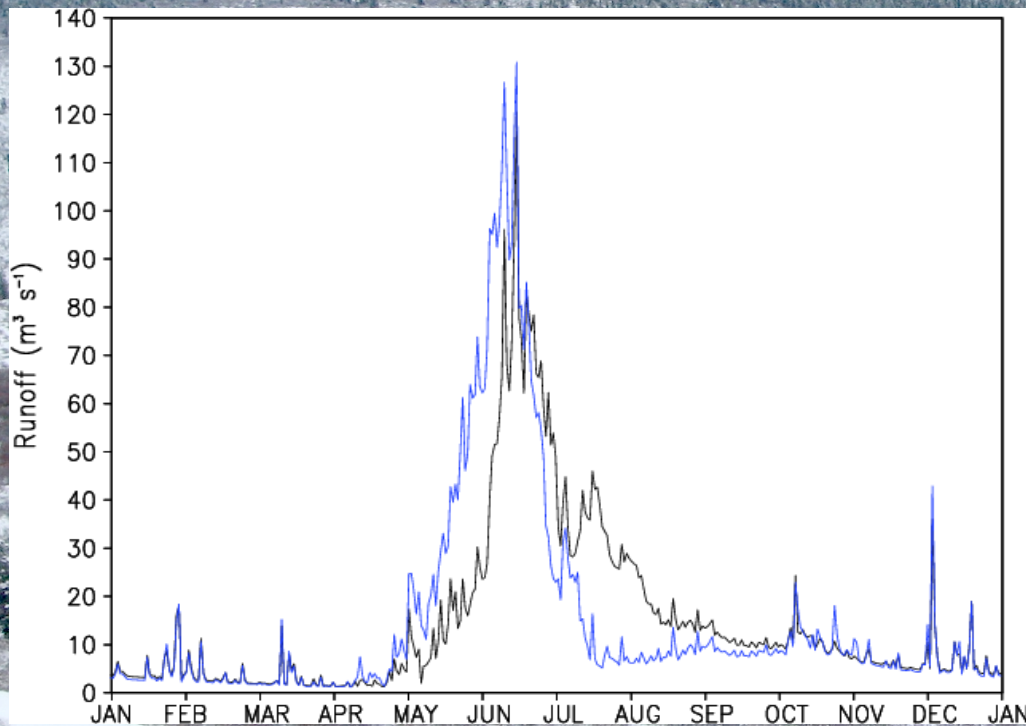
Effect of shrubs on snowmelt energetics in Abisko

— Shrub run
— No shrub run

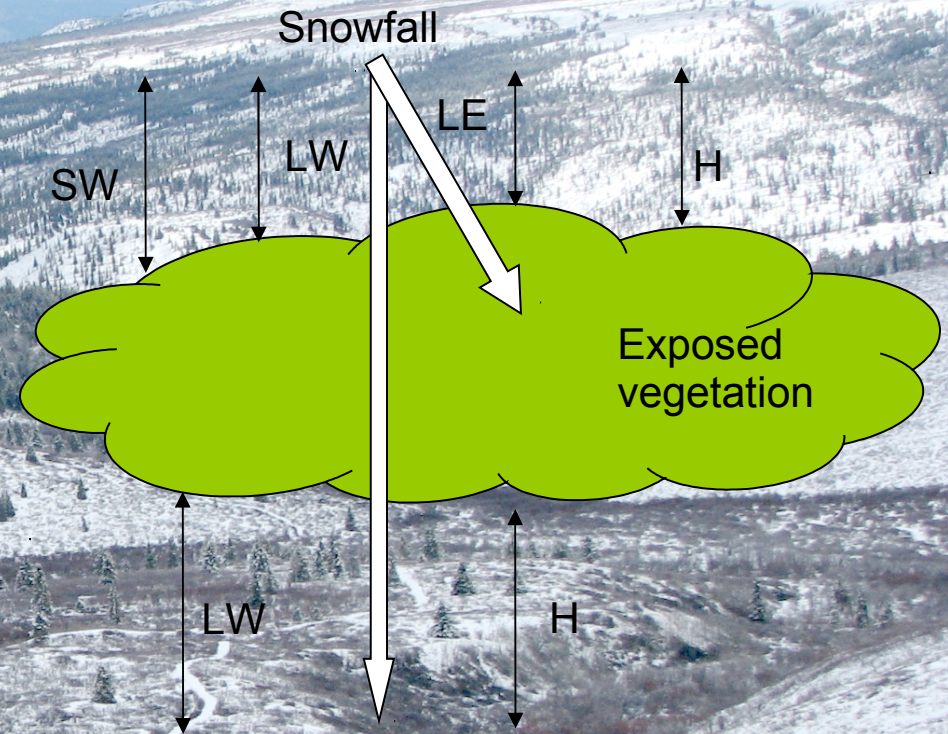


Effect of shrubs on snowmelt energetics in Abisko

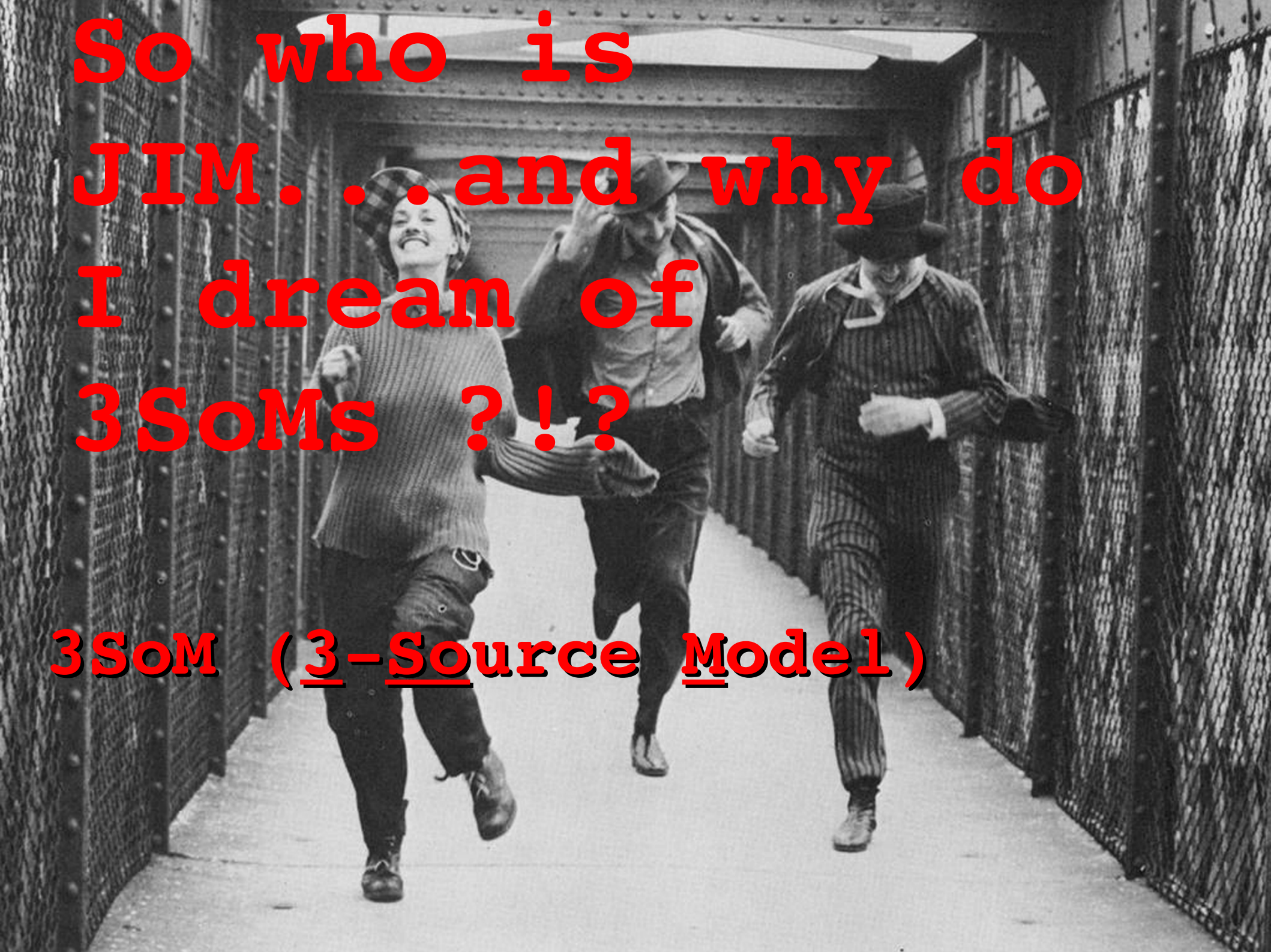
— Shrub run
— No shrub run



To intercept or not to intercept...



Snowpack

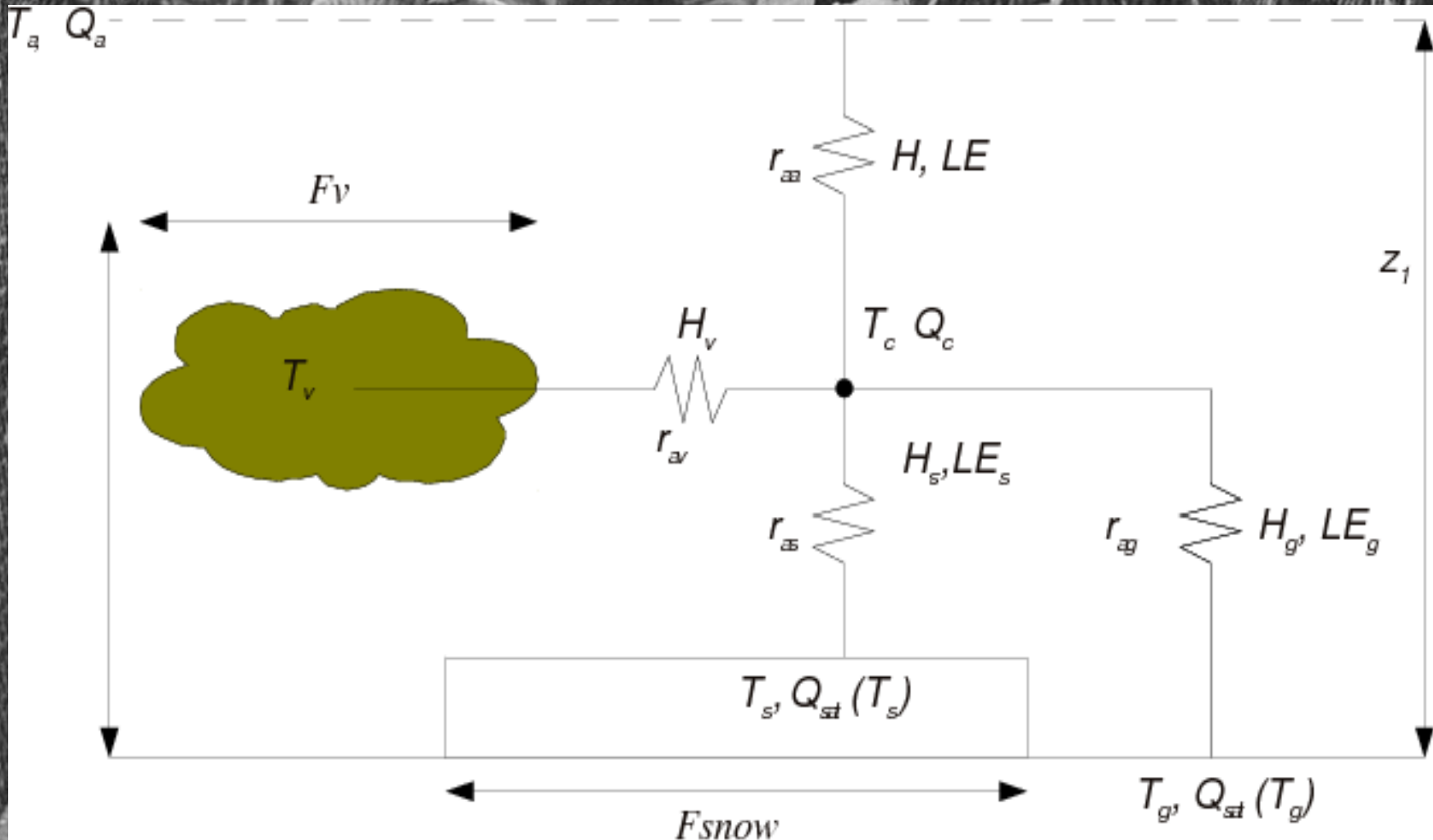


**So who is
JIM... and why do
I dream of
3SoMs ? ! ?**

3SoM (3-Source Model)

JIM?

JULES Investigation Model





Thank you