JULES et JIM

... or
why I
dream
of
3SoMs

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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...)

Runoff (m$^3$. s$^{-1}$)
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

\[
\frac{F_v}{F_{v0}} = \frac{1}{1 + (S_d/d_h)^{m}}
\]
Snow fraction parameterisation

- in JULES

\[ Fs = \frac{\text{snowdepth}}{\text{snowdepth} + \text{canopy height}} \]

\[ \text{Albedo} = Fs \alpha_{\text{snow}} + (1-Fs) \alpha_{\text{tile}} \]
Snow fraction parameterisation

- in JULES

$$Fs = \frac{\text{snowdepth}}{\text{snowdepth} + \text{canopy height}}$$

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

- $$Fs = (1 - Fv) F_{\text{snow}}$$

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

$$\text{Albedo} = Fs \alpha_{\text{snow}} + (1-Fs) \alpha_{\text{tile}}$$
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
To intercept or not to intercept...
So who is JIM...and why do I dream of 3SoMs ?!!?

3SoM (3-Source Model)
JULES Investigation Model
Thank you