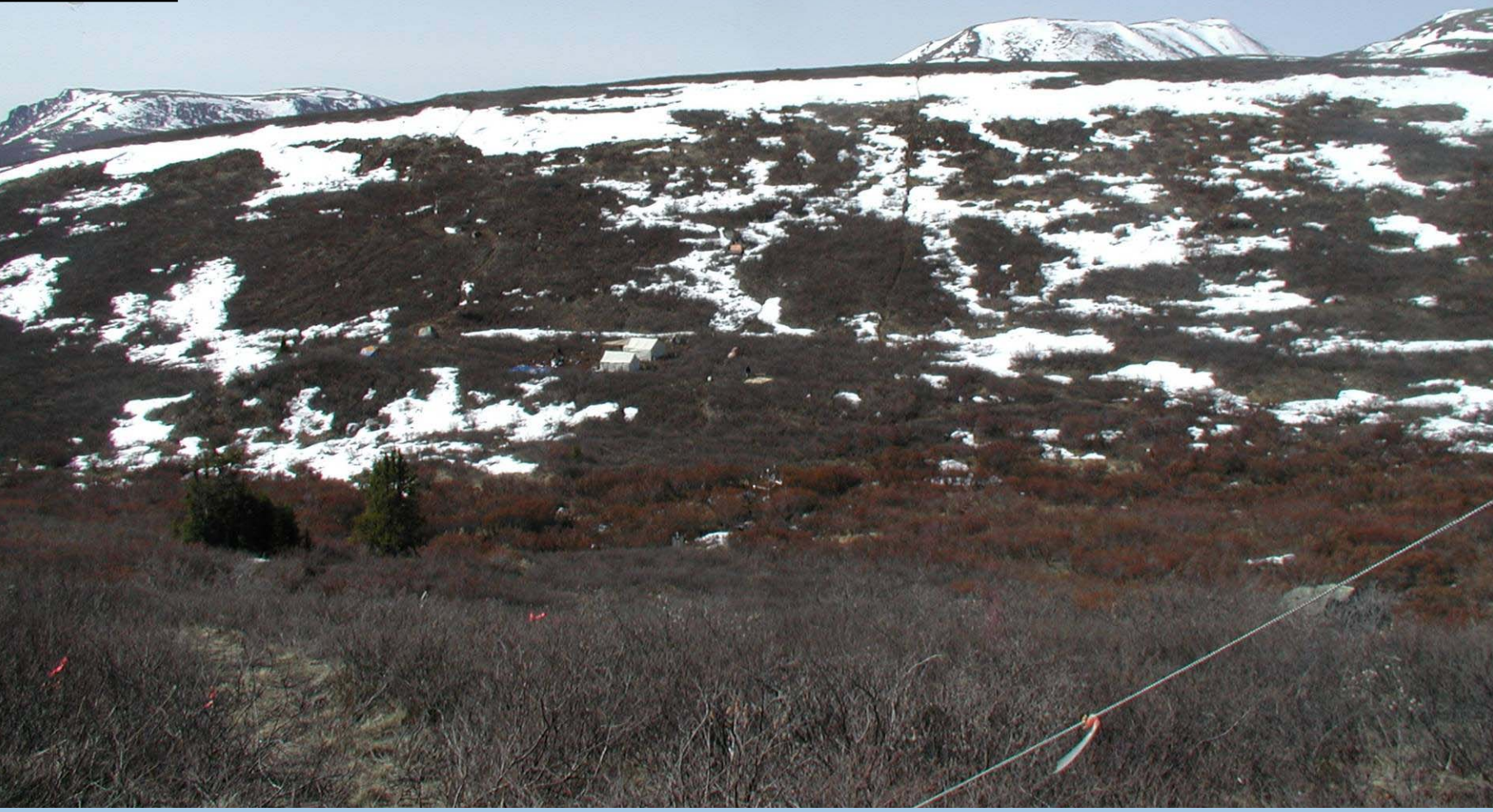
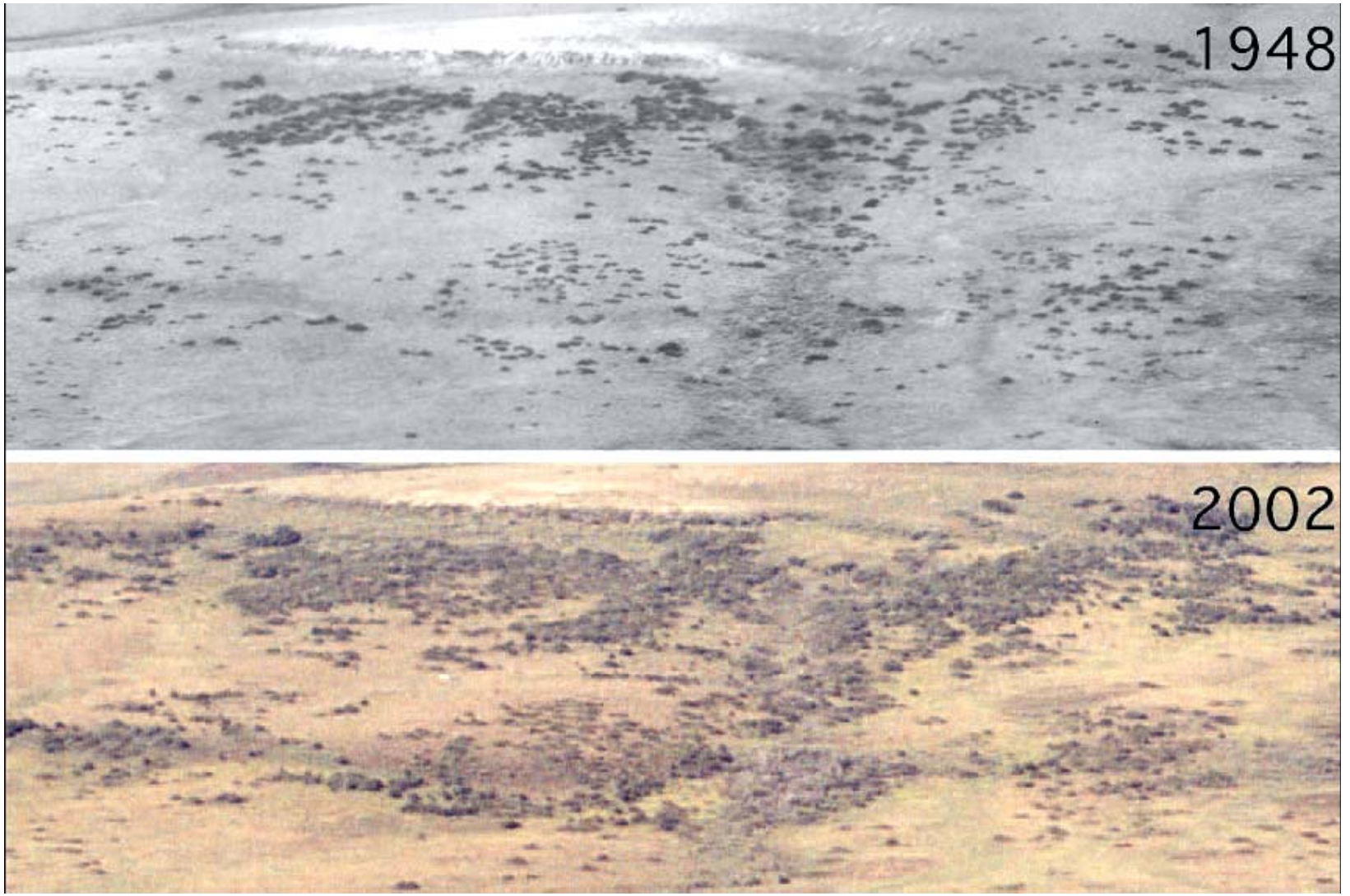
Processes, Parameterisation and Prediction for Shrub Tundra

Richard Essery, Cécile Ménard, John Pomeroy



CMOS-CGU, 31 May – 4 June 2010, Ottawa

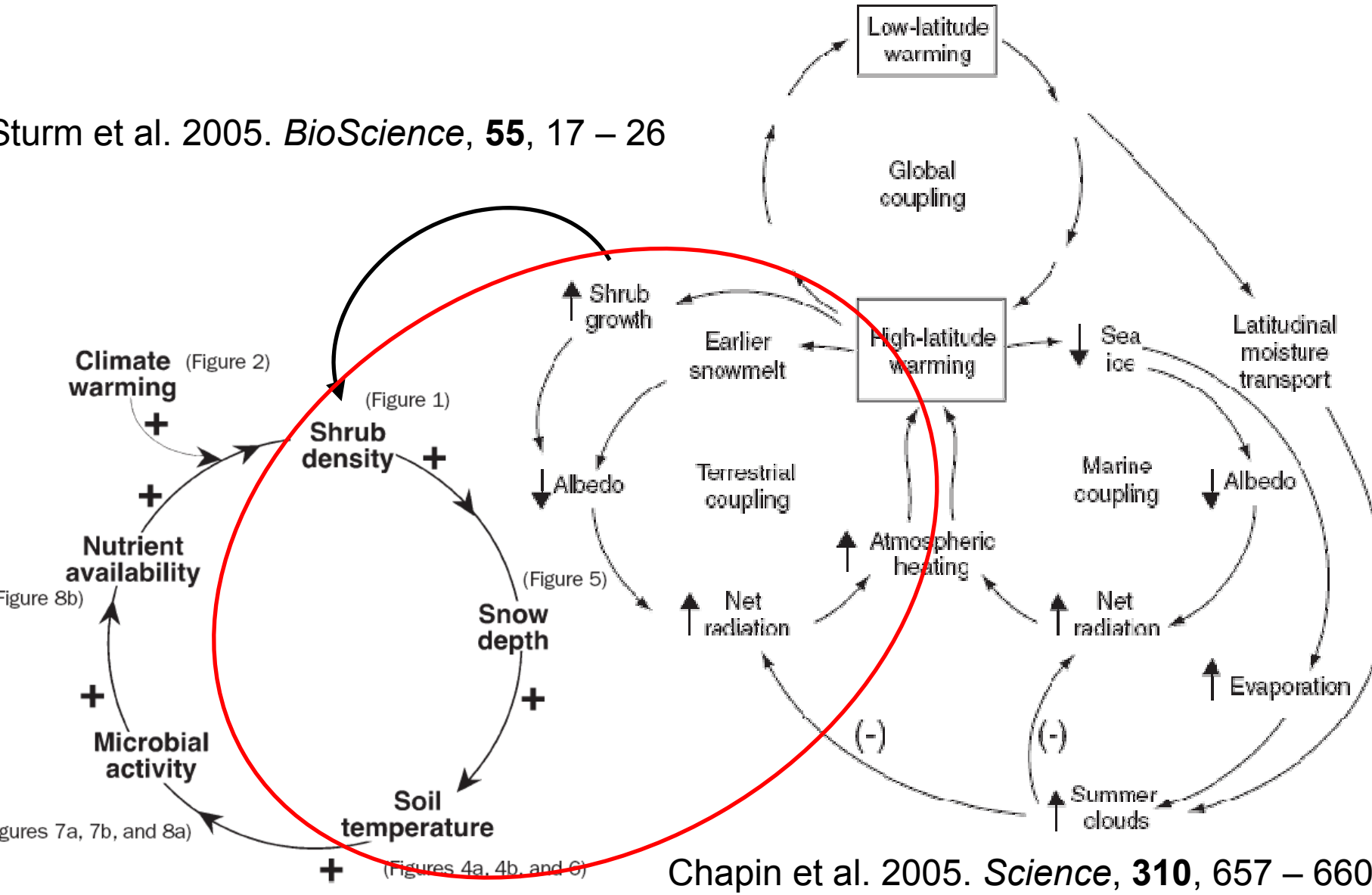
Increasing Shrub Abundance



Sturm et al. 2005. *BioScience*, **55**, 17 – 26

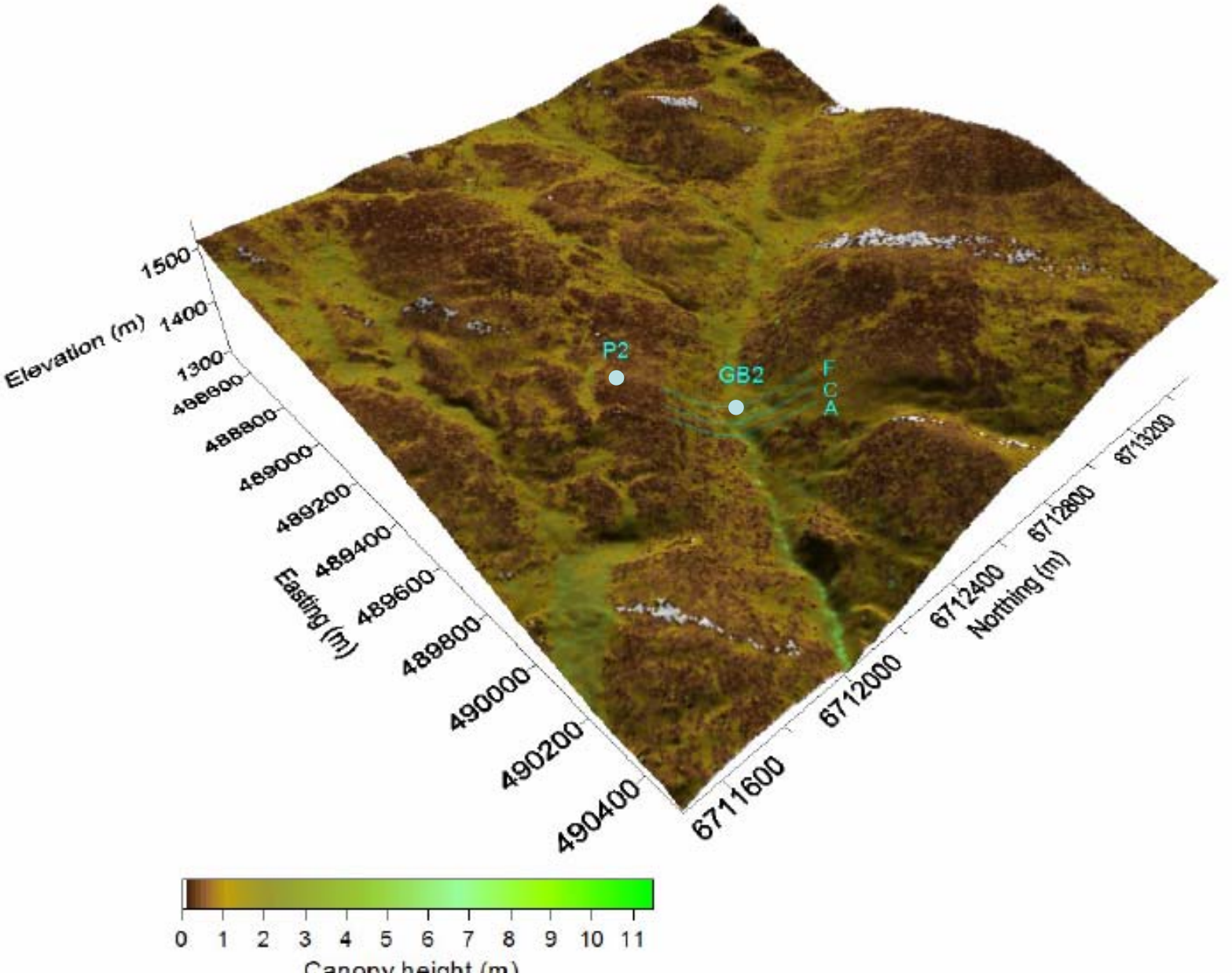
Arctic Climate Feedbacks

Sturm et al. 2005. *BioScience*, **55**, 17 – 26



Chapin et al. 2005. *Science*, **310**, 657 – 660

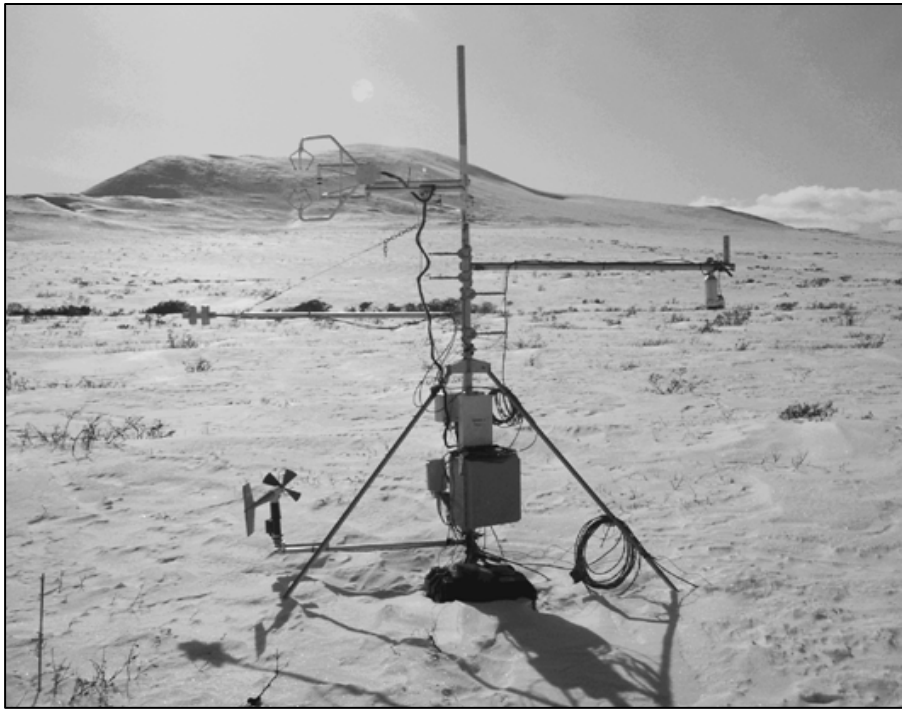
Granger Valley, Wolf Creek Research Basin



Granger Valley Micromet Stations

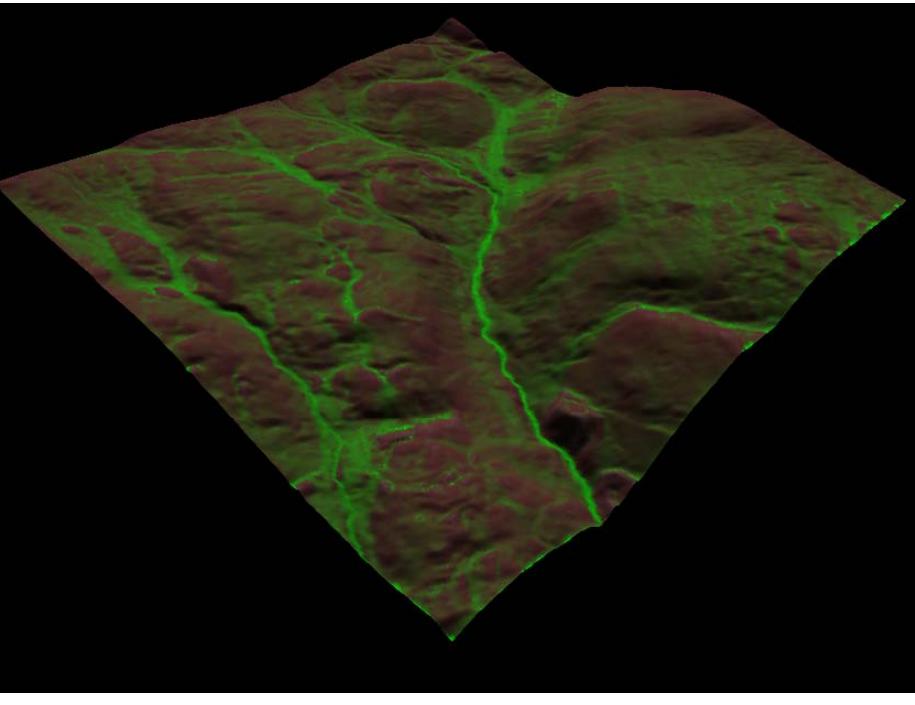
Valley

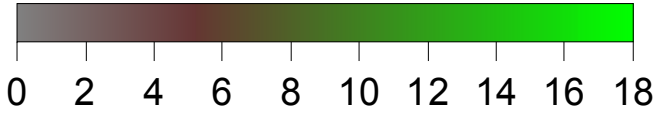
Plateau



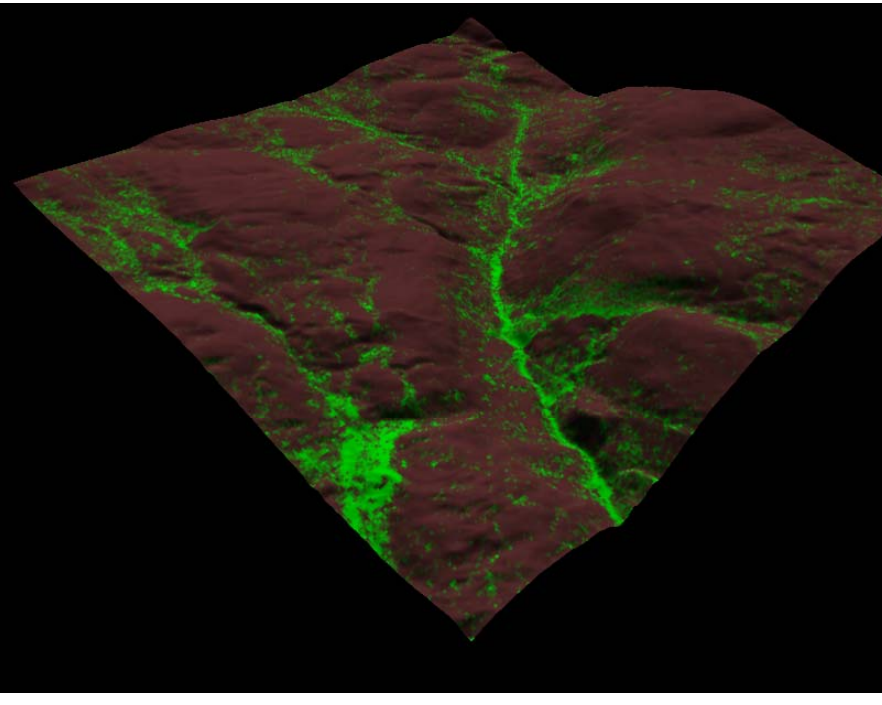
Topography and Vegetation

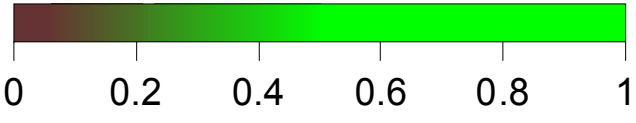
Topographic Wetness Index



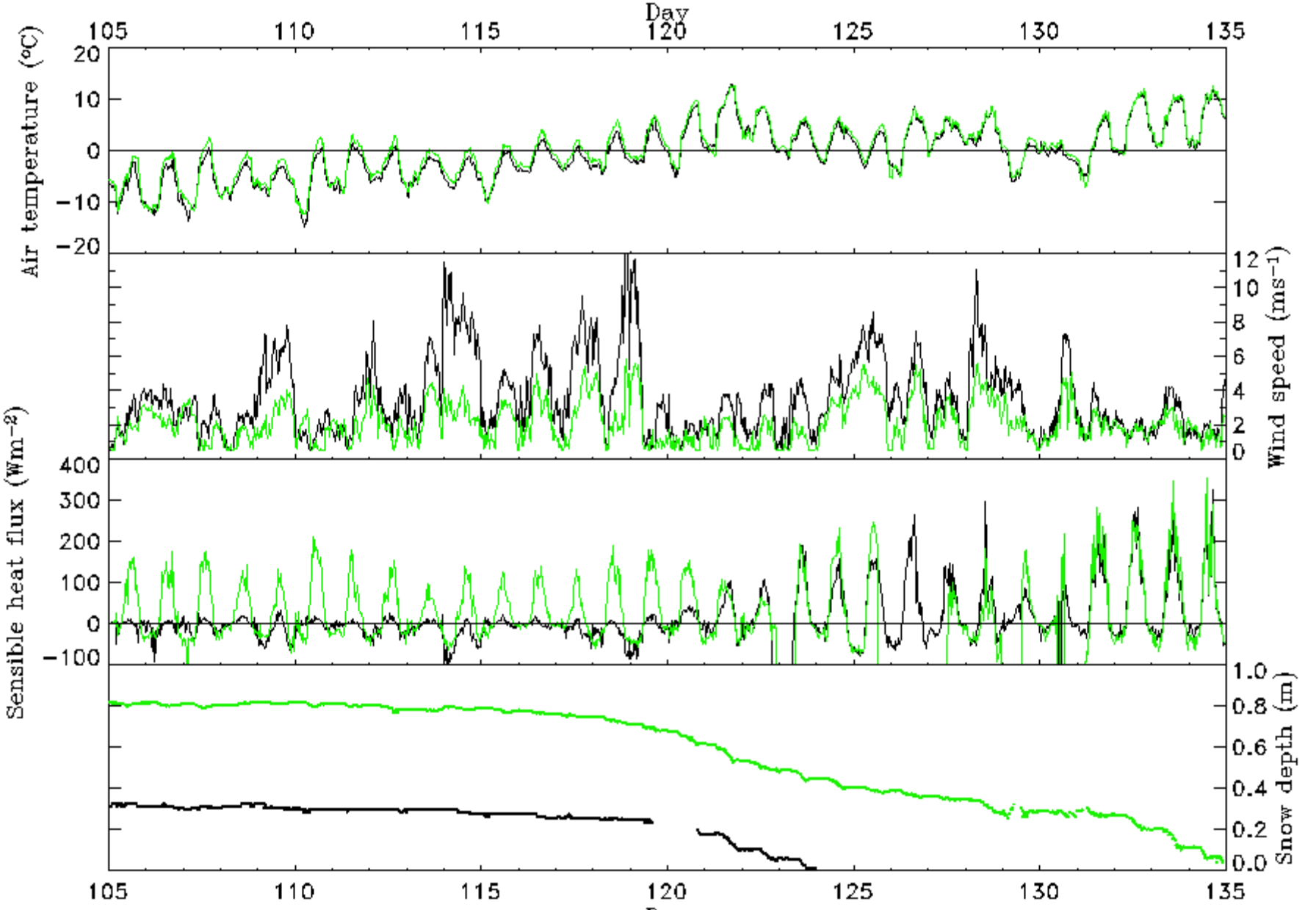


Vegetation fraction



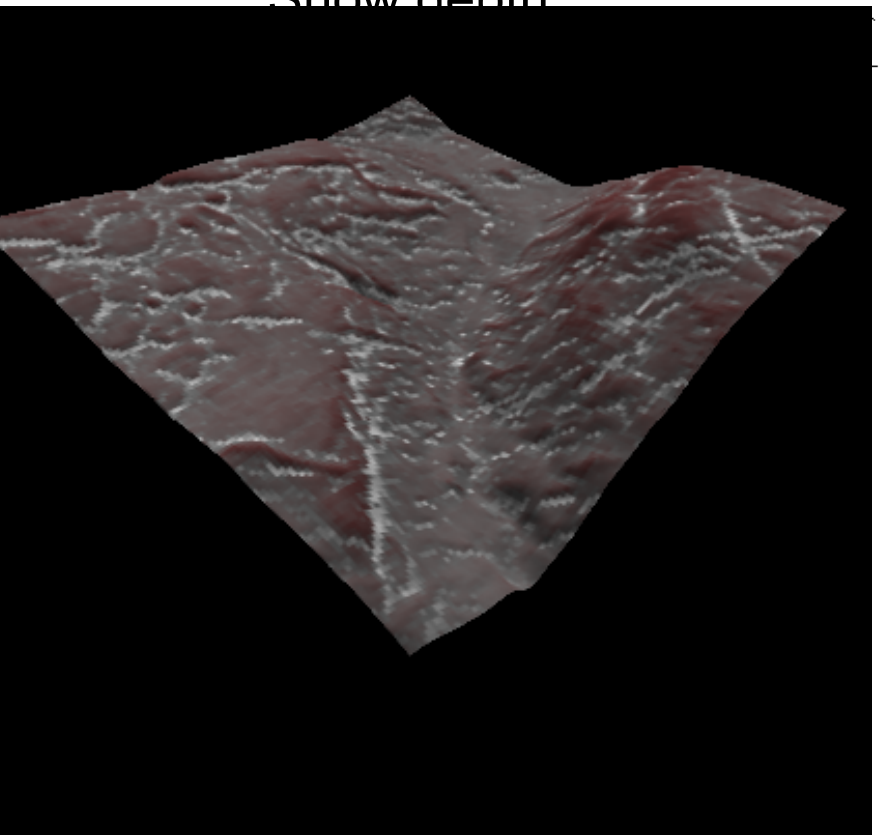


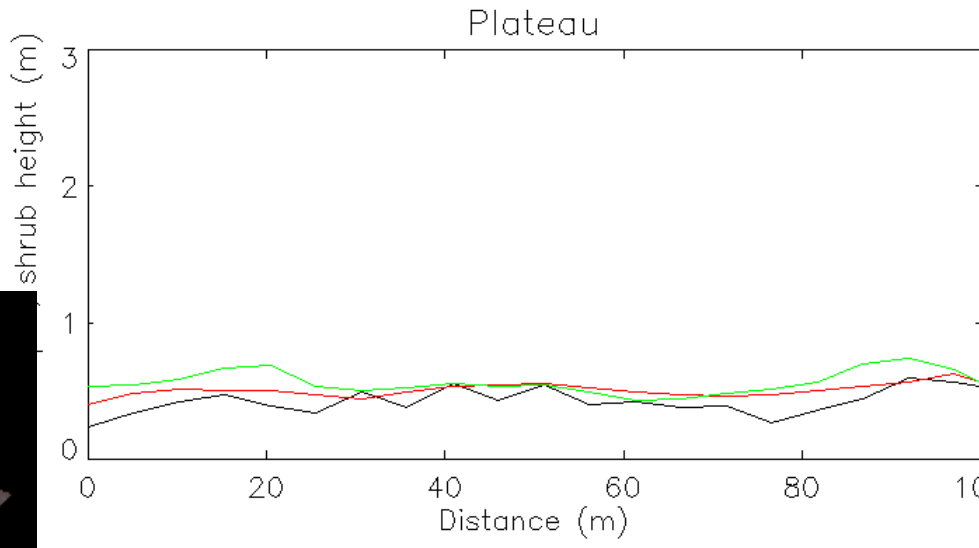
Granger Valley Micrometeorology

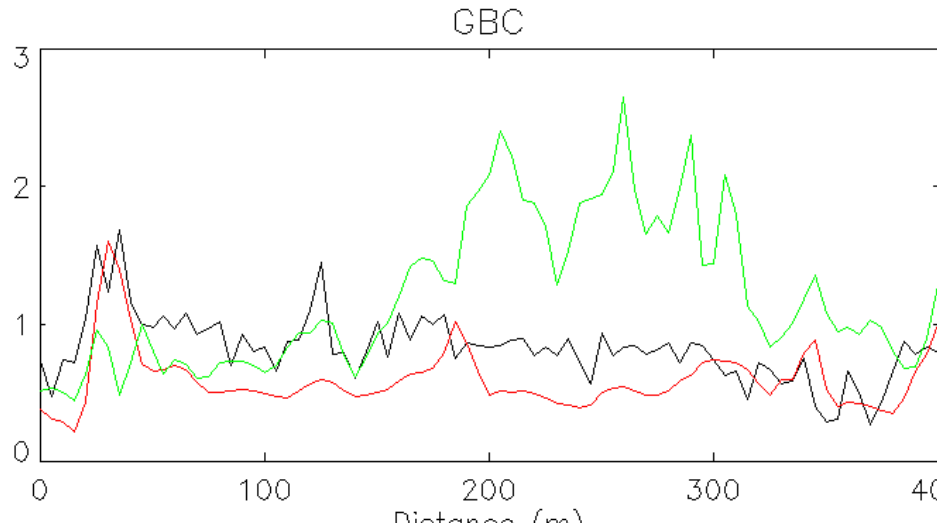


Topography and Snow

Snow depth

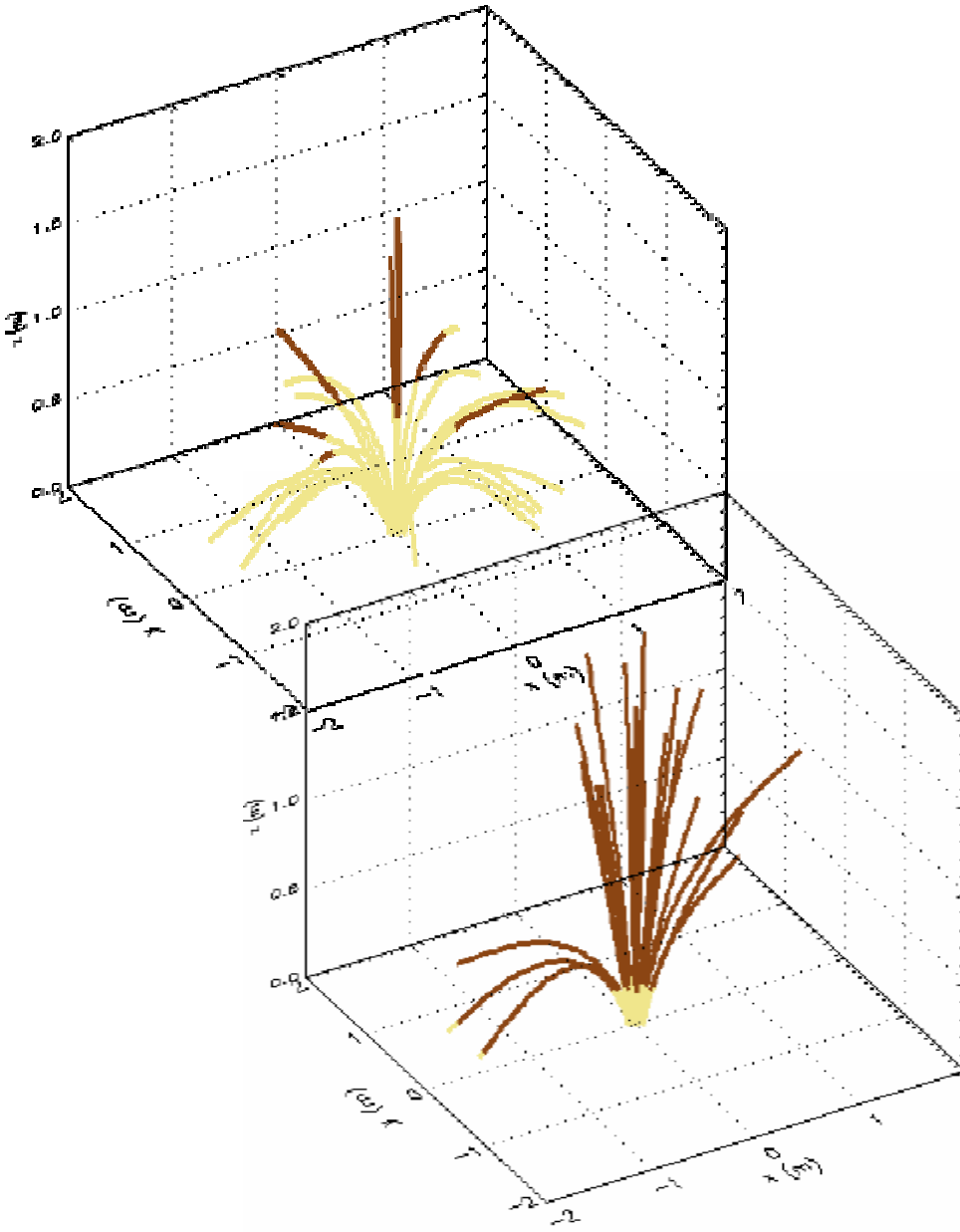




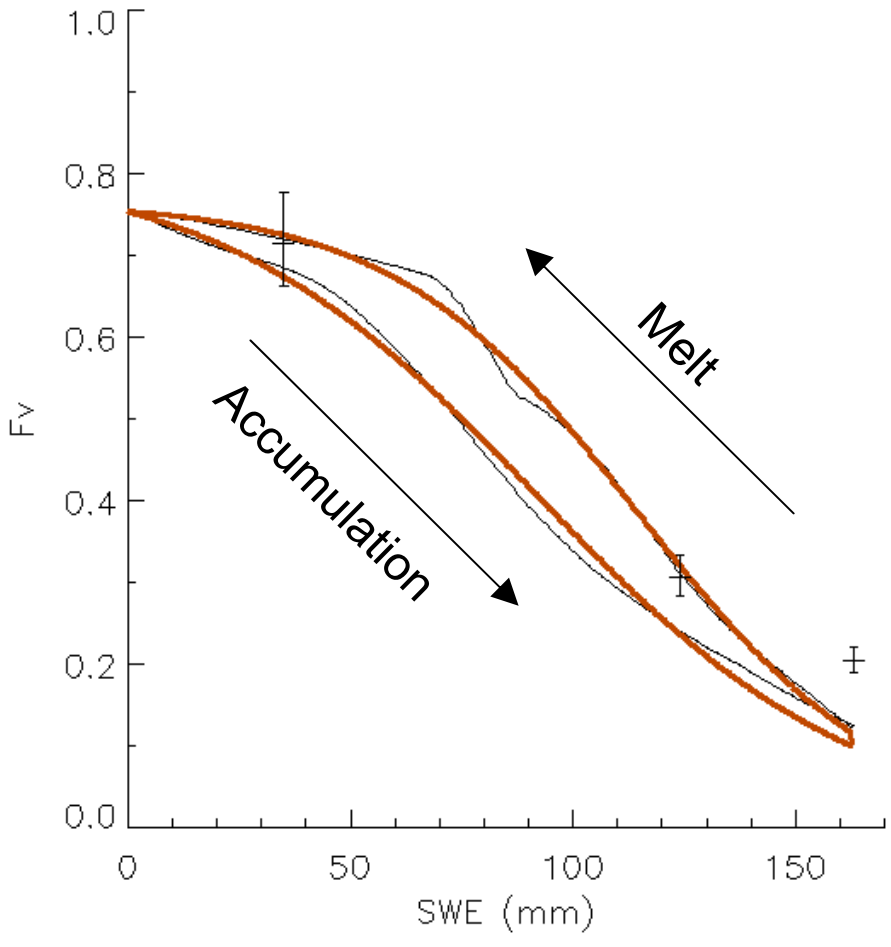


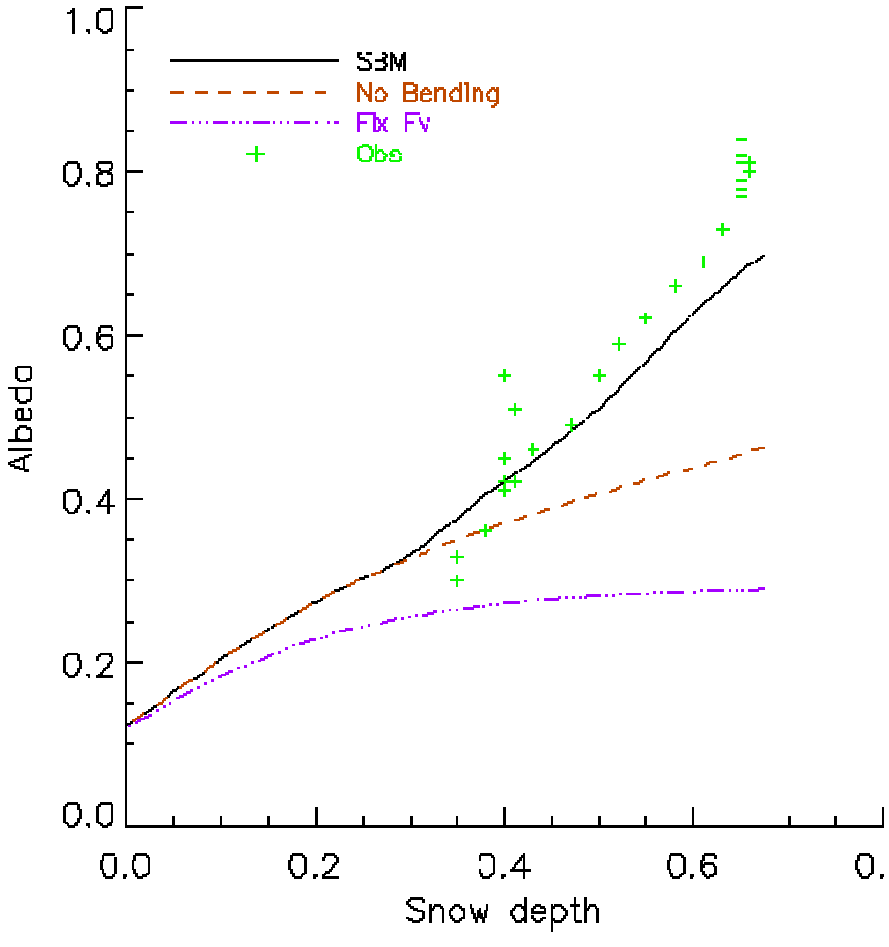
Distributed blowing snow model:
Essery and Pomeroy, 2004. *J. Hydromet.*, **5**, 735 – 744.

Shrub Interception of Snow



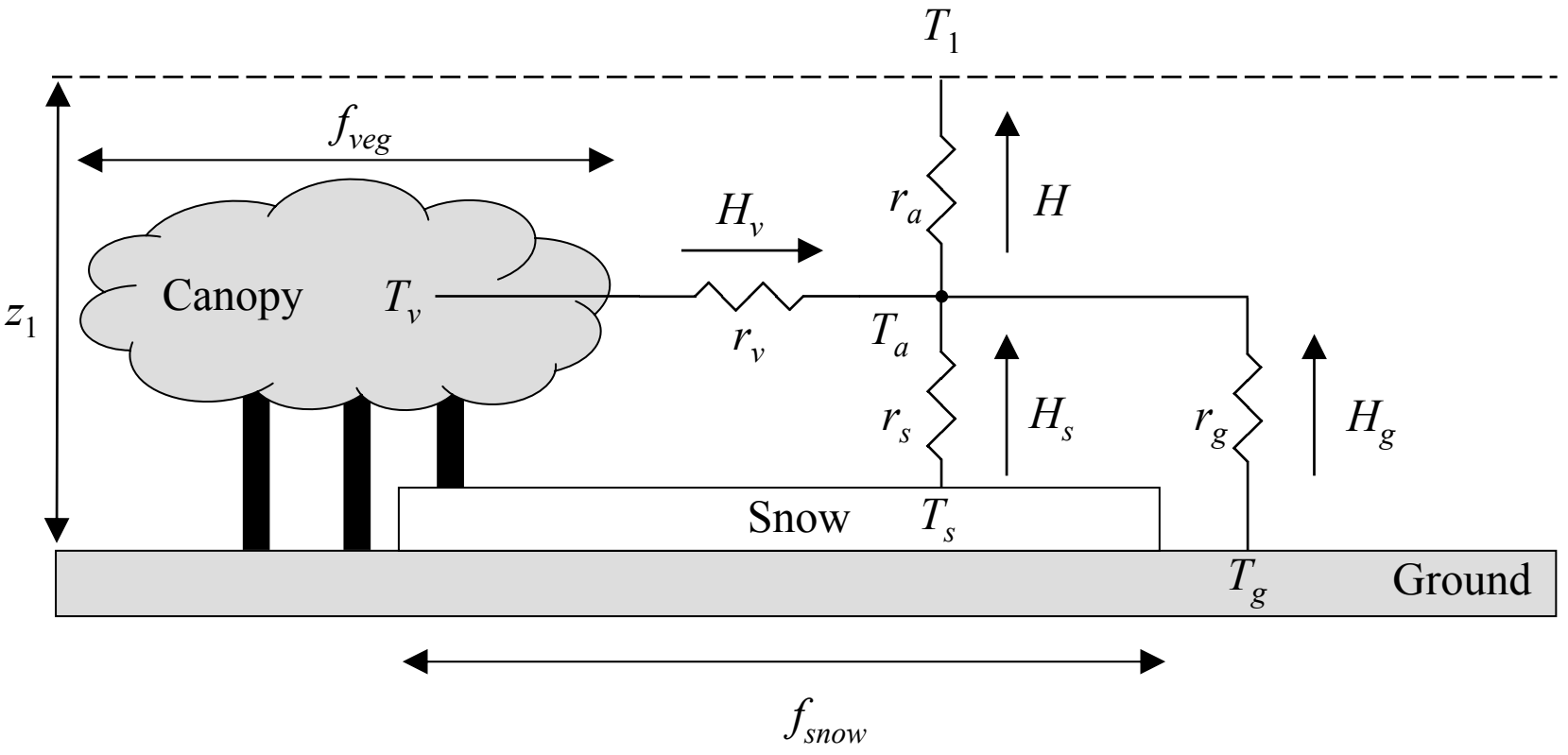
Parameterisation of Exposed Vegetation Fraction



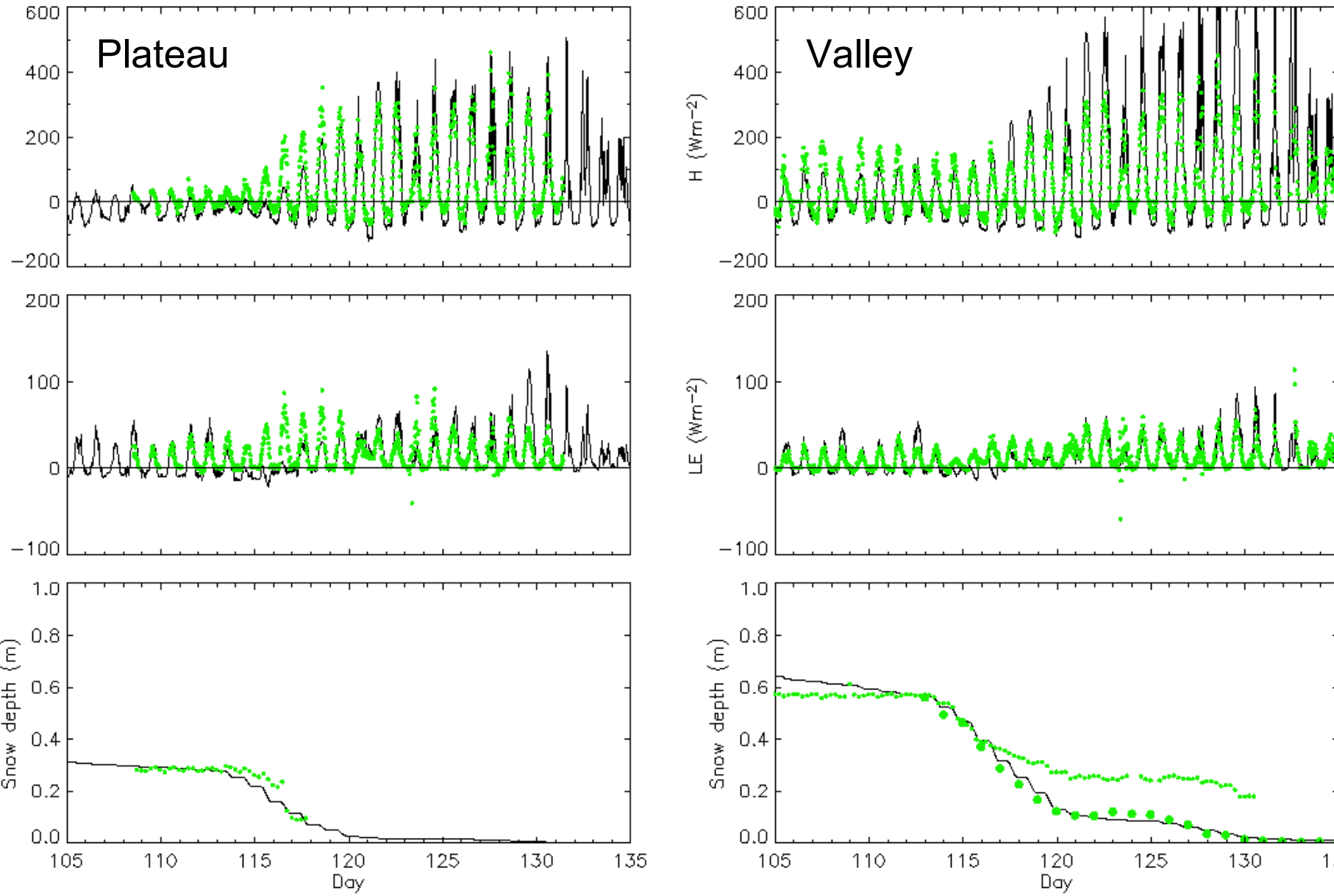


Parameterisation of Soil-Snow-Shrub-Air Fluxes

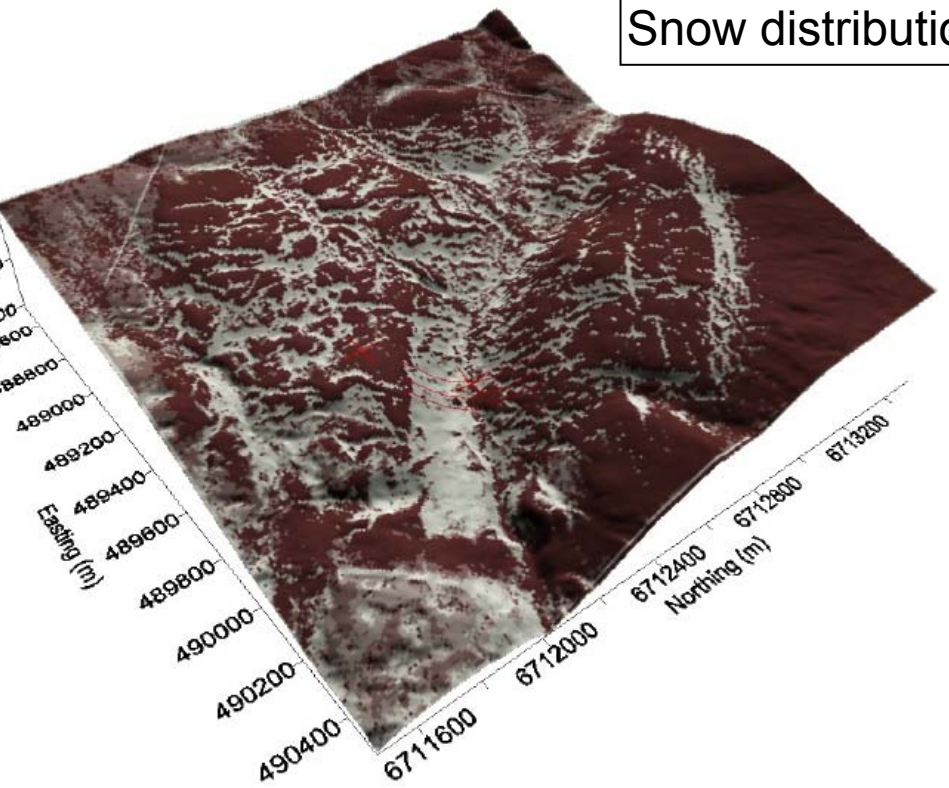
3-source surface energy balance model

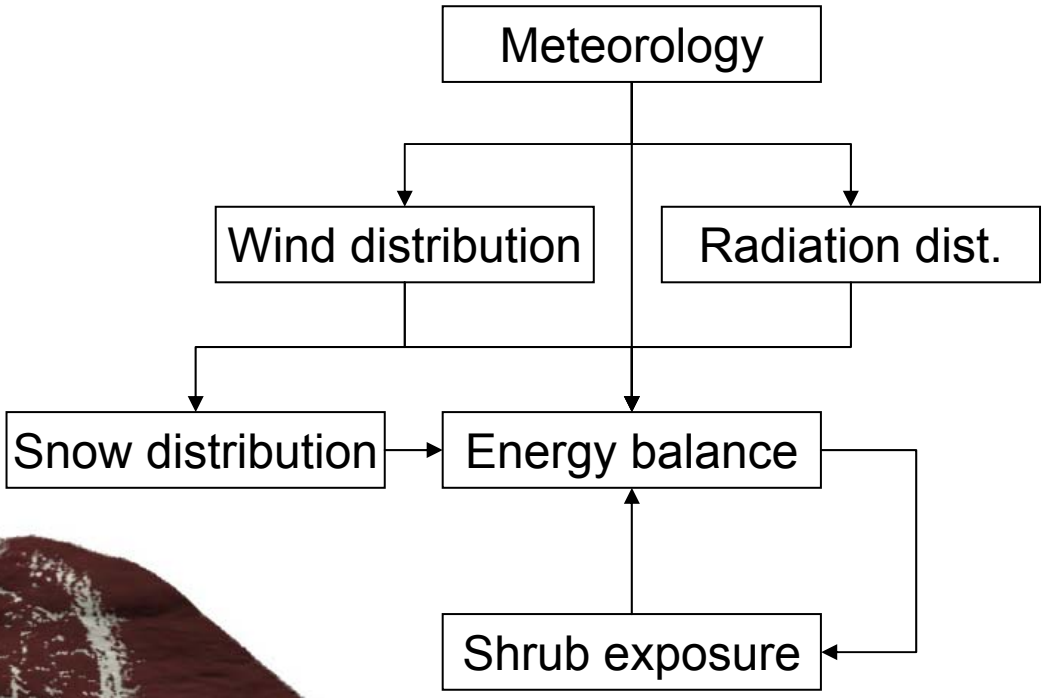


Flux and Melt Simulations

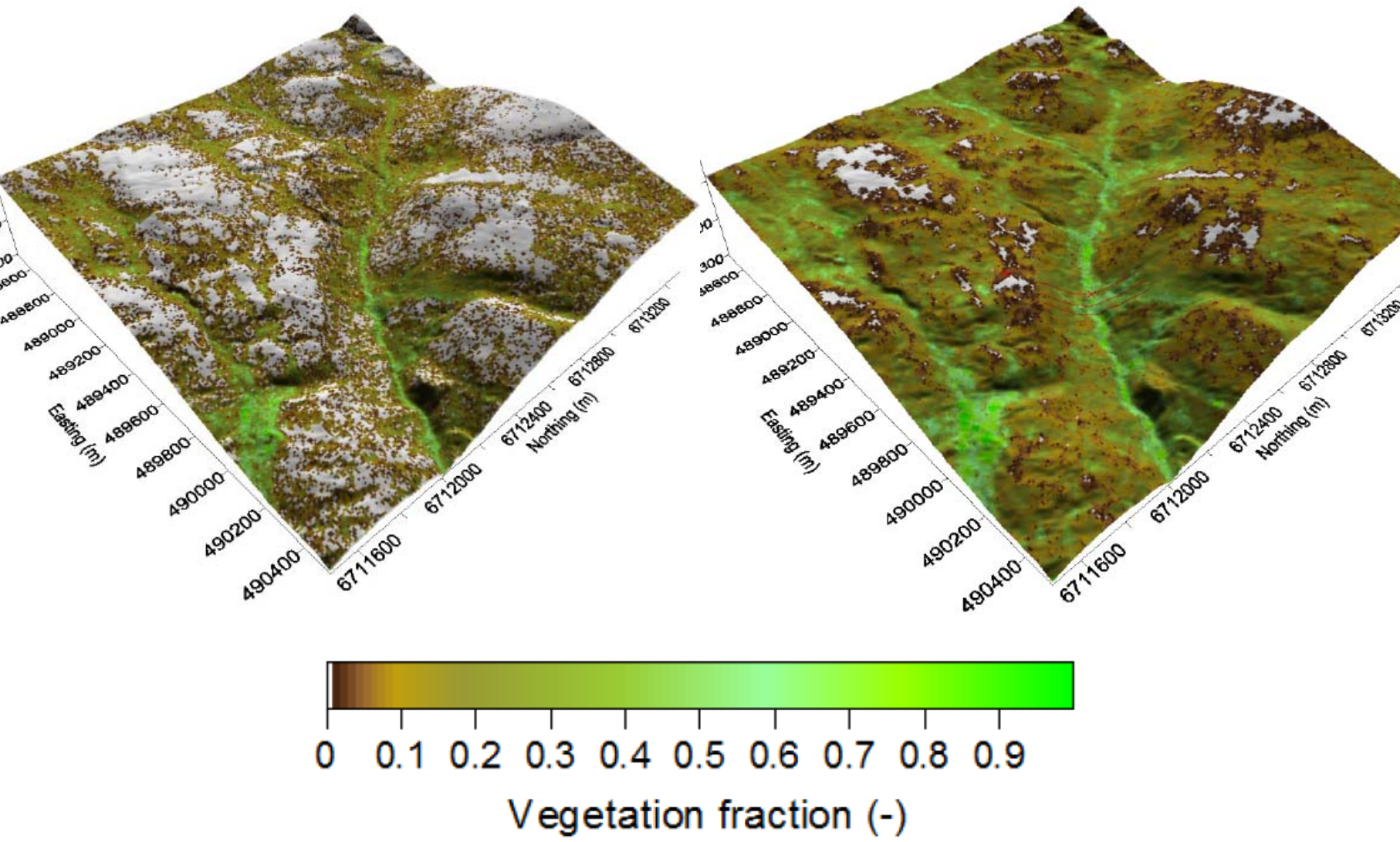


Distributed Model

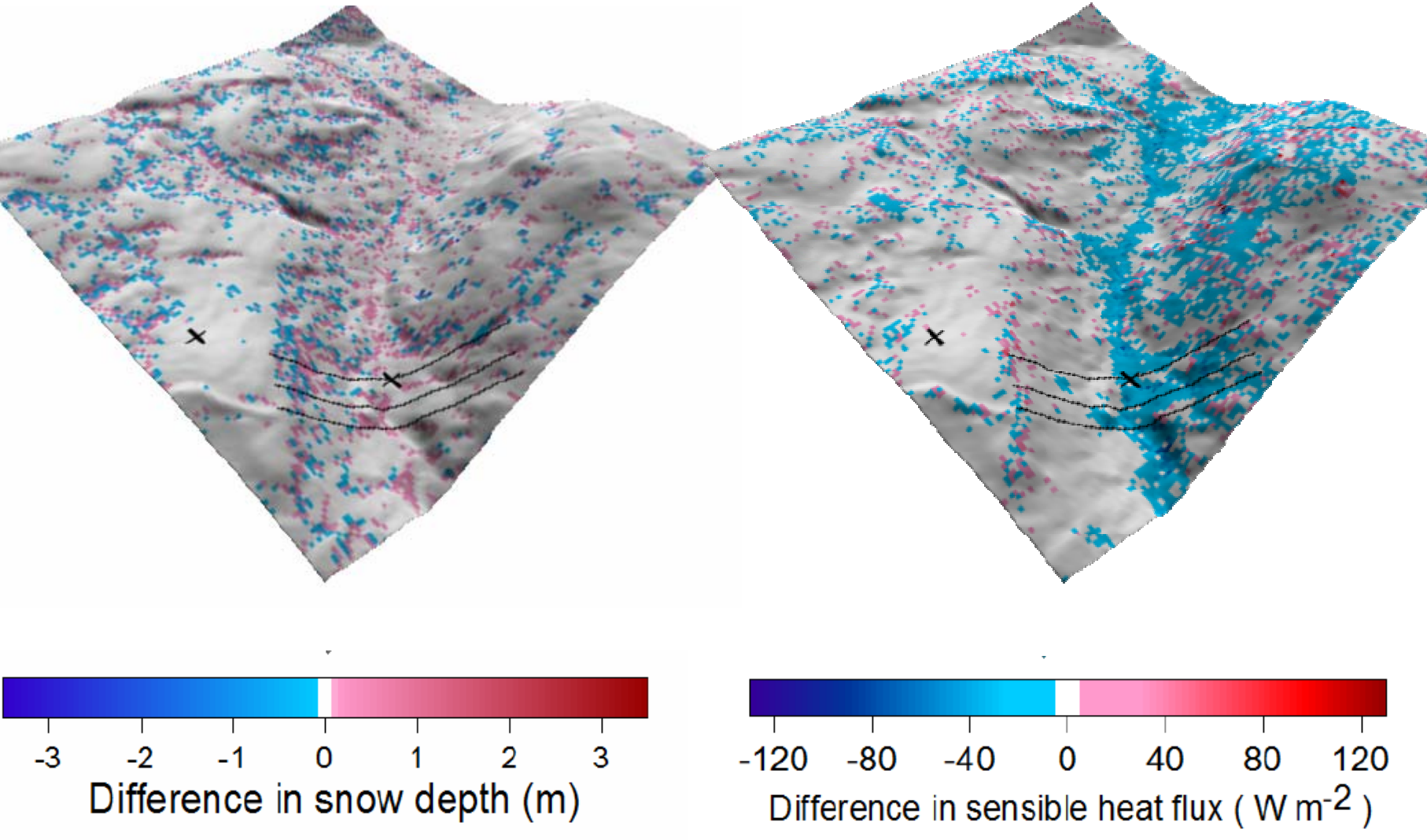




Shrub Expansion



Shrub Expansion Impacts



Prediction and Conclusion