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The effects of advection and mesoscale circulations on snowmelt in flat and hilly terrain

D.B. Clark
Centre for Ecology and Hydrology, Wallingford, UK (dbcl@ceh.ac.uk)

On the atmospheric mesoscale, variations of topography and vegetation type result in different rates of snow accumulation across the landscape. As the spring melt progresses, the snowcover becomes patchy and the surface energy balance shows major variations related to the topography and vegetation. This presentation describes the initial stages of work using an atmospheric model (RAMS) to investigate how characteristics of patchy snowcover and the landscape affect the rate of melt, and the roles played by advection and mesoscale circulations. The land surface model (LEAF2) is calibrated by comparison with observed surface fluxes from Wolf Creek in the Yukon. The influence of patch length scale on the melt rate of idealised patchy snow is first investigated over a flat surface, and then over simple hills. Hilly terrain introduces several new effects, including topographically-induced flows. The strength of advection and mesoscale flows depend upon several details of the landscape. Sensitivity experiments will be used to identify the dominant influences on snowmelt.