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Untangling the contribution of aspect, drainage position and elevation to the spatial variability of fine surface fuels in south east Australian forests

Gary Sheridan, petter nyman, Tom Duff, Craig Baillie, William Bovill, Patrick Lane, and Kevin Tolhurst
The University of Melbourne, School of Forest and Ecosystem Science, Melbourne, Australia (sheridan@unimelb.edu.au)

The prediction of fuel moisture content is important for estimating the rate of spread of wildfires, the ignition probability of firebrands, and for the efficient scheduling of prescribed fire. The moisture content of fine surface fuels varies spatially at large scales (10's to 100's km) due to variation in meteorological variables (eg. temperature, relative humidity, precipitation). At smaller scales (100's of metres) in steep topography spatial variability is attributed to topographic influences that include differences in radiation due to aspect and slope, differences in precipitation, temperature and relative humidity due to elevation, and differences in soil moisture due to hillslope drainage position. Variable forest structure and canopy shading adds further to the spatial variability in surface fuel moisture. In this study we aim to combine daily 5km resolution gridded weather data with 20m resolution DEM and vegetation structure data to predict the spatial variability of fine surface fuels in steep topography. Microclimate stations were established in south east Australia to monitor surface fine fuel moisture continuously (every 15 minutes) using newly developed instrumented litter packs, in addition to temperature and relative humidity measurements inside the litter pack, and measurement of precipitation and energy inputs above and below the forest canopy. Microclimate stations were established across a gradient of aspect (5 stations), drainage position (7 stations), elevation (15 stations), and canopy cover conditions (6 stations). The data from this extensive network of microclimate stations across a broad spectrum of topographic conditions is being analysed to enable the downscaling of gridded weather data to spatial scales that are relevant to the connectivity of wildfire fuels and to the scheduling and outcome of prescribed fires. The initial results from the first year of this study are presented here.