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In order to complement emerging ensemble-based fire modelling frameworks, wind field information is recast in probabilistic terms. Within this research, wind direction response distributions are represented as bivariate circular probability distributions. In the first year of this work, a methodology was developed to ensure the toroidal nature of these distributions is preserved throughout subsequent analysis. A paper detailing this work is currently under review with the journal of Computational Statistics and Data Analysis.

Investigations are now on-going as to whether surface roughness, including vegetation and topography, has a significant impact on the modal structure of these wind direction response distributions. While surface roughness at the topographical scale has clear effects on wind direction, initial findings suggest that in some areas up to seven years worth of post-fire vegetation regrowth has had no significant impact on wind direction response.

Initial evaluation of current operational wind models has shown that model predictions can be highly inaccurate when modelling wind direction across complex terrain. This progress so far highlights the need for a more detailed understanding of the variability of wind direction across the landscape and further study will help to enhance discussions of uncertainty in both wind and fire modelling schemes.