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Application of high-resolution climate measurement and modelling to the adaptation of New Zealand vineyard regions to climate variability

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Results of a new research programme being conducted into the relationship between climate variability, mesoscale flow regimes in the boundary-layer and wine production in vineyard regions of New Zealand will be presented. Atmospheric mesoscale modelling tools are being developed to ensure that viticultural practices and grape varieties are better adapted to current and future climate. The research involves application of advanced regional scale weather model (Weather Research and Forecasting; WRF) and their integration with state-of-the-art grapevine phenological and crop models. The main objectives are to improve adaptation of grape varieties to fine scale spatial variations of climate, and to reduce the impact of climate variation and risk factors such as frost, cool spells and high temperatures. Improved optimization of wine-grape production through better knowledge of climate at high resolution within vineyard regions will contribute to the future sustainability of high quality wine production in New Zealand.
An enhanced network of climate monitoring sites has therefore been installed in New Zealand's premier vineyard region (Marlborough) and the WRF model has been set up to run at 1 km resolution operationally (twice daily) through the growing season. Model performance has been assessed using climate station data and model output is being used to derive high-resolution maps of bioclimatic indices. Initial assessment of model performance suggests that WRF has a cold bias, which appears to be due to a bias in the model input data. However, spatial patterns of predicted air temperature and bioclimatic indices appear to accurately represent the significant spatial variability caused by the complex terrain of the Marlborough region. The latest results of this research programme will be provided along with a review of the 2013-14 growing season, based on data provided by both the climate station network and output from the WRF model.