

MEASUREMENT OF WATER VAPOUR FLUXES WITH EDDY COVARIANCE TOWERS – HOW DIRECTLY MEASURING EVAPOTRANSPIRATION CAN HELP US MANAGE WATER

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The continued expansion of irrigated areas in New Zealand places greater pressure on our freshwater resources and underscores the need for better water-use efficiency. The two principal fates of irrigation water and natural rainfall are drainage and evapotranspiration, and therefore these are key terms in the agricultural water budget. Evapotranspiration has generally been estimated using a variety of models based on commonly measured meteorological variables. Eddy covariance is a technique that measures the vertical flux of water vapour and therefore provides a means to directly measure evapotranspiration. The method also quantifies carbon dioxide fluxes, which allows not only a validation of evapotranspiration models, but also provides new insights into the relationship between photosynthesis and plant water use. Options also exist for partitioning evapotranspiration into its components: soil evaporation and plant transpiration. In the last few years several eddy covariance towers have been established in agricultural fields in New Zealand. The measurements are frequent (every 30 minutes), continuous and integrate over a large spatial area (>1 ha). Some of the towers are collocated with lysimeters where drainage is also quantified. We discuss how these measurements can provide information that can be used to help farmers and water managers make efficient water management decisions.

Editor's Note: An extended manuscript has not yet been submitted for this presentation.