

NEAR SURFACE WATER CONTENT ESTIMATION USING GPR DATA: INVESTIGATIONS WITHIN CALIFORNIA VINEYARDS

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Detailed estimates of water content are necessary for variety of hydrogeological investigations. In viticulture applications, this information is particularly useful for assisting the design of both vineyard layout and efficient irrigation/agrochemical application. However, it is difficult to obtain sufficient information about the spatial variation of water content within the root zone using conventional point or wellbore measurements. We have investigated the applicability of ground penetrating radar (GPR) methods to estimate near surface water content within two California vineyard study sites: the Robert Mondavi Vineyard in Napa County and the Dehlinger Vineyard within Sonoma County. Our research at the winery study sites involves assessing the feasibility of obtaining accurate, non-invasive and dense estimates of water content and the changes in water content over space and time using both groundwave and reflected GPR events. We will present the spatial and temporal estimates of water content obtained from the GPR data at both sites. We will compare our estimates with conventional measurements of water content (obtained using gravimetric, TDR, and neutron probe techniques) as well as with soil texture and plant vigor measurements. Through these comparisons, we will illustrate the potential of GPR for providing reliable and spatially dense water content estimates and the linkages between water content, soil properties and ecosystem responses at the two study sites.