ASSESSING THE UTILITY OF A NEW GEOPHYSICAL SUBSURFACE IMAGING SYSTEM FOR EFFICIENT EVALUATION OF RECHARGE SITES

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This study was conducted in the Tulare Irrigation District, California, with the goal of assessing the utility of a recently developed geophysical imaging method for evaluating potential dedicated recharge basins as well as the suitability of on-farm recharge sites, i.e. farm fields that are used for recharge through surface spreading.

For an ideal recharge site, the ground needs to be conducive to infiltration and recharge of water to the subsurface storage layers. In the case of using farm fields as temporary infiltration basins, meeting this criterion is critical both because it determines if the basin can effectively recharge the aquifer, but also because an inability to infiltrate quickly enough would result in extended periods of ponded water at or near the surface, which may damage the roots of any crops or trees being grown in the fields.

We employed a recently developed towed time-domain electromagnetic (tTEM) system that is specifically designed for b c\’3-D high-resolution imaging of the upper 60-80 m of the subsurface. The system is towed behind an ATV while continuously imaging the subsurface geology.

The results from five field sites show detailed structural variations at the scale of meters and provide insight on the suitability of each site for aquifer recharge. For example, in an almond grove in which we worked variations in clay/sand are shown on such a fine scale that the infiltration efficiency is highly dependent on where surface water is spread within the grove. We compared the results with other geophysical data (airborne EM, electrical resistivity and induced polarization) and with available hydrogeologic data. The tTEM system has the potential to be a valuable method for assessing the suitability of sites for recharge, thereby decreasing the risk associated with large investments and increasing the effectiveness of recharge operations.