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Hyper-spatial and hyper-temporal field ecohydrology: scaling park-plot-plant processes using an integrated satellite-airborne-drone-field-geophysics approach.

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Understanding the dynamics of plant-water-climate-human interaction has been challenged by our ability to resolve processes that span large spatial and temporal scales. The application of multi-disciplinary approaches and integration new and emerging technologies provides new tools to conduct field-based research, and to scale in space from the leaf-plant-plot-park. They can also allow us to build multi-temporal understanding across scales of seconds to years. In this study we show how integrating drone thermal, multispectral and structural data allows us to scale in time and space, in addressing questions of banksia woodland decline under pressures of a changing climate and water availability. We present results demonstrating our approach scaling in the time/space domains using data from our field ecophysiology research that integrates new-generation and frequent-return and high-resolution satellite imagery, annual airborne multispectral data, within-season drone missions supported by hydro-geophysics (gravity surveys and Electrical Resistivity Tomography). We discuss the success, issues and future of integrating drone and other "big data".