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## Embedded networked sensing in terrestrial ecosystems

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Embedded networked sensing in terrestrial ecosystems

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Ecological Observatories are a new class of multi-user research infrastructure being designed and deployed to address a broad range of continental scale ecological questions that until only recently were not technologically feasible. Highly networked ecological observatories, spread continental-scale regions and featuring a diverse integration of programmable sensing capabilities and remote observational functions are expected to enable a transformation in the scope of environmental research, particularly in relation to understanding how global climate variability and local and regional land use changes will quantitatively affect the composition, structure, and dynamics of the world's ecosystems and services.

Observing Systems research focused on terrestrial ecology is one of the four core research application fields of the US National Science Foundation funded Center for Embedded Networked Sensing, which operates an engineering and experimental test bed located in southern California at the James San Jacinto Mountains Reserve, a biological field station that is part of the University of California Natural Reserve System. This talk describes the various experimental and deployed embedded networked sensing systems at the James Reserve, and suggests how similar systems and related infrastructure will be key to meeting the engineering and science objectives of future ecological research.

A multi-tiered and multi-scale sensor network combines environmental, chemical and biological measurements from within soils, above ground, below and above canopy, to quantify interactive linkages across ecosystem functions (e.g. plant and root growth, carbon, water and nutrient dynamics) and how these functions may be affected by changes of physical variables, many of which are influenced by anthropogenic effects. An overview of systems will be presented and applications to Pacific island ecosystems will be discussed