

David Bubenheim  
Biospheric Science Branch  
NASA Ames Research Center  
Moffett Field, CA 94035-1000

[david.l.bubenheim@nasa.gov](mailto:david.l.bubenheim@nasa.gov)

## **Controlled Environments Enables Adaptive Management in Aquatic Ecosystems Under Altered Environments**

David L. Bubenheim, NASA Ames Research Center, Earth Science Division, Moffett Field, CA 94035

Ecosystems worldwide are impacted by altered environment conditions resulting from climate, drought, and land use changes. Gaps in the science knowledge base regarding plant community response to these novel and rapid changes limit both science understanding and management of ecosystems. We describe how CE Technologies have enabled the rapid supply of gap-filling science, development of ecosystem simulation models, and remote sensing assessment tools to provide science-informed, adaptive management methods in the impacted aquatic ecosystem of the California Sacramento-San Joaquin River Delta. The Delta is the hub for California's water, supplying Southern California agriculture and urban communities as well as the San Francisco Bay area. The changes in environmental conditions including temperature, light, and water quality and associated expansion of invasive aquatic plants negatively impact water distribution and ecology of the San Francisco Bay/Delta complex. CE technologies define changes in resource use efficiencies, photosynthetic productivity, evapotranspiration, phenology, reproductive strategies, and spectral reflectance modifications in native and invasive species in response to altered conditions. We will discuss how the CE technologies play an enabling role in filling knowledge gaps regarding plant response to altered environments, parameterization and validation of ecosystem models, development of satellite-based, remote sensing tools, and operational management strategies.

Key Words: Ecosystems Environmental Models Remote Sensing

Conference URL:

<http://icec-auspheno2016.com.au/index.asp?IntCatId=14>

Conference Info.:

5th International Controlled Environment Conference  
September 18 – 23, 2016,  
Canberra, Australia

Sponsor: Australian Plant Phenomics Facility