# 21th FEFCO

Forest Ecosystem Function Colloquium (FEFCO) は、地域や地球全体のレベルで森林生態系の機能とその持続的活用法を統合的に理解することを目的とし、研究者間の学術交流を推進します。

第21回森林生態系機能コロキウムは、Duke大学のRam Oren先生にご講演いただきます。どなたでも参加できますので、多くの皆様のご参加をお待ちしております。京都大学農学研究科熱帯林環境学研究室&森林水文学研究室がホストを務めます。

## 21th FEFCO

## 2015/6/9 16:30 - 18:00

## Faculty of Agriculture Main Building, S174

## Ram Oren (Nicholas School of the Environment, Duke University)

## Lessons from Free-Air $CO_2$ Enrichment (FACE) experiments: How perceptions interfere with reality

FACE experiments in forests are rare. It is therefore not surprising that many FACE-related publications are cited frequently. However, much of the cited work has been published prematurely, with subsequent corrections rarely carrying the same impact. As result, much eco-physiological understanding and related modeling work is ill-informed, with consequences to predictions of climate change impacts on forest growth and species dynamics, biosphere-atmosphere exchanges of mass and energy, and ecosystems services such as water yield, carbon sequestration and timber production. This presentation will visit a series of dominant perceptions and assess how well these are in agreement with data produced towards the end of the experiments. Starting with water, we will examine the ideas that stomata close in direct response to elevated $CO_2$, thus reducing transpiration and allowing for greater amount of water flow to downstream ecosystems and users (not likely). We will examine the idea that understory composition is changing in favor of shade tolerant species and that the vine poison-ivy will increase in dominance (inconsistent because the ivy is intolerant, and both unlikely). A conservative response of net primary production has been touted as one of the most important outcome of synthesis of results from FACE experiments (wrong) at the same time that progressive nitrogen (N) limitation was promoted as the mechanism that will prevent forests from responding to elevated $CO_2$ (never demonstrated, and not likely). Nitrogen does appear to operate as a dial – with increasing N supply, more of the extra carbon fix under elevated [$CO_2$] ends up in plant material and not in fast turnover belowground pools. And indeed, it appears that on poor soils, trees do not respond to elevated $CO_2$, even though they photosynthesize more. In such sites, increasing the availability of all needed nutrients does increase canopy leaf area and production appreciably. Overall, it seems the responses of ecosystems to elevated atmospheric $CO_2$ are mostly captured by their ability to increase canopy leaf area.

**Bio** Ram Oren holds a distinguished professorship (Nicholas Professor of Earth System Science) at Duke University Nicholas School of the Environment. His graduate work under Prof. Richard Waring at Oregon State University concentrated on various factors affecting growth efficiency under biotic and abiotic stress. His postgraduate work under Prof. Ernst-Detlef Schulze at the University of Bayreuth assessed the contribution of acidic precipitation to nutritional disharmony of Norway spruce forests. For the last three decades, together with his students, he was involved in studies of whole trees and ecosystems water use, the mechanisms controlling the use of water, and the consequences to carbon assimilation and tree growth. These studies range in latitude from the Peruvian Amazon to near the Arctic Circle, and included the Duke Free-Air CO2 Enrichment (FACE) experiment, of which he served as principal investigator. He serves as the Editor-in-Chief of the journal Tree Physiology, and is a member of the Royal Swedish Academy of Agriculture and Forestry.

Forest Ecosystem Function Colloquium

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