

ACMS Applied Math Seminar



David Medvigy
Thursday, October 26, 2017
154 Hurley Hall
3:30 – 4:30 PM

Cheating Death and Acquiring Wealth: Arboreal Formulae for Success

Successful trees (1) cheat death by surviving adverse environmental conditions, and (2) acquire wealth through high rates of photosynthesis. Severe droughts are examples of adverse environmental conditions that put trees in danger of dying. However, the mechanisms of drought-induced tree mortality are poorly understood. It is therefore challenging to predict how trees will, in the future, respond to what are likely to be hotter drought conditions. This talk will present an application of optimal control theory to the problem of tree mortality. The theory is used to derive optimal tree drought-response strategies. The resulting model is able to explain recently-observed patterns, such as disproportionate tendency for large trees to die following drought. This talk will also explore arboreal wealth-acquisition strategies. These strategies hinge on the presence of leaves. Surprisingly, in tropical forests, the amount of time that leaves remain attached to a tree varies 20-fold across species. An optimality theory is derived and used to explain these variations in leaf longevity.

The Department of Applied and Computational
Mathematics and Statistics

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