Location: HUCE 433i

Topic 1: Introduction: the changing nature of ecology

The recognition that the earthâ€™s ecosystems are changing at an unprecedented rates, magnitudes, and spatial extents due to human activities is leading to important shifts in the way that ecological research is being conducted. In this unit, we will discuss the motivations behind these shifts, and the implications of them for ecological observations, experiments and models.

Evans_etal_12_prsb.pdf

Vitousek_1994_ecology_global_change.pdf

Dietze_et_al_13_PCE.pdf

Mouquet_etal_15_predictive_ecology.pdf

Topic 2: Demystifying/Deconstructing Predictions of Large-Scale Ecosystem Change

Predictions of large-scale terrestrial ecosystem change, arising from changes in climate, increasing atmospheric CO_2 concentrations, and land-use, relies heavily on the use of terrestrial biosphere models. In this unit, we will delve into the structure and nature of modern-day terrestrial model formulations.

Primary readings: Foley et al. (1996) and Moorcroft et al. (2001)

Supplementary readings:

Moorcroft et al. (2001) appendix and Moorcroft (2006)

Online Farquhar model simulation

Topic 3: Predictions of Large-Scale Ecosystem Change

Recent of predictions of large-scale terrestrial ecosystem change, arising from changes in climate, increasing atmospheric CO_2 concentrations. In this section, we examine two studies that compare predictions from several different terrestrial biosphere models.

February 21st Readings: Sitch et al. (2008) and Zhang et al. (2015)

February 28th Readings: Zhang et al. (2015) and Bonan_and_Doney_2018.pdf

Topic 4: Terrestrial Ecosystem Responses to Elevated Carbon Dioxide

In this section, we examine measurements and theoretical models of how plants are expected to respond to elevated carbon dioxide.

March 7th Empirical Evidence from Free-Air CO2 Enrichment (FACE) experiments.

Readings: Norby_Zak_11_FACE_review.pdf and McCarthy_etal_2010.pdf

March 19th The impacts of elevated CO2 on New England Tree Species

Readings: Bazaaz_etal_1990.pdf and Bazzaz_and_Miao_Ecology_1993.pdf

Topic 5: Stomatal Conductance

In this section, we examine how stomatal conductance affects the exchanges of carbon, water energy between the biosphere and the atmosphere.

March 26th Readings: Medlyn_et al_2011.pdf and Kala_etal_16.pdf