Title: Shedding light on the dark side of carbon cycling: Environmental impacts on plant respiration from leaf to ecosystem

Abstract for talk:

Leaf respiration represents an immense flux of carbon dioxide from terrestrial ecosystems – approximately six times annual fossil fuel emissions – but remains one of the least understood aspects of the global carbon cycle. Multiple interacting environmental controls on respiration complicate its ability to be modeled and scaled, and the direct and indirect environmental effects of climate change on this process further alters how plants cycle and store carbon. Resolving major uncertainties – including the short-term temperature response and light inhibition of respiration – will greatly improve estimates of ecosystem carbon cycling, especially in regions experiencing rapid environmental change, as in the arctic tundra. Extensive field measurements made in intact ecosystems around the world reveal convergence of respiration responses to climate, short-term change in temperature, and leaf traits across diverse species representing different plant functional types. However, evidence from experimentally altered boreal, temperate, and arctic ecosystems suggests potential adaptive differences among species under future climate change. When integrated into terrestrial biosphere models, these results could provide more accurate estimates of current and projected carbon fluxes across the globe.