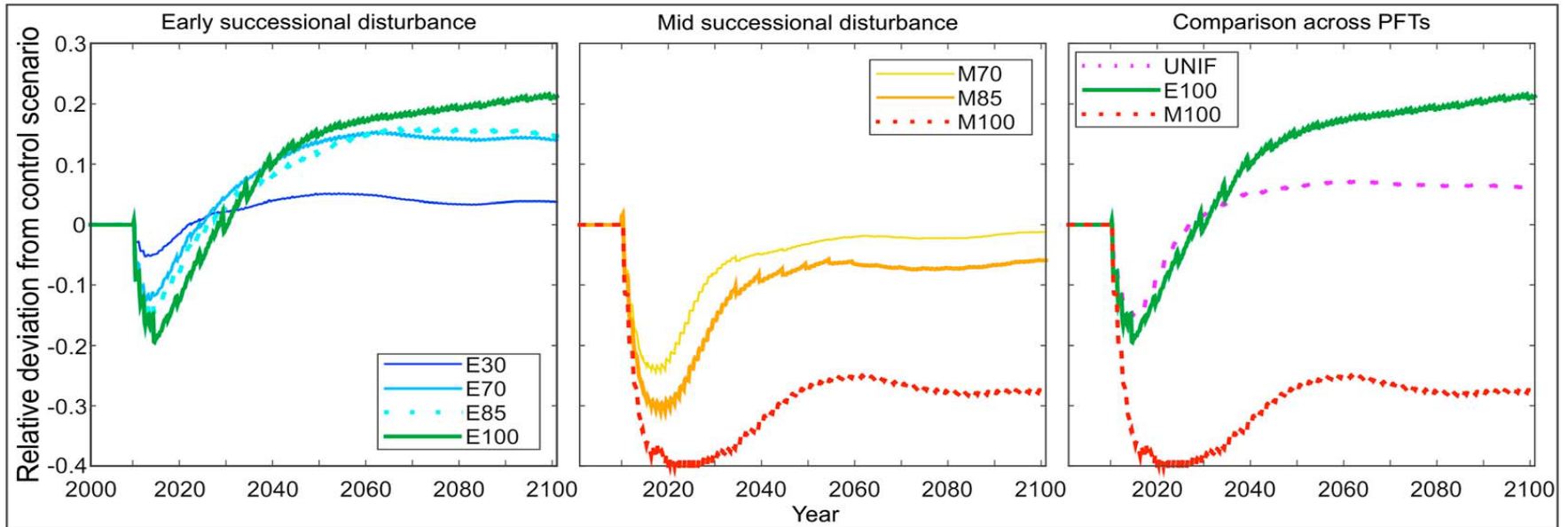


Modeling forest carbon cycle response to tree mortality: Effects of plant functional type and disturbance intensity



Natural and anthropogenic disturbances influence ecological succession and impact the carbon cycle. Understanding disturbance effects and ecosystem recovery is essential to carbon modeling.

We used the Ecosystem Demography (ED2) model to simulate the Forest Accelerate Succession Experiment (FASET) and its control – the UMBS forest plot. Flux and tree growth from both plots were used for model parameterization and validation. We used the model to test the sensitivity of the forest NEE to the type and intensity of disturbance. We found that NEE will increase after intensive removal of early successional plant (left panel, E30, E70, ..E100 marks the % of early successional removed in a virtual treatment during model year 2008). NEE will decrease with intensive removal of mid-successional plants (middle panel, M70, M85, M100). A uniform removal of 30% of each functional type (UNIF, right panel) resulted in an intermediate effect. Recovery time, during which NEE was lower than the post-disturbance equilibrium also varied with disturbance type and intensity.

Our results show that both the intensity and the characteristics of the disturbance matter. Unfortunately, disturbances such as bark-beetles as species specific and attach later successional trees.

Frasson, et al (2015), Modeling forest carbon cycle response to tree mortality: Effects of plant functional type and disturbance intensity, J. Geophys. Res. Biogeosci., 120,2178–2193, doi:10.1002/2015JG003035.