Do temperate deciduous forests experience synchronous disturbances?

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It has been suggested that canopy persistence might slow the effects of anthropogenic climate change in the forests of eastern North America (ENA). Forests currently experiencing dramatic changes in structure and function are generally found in semi-arid regions or have low species diversity when compared to the temperate deciduous forests of ENA. The goal of this study was to see if there existed synchronous disturbances through time, which could cause a more rapid change in forest composition than the effects of gap dynamics alone. For this experiment, we randomly selected plots in the Palmaghatt Ravine, a forest considered to be old-growth, prior to going in the field. Plots were each composed of nested circles, so that the size of trees cored increased with distance to capture more of the larger and, presumably, older trees to construct a longer forest history. Trees were cross-dated by species, to ensure correct dating, measured to the nearest micron, and then analyzed to determine growth releases and recruitment. From this data, we reconstructed the disturbance history of the Palmaghatt Ravine at two ends of the forest. The 1870s experienced a strong disturbance event due to logging, which came as a surprise in a presumed old-growth forest. This pilot study indicates that there are pulses in forest dynamics in these gap dynamic dominated forests. Discounting the 1870s logging event, we see other synchronous disturbances across these plots in the 1790s, 1850s, 1940s, and early 1970s, which suggests that these forests have been influenced for centuries by severe disturbance as well as by gap dynamics. Overall, we found that release events are nearly continuous through time, but also contain pulses of disturbance, not all of which can be easily identified as anthropogenic in cause. This study suggests, therefore, that these intense and synchronous events could allow for more rapid changes in the forest than simply gap dynamics.