

Poster #115

Results of the First TES Early Career Project: Understanding and Simulating Drought-Induced Forest Mortality

TES Early Career Award

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Drought- and heat-induced forest mortality is accelerating globally but the mechanisms were unknown, so accurate simulation was nearly impossible. We developed testable theory and then implemented a drought and heat manipulation study in a pine-juniper woodland ecosystem to test hypotheses regarding the mechanisms of mortality. We subsequently developed model representations of these processes. Theory and data both suggest that drought- and heat-induced mortality is higher in larger plants and under hotter conditions, due in part to rising vapor pressure deficit with rising temperature. The mechanisms of mortality globally are frequently inter-related, and include carbon starvation, hydraulic failure, and biotic attack. Model improvements now allow representations of most of these processes. Process model and empirically-based projections both suggest SW USA will be free of conifers sometime near the year 2050, with the global temperate coniferous region following closely behind. Given the apparent similarity of processes across biomes, we suggest that predictions of future forest mortality can be simulated globally in the near future.