



Modelling drought-induced dieback of Aleppo pine at the arid timberline

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During the mid 1960's an ambitious afforestation programme was initiated in the Negev desert of Israel. After five decades enduring harsh growing conditions, the Aleppo pine forest of Yatir is now exhibiting signs of 'drought-induced' dieback. Since 2010, 5-10% of the entire Yatir population have died, however the pattern of mortality is extremely patchy with some areas exhibiting >80% mortality whilst others display none. In this presentation, we reflect on historic climatic and edaphic conditions that have triggered this landscape mosaic of survival and mortality and how physiological and hydraulic traits vary within this patchwork. In addition, we explore how these pine trees have responded physiologically over recent years (1996-2010) to a series of severe drought events using a combined approach that brings together micrometeorological, dendro-isotopic and dendro-climatological datasets alongside process-based modelling. In particular the dataset trends were investigated with the isotope-enabled ecosystem model MuSICA to explore the consequences of subsequent droughts and embolism on modelled carbohydrate and water pool dynamics and their impact on carbon allocation and ecosystem function.