**Nationwide Modelling of the Forest Health and Mortality Risk by Fusing Airborne Laser Scanning Data, Satellite Imagery and Field Inventory Data**

Climate change results in warmer and drier conditions that accelerate forest mortality worldwide. Drought-induced tree mortality affects the forest ecosystem services and alters forest structure. However, our ability to predict the risk of mortality due to drought remains limited. Understanding how site and stand factors shape patterns of forest mortality is crucial for supporting forest management as well as creating appropriate adaptation strategies in the era of climate change. Until recently, many stand characteristics such as tree height, volume and stand density were measured by traditional field methods. However, the current use of remote sensing tools opens up new possibilities for forest monitoring and measurements. The aim of the analysis, was to indicate climate, site and stand characteristics determining the risk of stand level mortality during the period of sequential droughts in 2015–2020. Instead of sample-plot observations, we use wall-to-wall aiborne laser scanning and forest inventory data covering over 7 mln ha, from which milions trees were killed by drought. Spectral indices obtained from satellite imagery allowed additional assessment of the impact of drought on forest condition and mortality risk. We found that the occurrence of tree mortality is mainly driven by the lagged effect of the water deficit in the previous year expressed by the climatic water balance. Water deficit expressed by CWB is at the same time correlated with selected spectral indices. Spectral indices determined from satellite imagery combined with stand mortality risk determination and meteorological data can be used as an early detection system for the negative effects of drought. Models and maps obtained through unprecedented data availability indicate that the highest risk of drought-induced forest mortality occurs on the most productive sites and affects the oldest stands. Thus, the oldest and highly productive forests are most endangered by the projected climate change. Such exacerbated susceptibility to mortality should be considered in forest carbon sink projections, forest management, and policies designed to increase resilience and protect forest ecosystems