



Acronym	ForStress
Full Title	Forest Stress near-casting: Capturing and simulating tree water deficit in montane environments
Grant Theme	Pilots of long-term climate impact forest monitoring sites: Providing temporally resolved ecosystem-level information on the effects of climatic drivers on forest structure and function in near real-time
Participants	Karlsruhe Institute of Technology, KIT-Campus Alpin, Germany (<i>coordinator</i>) Technical University of Munich, Germany
Start Date	February 2026
Duration	18 months
Description	Montane forests are among the ecosystems most vulnerable to climate extremes, yet current monitoring networks rarely capture tree-level stress responses at the temporal resolution required to assess and anticipate impacts. This project will establish three supersites in mixed forests of the German Alps as long-term research platforms, integrating high-frequency dendrometer observations with process-based modelling to provide prototype near-casts of tree water deficit (TWD). One site is already operational and will deliver immediate data, while two additional sites will be equipped following the FORWARDS protocol. Point dendrometers on dominant tree species, complemented by soil and meteorological sensors, will monitor growth and TWD, while targeted physiological campaigns during dry and hot periods will capture species-specific hydraulic responses. Historical growth reconstructions from tree cores and high-resolution climate datasets will support retrospective simulations of carbon water–nutrient dynamics with the LandscapeDNDC model. The model will be extended with a new routine for sub-daily TWD dynamics and evaluated against high-frequency observations to establish site- and species-specific patterns, with outputs designed to link to remote sensing products for landscape-level scaling. When coupled with weather forecasts, the framework provides weekly near-casts of TWD, carbon fluxes, and water dynamics as short term drought indicators. By bridging scales between monitoring and modelling, the project will deliver a proof of concept for integrating tree hydraulic stress near-casting into European forest climate impact assessments. ForStress will contribute to FORWARDS by refining drought stress indicators and demonstrating a transferable near-cast methodology for supersites across Europe.



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