Project Database of ICP Forests

PROJECT DESCRIPTION

PROJECT INFORMATION

Project title:	**Spatio-temporal development of forest condition in Europe**
Project ID:	287
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PROJECT DESCRIPTION

This project will be based on data obtained from the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests), a programme under the UNECE Convention on Long-range Transboundary Air Pollution. Forest conditions have been monitored in Europe by the ICP Forests since the late 1980s through two monitoring networks (Level I and Level II). Based on these data, we aim to study the relationship between defoliation and meteorological, soil, topographic and vegetation indicators attributes (remote sensing). We will also attempt to use and amend existing defoliation – growth relationship to assess the possible impact on growth.

Purpose of research

By constructing spatio-temporal models, we aim at (i) estimating and mapping defoliation trends for different tree species from 1990 to 2022; (ii) assessing the feasibility of predictive/forecasting models; and (iii) to assess the potential impact of poor forest health on forest growth.

Methods

- Model-related methods: mixed models (LMs), Generalized additive mixed models (GAMMs), Geographically and temporally weighted regression (GTWR), Random Forest (RF), Long Short-Term Memory (LSTM).
- Remote sensing data: Landsat series and Sentinal series.
- Analytical statistical method: Some basic statistics and Mann-Kendall Statistical Test, etc. The change from 1990 to 2022 is analyzed by Mann–Kendall Statistical Test, Sens Slope Estimator and Hurst exponent to map the evolution of forest health in Europe.

Expected results

- Spatio-temporal trends in defoliation and damage across Europe, with map the level of defoliation through the model prediction.
- Relationships between modeled and/or measured meteorological, soil, topographic and vegetation indicators (incl. remote sensing) factors and defoliation to figure out the most important factors affecting defoliation.
- Expected impact of poor forest health on forest growth over the examined period.