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Quantification of soil respiration and vertical partitioning of soil CO_2 production in a beech and a pine forest stand in the Northeast German Lowlands

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Soil respiration is one of the most significant carbon fluxes in terrestrial ecosystems. The analysis and quantification of its influencing factors play a crucial role in the understanding of the global carbon budget.
We present results of four years measurements of soil respiration at two ICP Forests Intensive Monitoring sites in the Northeast German Lowlands, a Scots pine (DE1203) and an European beech (DE1207) forest stand. CO_2 efflux and vertical partitioning of CO_2 production in soils were calculated using the flux-gradient approach based on measured CO_2 concentrations at the soil surface and at 0, 10, 20, 30 and 100 cm soil depth. CO_2 concentrations were measured every 30 minutes using 16 mini NDIR sensors which were attached to gas permeable polypropylene gas probes installed at the respective sampling depths. To develop site-specific diffusion models, intact soil samples were taken at different depths to measure the soil gas diffusion coefficient at different levels of soil moisture in the laboratory. The site-specific diffusion models were used to calculate the time series of soil gas diffusivity throughout the year based on soil moisture and temperature. Soil moisture and temperature were measured at identical time steps and soil depths as soil CO_2 concentrations.