

# Joint Spatial Modeling of Recurrent Infection and Growth with Processes under Intermittent Observation

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**Abstract:** In this article we present new statistical methodology for longitudinal studies in forestry where trees are subject to recurrent infection and the hazard of infection depends on the rate of tree growth over time. A joint model for infection and growth is developed wherein a mixed non-homogeneous Poisson process, governing recurring infection, is linked with a nonlinear spatially-varying growth curve representing the underlying height growth trajectories. Spatial variability in growth parameters is accommodated through a flexible multivariate spatial process derived through kernel convolution. Our methodology is applied for analysis in an eleven year study of recurrent weevil infestation of white spruce in British Columbia.

**Keywords:** recurrent events; panel data; spatially-varying trajectory function.