Geophysical Research Abstracts
Vol. 19, EGU2017-16879, 2017
EGU General Assembly 2017


# Expansion of the Lyme Disease Vector Ixodes scapularis in Canada inferred from CMIP5 Climate Projections

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A number of studies have assessed possible climate change impacts on the Lyme disease vector, Ixodes scapularis. However, most have used surface air temperature from only one climate model simulation and/or one emission scenario, representing only one possible climate future. We quantified effects of different Representative Concentration Pathway (RCP) and climate model outputs on the projected future changes in the basic reproduction number (R0) of I. scapularis to explore uncertainties in future R0 estimates. We used surface air temperature generated by a complete set of General Circulation Models from the Coupled Model Intercomparison Project Phase 5 (CMIP5) to hindcast historical and forecast future effects of climate change on the R0 of I. scapularis. As in previous studies, R0 of I. scapularis increased with a warming climate under future projected climate. Increases in the multi-model mean R0 values showed significant changes over time under all RCP scenarios, however; only the estimated R0 mean values between RCP6.0 and RCP8.5 showed statistically significant differences. Our results highlight the potential for climate change to have an effect on future Lyme disease risk in Canada even if the Paris Agreement's goal to keep global warming below 2°C is achieved, although mitigation reducing emissions from RCP8.5 levels to those of RCP6.0 or less would be expected to slow tick invasion after the 2030s. On-going planning is needed to inform and guide adaptation in light of the projected range of possible futures.