

Correlation between average annual air temperature and number of tick-bitten humans (1)



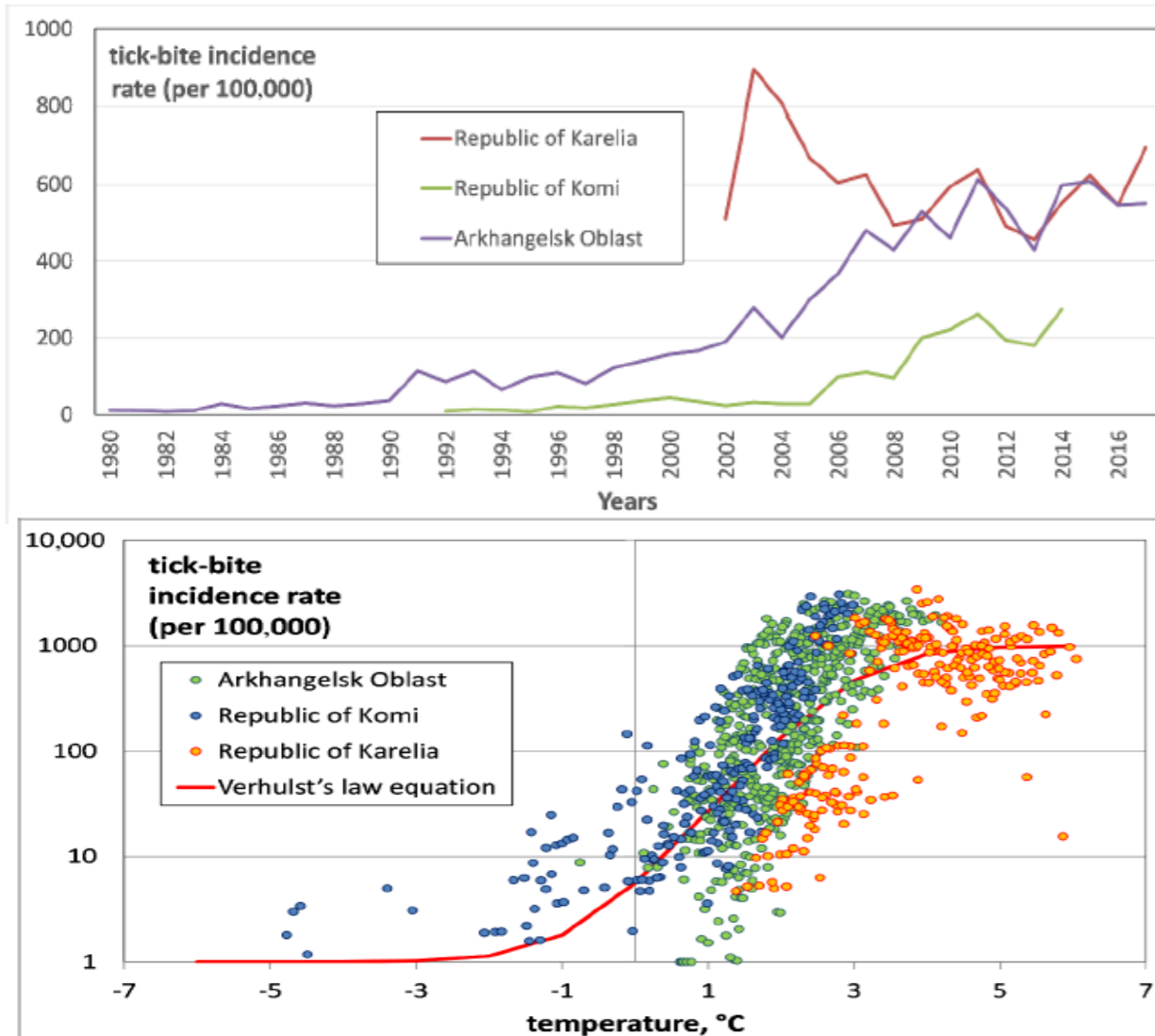
The northern border of *Ixodes* tick distribution goes through the North of European Russia. We want to understand, whether this border is affected by climate change.

Statistical data on tick-bitten humans have been collected in Arkhangelsk Oblast and the Republics of Karelia and Komi for several decades.

For the same regions we calculated the local average annual air temperature.

We found that the number of tick-bitten humans correlates with the average annual air temperature in an S-shaped distribution, which can be described as “Verhulst’s law” or logistic function.

Correlation between average annual air temperature and number of tick-bitten humans (2)



Between +0.5 C to +4 C the tick-bite incidence rate increased exponentially.

An average air temperature above 4C did not result in higher tick-bite frequency.

A tick-bite incidence rate of a few thousand per 100 000 inhabitants may be considered as a saturation value.

From these results we conclude that above +4 C the size of the tick population appears to be rather stable.

Figure: Tick-bite incidence rate per 100 000 inhabitants for 1980-2016 in three regions of the European North of Russia (top) and in relation to the average annual model air temperature for the respective region (bottom).