Geophysical Research Abstracts
Vol. 13, EGU2011-6184, 2011
EGU General Assembly 2011

Relating the satellite derived EVI and meteorology with the incidence of Lyme Disease in Belgium

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The connection between Lyme disease, vegetation and meteorology has been studied in recent research. In Belgium, the incidence of Lyme disease is emerging. The incidence of Lyme disease is progressing from less than 50 reported cases in the nineties to more than 200 in 2005 and 2006. Changing climate has been suggested as a triggering factor of recently observed epidemiologic peaks. Prior to this investigation, first a clear link between vegetation, climate and Lyme disease must be established.

We investigated whether there is a connection between the occurrence of Lyme disease in Belgium and vegetation dynamics using time series of MODIS derived Enhanced Vegetation Index (EVI), temperature and moisture availability. From MODIS pixels localized in the Campine region of Flanders, covering the period 2000-2008 an average annual EVI data set was set up and used as input for modeling the seasonal variability in the cases of Lyme disease.

Results indicate a straightforward relation between seasonal variations of averaged EVI values and averaged seasonal cases of Lyme disease. By introducing a time shift of approximating eight weeks, a correlation with a R^2 value of 0.77 was reached. By introducing a temperature function, reflecting activity ranges of ticks, the correlation increased to a R^2 value of 0.84. In additional moisture function did not increase the R^2 value significantly.

Further research should also include the human activity in the environment (hunting, recreation, nature professionals) since increased contact with vegetation types that favors ticks will likely increase the chance of getting bitten by ticks and hence more cases of Lyme disease.