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Remotely sensed forest phenology and its relation with Nephropathia

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Nephropathia epidemica (NE), a mild form of haemorrhagic fever with renal syndrome, is a zoonotic disease caused by a Hanta virus called Puumala virus in Europe. Concern about this disease has increased in recent years due to the increase in the amount of reported cases. In 2005, 2007 and 2008 the number of infected cases surpassed 300 cases per 100000 inhabitants in Belgium, which was never observed before.

NE incidence is closely related to environmental conditions. The main role in the virus transmission mechanism is played by the red bank vole (Myodes glareolus), a rodent species that is native in West European broad-leaved forests (BLF) and acts as the virus reservoir. Although the link between vegetation and NE in Belgium has been underlined repeatedly in recent research works, so far little has been done towards the exploration of remote sensing techniques for analyzing vegetation systems as an input in early warning systems.

This study aims at determining whether observed NE occurrence pattern in Belgium can be connected to specific trends in BLF phenology parameters. Hence, phenology information was derived from time series of the MODIS Enhanced Vegetation Index (EVI) for the period 2000-2008 in 10 major BLF in southern Belgium. EVI values were calculated from the MOD09A1 dataset which provides an estimate of the surface spectral reflectance for bands 1-7 at 500 m resolution every 8 days.

Based on our preliminary results, it is concluded that one of the most remarkable phenomena taking place in BLF is the gradual increase in length of the growing season in the 2000-2007 period. This is supported by international literature. Increasing growing seasons might contribute to an increase in the availability of resources to sustain large rodent populations and in the prolongation of optimal conditions for breeding. For most of the sampled sites, the years preceding peaks in NE cases (2005, 2008) were characterised by a late end of the growing season which coincides with warmer fall seasons.

This research is part of a larger effort that aims at the incorporation of remotely sensed data in the prediction and monitoring of epidemiologic diseases.