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Using remote sensing and machine learning for the spatial modelling of a bluetongue virus vector

J. Van doninck (1), J. Peters (2), B. De Baets (2), E. Ducheyne (3), and N.E.C. Verhoest (1)

(1) Ghent University, Laboratory of Hydrology and Water Management, Ghent, Belgium (Jasper.Vandoninck@UGent.be), (2) Ghent University, Research Unit Knowledge-based Systems, Ghent, Belgium, (3) Avia-GIS, Zoersel, Belgium

Bluetongue is a viral vector-borne disease transmitted between hosts, mostly cattle and small ruminants, by some species of *Culicoides* midges. Within the Mediterranean basin, *C. imicola* is the main vector of the bluetongue virus. The spatial distribution of this species is limited by a number of environmental factors, including temperature, soil properties and land cover. The identification of zones at risk of bluetongue outbreaks thus requires detailed information on these environmental factors, as well as appropriate epidemiological modelling techniques.

We here give an overview of the environmental factors assumed to be constraining the spatial distribution of *C. imicola*, as identified in different studies. Subsequently, remote sensing products that can be used as proxies for these environmental constraints are presented. Remote sensing data are then used together with species occurrence data from the Spanish Bluetongue National Surveillance Programme to calibrate a supervised learning model, based on Random Forests, to model the probability of occurrence of the *C. imicola* midge. The model will then be applied for a pixel-based prediction over the Iberian peninsula using remote sensing products for habitat characterization.