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Title: LiDAR data enhances the BIOSOS biodiversity monitoring approach

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Abstract (1264/Maximum 3000 characters including spaces)

Measuring and reliable reporting of trends and changes in biodiversity requires that data and indicators are collected and analysed in a standard and comparable way. Key is the challenge to develop a biodiversity observation system that is transmissible and cost effective. LIDAR is an alternative remote sensing technology that allows increased accuracy in the measurement of biophysical measurements and extended spatial analysis into the third dimension, namely vegetation structure. The EBONE and BIOSOS projects shows alternatives to measuring habitat diversity as a proxy for biodiversity on the basis of plant life forms and associated General Habitat Categories (GHCs), which contain descriptions of vegetation structure. BIOSOS is a European GMES project that aims to develop an operational ecological modelling system suitable for consistent multiannual monitoring of NATURA 2000 sites and their surroundings according to EU obligations. BIOSOS has developed novel and automated methods that are beyond current state-of-the-art in Europe and utilise High and Very High Resolution (VHR) remote sensing data to identify and map land cover types described by the Food and Agricultural Organisation (FAO) Land Cover Classification System (LCCS). These are translated subsequently with contextual and semantic information to map GHC and finally Annex I habitat types. The procedures will sit within an ecological modelling framework for automated provision of habitat maps and biodiversity indicators useful for a deeper understanding of the impacts of human induced pressures. However, accurate vegetation height measurements are crucial is the entire approach and these can be provided by LiDAR. The objective of our study was to assess to what extent LIDAR can be used to support mapping and monitor plant life forms based on the GHCs methodology and assess the limitations. Such information is important to obtain as the Netherlands will soon be covered with LiDAR approximately every 4 years with 10 point measurements per square meter. These data can, in principle, enhance the monitoring of biodiversity in the Netherlands. The conclusions are that LiDAR provides accurate height measurements on shrubs and trees, even in early spring when no leaves are present. Unfortunately, the whole range of plant life forms could not be measured with many smaller shrubs remaining undetected. For this reason, there is still reliance on using optical data to facilitate their classification, with LiDAR providing an upper height threshold of around 20 cm below which spectral information is still needed.