Camilla Persson

Analysing the vegetation condition during the 2017 and 2018 growing seasons using indices derived from Sentinel-2 data: a case study over southern Sweden

The summer of 2017 was climatically close to normal in southern Sweden, whereas the following summer was unusually warm and dry. These two years therefore make an interesting case study for investigating the impact of severe drought on vegetation, particularly when considering that climate change is predicted to lead to an increased frequency of drought events in the study area.

The comparison was done by calculating *vegetation indices* (VI) based on satellite imagery. The calculated indices are *Normalised Vegetation Index* (NDVI), *Enhanced Vegetation Index* (EVI) and *Normalised Difference Water Index* (NDWI) based on four Sentinel-2 images from 2017 and four images from 2018. *Rain Use Efficiency* (RUE) was calculated based on NDVI and EVI and a precipitation data set from PERSIANN-CCS, in an attempt to measure drought resilience. The data was extracted for different land covers and crop types to determine where the largest differences were seen in the study area.

It was found that the land cover with the smallest decreases (and some increases) in VI values between the two years was mixed forest. Both coniferous and deciduous forest had more negative changes between the two years; this suggests that the combination of tree types could increase the drought resilience. The land cover with the largest decrease was agricultural land which had decreasing values for all VI's, suggesting that this might be the least drought resilient land cover.

The break-down of the changes by crops showed that part of the decrease in VI values between 2017 and 2018 in agricultural land could be explained by a shift from winter crops to spring crops due to the late harvest in 2017. It could also be a result of the satellite imagery from the different years being taken at different dates, and capturing different stages of the growing cycle which would affect the results of cereal crops and rapeseed in particular. The largest decrease in VI values were seen in winter wheat and spring barley which indicates that these might be more drought sensitive. Both RUE and the standard deviation of RUE increased for the whole study area between the two years, which is likely a result of the large amount of precipitation amounts in 2017.

Keywords: Physical Geography and Ecosystem analysis, Remote sensing, Vegetation indices, Drought, Geomatics

Advisor: **Abdulhakim M. Abdi**
Master degree project 30 credits in Geomatics, 2019
Department of Physical Geography and Ecosystem Science, Lund University. Student thesis series INES nr 496