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# Advancing understanding of the importance of surface runoff for delivery of water, sediment, nutrients and pesticides to streams within agricultural catchments

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Explicit knowledge of the dynamics and spatial distribution of surface runoff, leaching and preferential flow paths in landscapes and their connections with surface water is critical for protecting the aquatic environment for inputs of sediment, nutrients, pesticides and other harmful substances. Therefore, there is a need for quantifying off-site surface runoff and the resulting transport of sediment, nutrients and pesticides to surface waters at the field scale combined with simultaneous measurements in receiving watercourses to increase our knowledge about the linkages between source areas, transport pathways and the resulting impacts on water quality in receiving water bodies. The importance of surface runoff for transport of sediment, nutrients and pesticides to surface waters have only been limited studied in Denmark even though forecasts of climate change predicts that extreme weather conditions with more intense precipitation events will increase in the future with a risk of having more frequent incidents with surface runoff from agricultural land.

In a recent project soil erosion and surface runoff risks have been modelled for the entire of Denmark on a 10 m x10 m grid scale (Onnen et al., 2019). The influence of surface runoff for transport of sediment, nutrients and pesticides to streams is measured in three carefully selected agricultural mini-catchments showing high risks for having surface runoff in the national model. Within each catchment, an edge of field monitoring site and a stream monitoring station has been established. The edge of field monitoring site consists of a flow chamber collecting surface runoff from the neighbouring field and an automatic sampler initiated at the onset of surface runoff. The edge of field station is established with communication to the stream station for starting an automatic sampler at the time of surface runoff. Selected water samples collected at the edge of field and stream station is analysed for sediment, nutrients and pesticides. A first pilot study from one of the small catchments during the winter of 2015-2016 showed that surface runoff from the field amounted to 48 mm. the loss of suspended sediment, total nitrogen and total phosphorus, respectively, 56 kg sediment $ha^{-1}$, 0.29 kg N $ha^{-1}$ and 0.30 kg P $ha^{-1}$ (Zak et al., 2019). The new edge of field and stream monitoring setup in three agricultural catchments was established during autumn and winter of 2019-2020. The first pilot results from the winter of 2019-2020 with the full monitoring programme in the three catchments have shown frequent surface runoff events and

relatively high concentrations of a number of pesticides both in edge of field and stream samples.

References

Onnen, N., Heckrath, G., Stevens, A., Olsen, P., Greve, M.B., Pullens, J.W.M., Kronvang, B. and Van Oost, K. 2019. Distributed water erosion modelling at fine spatial resolution across Denmark. Geomorphology 342: 150-162.

Zak, D., Stutter, M., Jensen, H.S., egemose, S., Carstensen, M.V., Audet, J., Strand, J.A., Feuerbach, P., Hoffmann, C.C., Christen, B., Hille, S., Knudsen, M., Stockan, J., Watson, H., Heckrath, G. and Kronvang, B. 2019. An assessment of the multifuntionality of integrated buffer zones in northwestern Europe, JEQ 48: 362-375.