EGU22-7141, updated on 12 Aug 2022
https://doi.org/10.5194/egusphere-egu22-7141
EGU General Assembly 2022

Integration of a Graph Network for the Definition of Neighbourhood in Landslide Detection with Machine Learning

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Landslide mapping using Machine Learning approaches often relies on various image statistics determined by neighbourhood functions. In this presentation, the effect of a graph network for the definition of the neighbourhood of each pixel is shown on the example of the Weheka valley, New Zealand. The graph network integrates the physical properties of sliding and flowing masses into the classification process of earth observation imagery. This neighbourhood is determined by connecting nodes based on the flow direction and therefore replacing common raster formats. Both Sentinel 1 and Sentinel 2 acquisitions are used to determine the change in each pixel. From the Sentinel 1 data the Beta Nought is calculated, and the Sentinel 2 data is used to derive multiple indices (e.g., NDWI and NDVI). These products are combined in each node of the graph network. Within the neighbourhood defined by the graph network image statistics (e.g., mean, and standard deviation) are derived for each node. All data and derived products are used to train a Random Forest Classifier which is applied to three different extents of a landslide in the Weheka valley. 81.11% of the affected area is detected for the largest event with a decreasing accuracy towards the margins of the reference area.