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Effects of DEM resolution on the performance of topographic indices

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Topography is the major local control on the water movement, and, thus, influences the spatial pattern of soil moisture and water availability for the biota. Water flow paths, moisture and biota in turn affect the soil chemistry. Therefore, topography also influences soil chemistry.

A topographic index can be used as an indirect measure of the soil water condition of a certain location in the landscape. The Topographical Wetness Index (TWI) combines the upslope area a and the slope *tanB* into one index *(ln(a/tanB))*, which can be calculated for any given point in the landscape. Previous studies indicated that the TWI can explain a significant part of the spatial variations in soil pH, soil moisture and ground water depth in Swedish boreal forests. These studies were based on digital elevation models (DEMs) of 20 m resolution.

In this study we used a DEM with a 5 meter resolution for a boreal forested area in central Sweden. We hypothesized that the finer resolution would increase the accuracy of the calculated TWI values and increase the ability of the index to estimate the soil parameters pH and soil moisture. TWI values were calculated for 100 sample sites, where soil characteristics had been measured. The spatial distributions of TWI were compared for different resolutions of the DEM (5 m, 10 m, 25 m and 50 m).

Similar to previous studies we found that on average TWI values decreased with decreasing grid size of the DEM. For finer resolutions there was also a more even distribution among the TWI-classes, as opposed to the coarser resolutions where the distri-

bution was more concentrated to the intermediate TWI-classes. We tested the effect of these differences on the ability of the TWI to predict spatial variations of soil moisture and pH. Initial results indicated that correlations between TWI and soil parameters were not as much affected by DEM resolution as expected.