Geophysical Research Abstracts
Vol. 20, EGU2018-17965, 2018
EGU General Assembly 2018


# Soil protection in highly mechanized timber harvest - influence of forestry vehicles on morphology and soil physics of skid trails

Lennart Rolfes, Voßhenrich Hans-Heinrich, and Brunotte Joachim
Thünen Institute of Agricultural Technology, Germany (lennart.rolfes@thuenen.de)

Forests serve multiple environmental and economic functions and have a multifunctional role for society. Their sustainable management requires a protection of forest soils. Increasing weights of powerful machinery, which are used in highly mechanized timber harvest, cause damage to soil and vegetation especially under wet soil conditions. In a joint venture between the Thünen Institute of Agricultural Technology, the Northwest German Forest Research Institute and the Niedersächsisches Forstplanungsamt, soil structure and soil properties, soil biology and chemistry in skid trails are examined and will be related to the depth of the driving lanes. The aim of the project is to receive information about soil damages in forests, caused by harvesting machinery and to develop solution strategies for a soil conserving timber harvest. The study area is located in southern Lower Saxony in the Solling, a German low mountain range, with stress-sensitive soils. In our part of this project, especially the soil physical properties will be investigated. The data collection started in November 2017 and will be finished in March 2020. In an existing system of old skid trails, undisturbed soil samples are taken before and after recent timber harvest. Additionally, penetration resistance, soil hydraulic conductivity and rut depth profiles is investigated. During vehicle crossing by a 6-wheel harvester (total weight: 25 Mg, tire inflation pressure: 3.5 – 5.0 bar) and a loaded 8-wheel forwarder (35 Mg, 3.5 – 5.0 bar), soil deformation was measured at depth of 0.2 and 0.35 m. Therefore, a multi-channel device, developed by Thünen Institute, was used. The ground surface of the study area was scanned by a hand-held laser measure before and after harvest to detect changes in rut depth. In subsequent laboratory investigations, soil moisture, dry bulk density, water retention characteristics, pore size distribution and saturated hydraulic conductivity will be measured.
In a first presentation, an introduction to the project, its aims and its first results will be given: Under wet conditions, rut depths up to 15 cm were measured. Additionally, lateral bulges with a height of more than 10 cm were formed. The deformation of the soil decreased with increasing depth: At a depth of 20 cm, a total deformation of 14 mm was observed, at 35 cm this value was only 3 mm. Due to the different weights and wheel loads, the vehicles caused a different settlement of the soil. The forwarder caused a maximum settlement of the soil by 10 mm, while the harvester caused changes in the amount of 2 mm.