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## ESTIMATING SOIL DISPLACEMENT IN SKID TRAIL CONSTRUCTION USING STEREO-PHOTOGRAMMETRY AND LiDAR

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Harvesting in steep terrain is traditionally carried out using cable based systems. However, a more effective method which involves a wheeled harvester working alternately with an excavator which opens temporary access trails has gained considerable territory in the Norwegian fjordlands. The method, which also incorporates a forwarder, is fully mechanized, making it easier to find willing machine operators than cable yarding crew members, and is presently more cost competitive than traditional cable yarding.

In developing environmental guidelines for the future application of this harvesting method, it is necessary to quantify the extent of the skid trails currently being constructed, both in terms of overall length and soil displacement volumes. Given that the stands are spread over a larger geographic area, and that 500-1500 m of skid trails are created per ha., metrics should be based on accurate, remotely sensed data to alleviate what would otherwise be an infeasible task.

In this study, the aim is to derive details such as inclination, width, cut height, segment length and cut volumes from existing trails. This is done by using DEMs developed from UAV based stereo-photogrammetry, as a more cost effective method of gaining information on individual harvesting sites.