

## Track #1 - Published Abstract

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### **Tether assist equipment stability and soil-machine interaction in steep slope logging**

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#### **Abstract**

The increased use of cable-assisted steep-slope harvesting has presented different operational, safety and environmental opportunities and challenges. The greatest change in the operation is not only about worker safety, but also about using heavy equipment in slopes that have been traditionally harvested by timber fallers and yarded with cable systems. This creates new scenarios for the interaction between equipment and soil, which ultimately affects the stability and mobility of the equipment, as well as the underlying soil properties in which it operates. We have performed an analytical study to determine equipment sliding stability in steep slopes in which equipment geometry and soil conditions have been modified and evaluated in different scenarios. We determined that soil has a major influence on equipment sliding stability, especially with respect to equipment geometry parameters. Additionally, we have performed field measurements on a tracked feller-buncher showing the effect of cable tension in the pressure distribution under the tracks, and compared them with the same un-tethered equipment. A detailed time study shows the differences as the equipment changes position and activity during a hypothetical harvesting operation. The results show an improvement on the pressure distribution under the tracks when the tether line is in place, mostly due to shifts in the equipment center of gravity.