## Abstract

A geophysical survey using the seismic refraction tomography(SRT) was carried out to study a landslide areas in Mekele, Northern Ethiopia as a part of large investigation. The study area is characterized by steep topography and a road cut of Addis Ababa-Tigray main road which has a high economic benefit for the country. In the study areas landslides are one of the most frequent geo-hazard phenomena. They are frequently damaging the road as well as the farming land, mainly during the rainy seasons. The main objective of this investigation is to produce explanatory report providing information about geotechnical properties of rocks and soils and the cause of landslides in the area. The information is utilized for planning a land use and for various kinds of engineering constructions. In addition, the obtained data and interpretation models provides information about construction material resources, identification and remediation of another geo-hazards with impact on the location, design and construction of engineering structures, and selection of potential sites for the ongoing constructions. The landslide material was characterized by a low seismic velocity. A layer of consolidated clastic rocks are considered to be the landslide bedrock and it is represented by a relatively high velocity. The results of the refraction survey identified the geometry of the failure surface and the changes in thickness of landslide materials. The accumulated material at the foot of the slopes is an unconsolidated material. The main road going through the landslide causes load on the crown of the landslide and results in slope instability. When stability conditions of the slope are disturbed either by the increase of stress imposed on the slope and / or by the decrease in strength of the earth material building up the slope and it involves enmass downward movement of earth material under the influence of gravity so that the materials could move easily.