

Applied Terrestrial Laser Scanner in Active Volcano Crater: Correction to Velocity and Geometry

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SUMMARY

Terrestrial laser scanner (TLS) was deployed in active crater of Papandayan volcano, West Java, Indonesia. The objective is to analyze influence of volcanic environment into TLS measurement result. Three targets were distributed inside crater with active volcanic gas emission. Targets were placed at difference distances, from 50 to 150 m. Type of TLS used is medium range Leica ScanStation C 10 which has maximum scope of 300 m. Along with TLS measurement, meteorological sensor also recorded temperature, relative humidity and air pressure. Location where three targets were located then substituted by GPS geodetic measurement to get data comparison. Distance measurement obtained by TLS and GPS then compared. It showed that distance from TLS is shorter than GPS. This is contradictive with our assumption, that TLS will give longer distance due to laser dispersion. However, we interpreted that volcanic gases distorted laser propagation and give false return. The difference of horizontal distance is up to 8 cm for distance ~150 m, while difference of slope distance is smaller. Refraction index was calculated using temperature, humidity and air pressure data and applied for velocity and geometry correction. Temporary result shows that correction only significant for first velocity, while for second velocity and geometry is very small. This is only the preliminary result of our investigation. We are still looking for alternative correction modeling and evaluate method of measurement. But we conclude that active volcanic crater contribute significant error source in TLS measurement. Finding appropriate TLS distance correction is important, because we will use it for volcano deformation monitoring that need very high accuracy.