

Investigating the Vertical Accuracy of Water Level Determination Using Electromagnetic Survey Instruments

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SUMMARY

The Light Detection and Ranging (LiDAR) is relatively new, but already widely used land surveying technology for countless applications in many branches of sciences. In many land surveying projects there is a need to determine the level of water surface. Traditionally, this is done using a spirit levelling, tidal gauge or other less accurate methods. The modern surveying instruments, including total station and LiDAR use the infrared electromagnetic waves in the range of 1064 nm or 1550 nm. It is commonly assumed that these electromagnetic waves do not penetrate or are strongly attenuated by water. In our contribution we report on the results of some experiments aimed at improving the knowledge on the water attenuation effect of the electromagnetic waves range used in surveying instruments. Our findings are expressed in terms of the vertical accuracy of determination of the water surface captured using survey instruments. In our experiments we used the Total Station Leica TS02 which is using the 650nm-690nm wavelength and also the Faro 330x LiDAR instrument which is using the infrared wavelength of 1550nm. The experiments were carried out for various incidence angles, state of the water surface, distance to the water surface and various levels of turbidity of water.

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