

Laser Rod Surface Elevation Table

Background

The traditional method of observing elevation changes in marsh surfaces using a rod surface elevation table (RSET) has been limited by the mechanical device and methodology used, and has been complicated by differences between human operators of the device, resulting in a maximum precision of about 1 cm. Field operators have documented measurement differences due to the human reader, the slow rate of data acquisition, and the limited number of measurements per set-up, and have been unable to draw inferences from traditional methods until two or more years of data have been collected. Thus, an improved RSET is needed.

Abstract

The present invention is directed to a method, and apparatus that measures distance along radial lines from a bench mark to the terrestrial surface using a laser (L-RSET). Repeated measures define surface elevation change with respect to the benchmark over time. The L-RSET uses laser measurement technology to simplify the process of measuring ground elevation with respect to the benchmark and increase speed and precision while minimizing human differences in measurement. The L-RSET uses a linear stepper motor to power a screw drive that advances a laser distance measuring device along a user-selected radius from the bench mark. The stepper motor and screw drive allow precise positioning of the laser along the radius. Software controlling the L-RSET along the radius allows the user to select starting and stopping points, the speed of advance, measurement interval, and number of measurements per interval. The L-RSET attaches without modification to the installed benchmark maintaining data integrity between traditional methodology and the L-RSET.

Opportunity

Scientific research institutes, engineering and government entities will benefit from the application of this technology.

Typically the RSET devices are established in difficult access areas that require manual measurement readings. By eliminating the human interface, the collected data is more accurate and reduces obtrusive field visits. The L-RSET increases the typical number of measurements from 36 to many hundreds or thousands, increasing accuracy of changes over a greater area. Increased precision provides greater temporal frequency of observation allowing detection of events over shorter time periods and smaller changes in elevation.

The L-RSET provides greater data precision, reduced measurement variability, and increased sample size, which allows scientists and engineers to look at shorter time intervals and within benchmark radius microtopography. Additionally, the laser carriage on the radial arm allows different instrument packages to be used including water penetrating light detection and ranging (LIDAR) and spectroscopic devices. These instrument packages cannot be used with traditional devices and methods.

This invention is an improvement of current methodologies and allows for more accurate data collection in a timely and cost efficient manner.

Keywords

- Rod surface elevation table (RSET)
- Sediment deposition
- Sediment erosion

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This technology is protected under patent application 62/118,159. The US Geological Survey is looking for a partner to further the commercialization of this technology through a license agreement. Interested parties should contact:

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