



Reservoir shore development in long range terrestrial laser scanning monitoring.

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Shore zones of reservoirs are in most cases very active, getting transformed as a result of coastal processes and mass movements initiated on the slopes surrounding the reservoir. From the point of view of the users of water reservoirs shore recession strongly undesirable as it causes destruction to infrastructure and buildings located in the immediate vicinity of the reservoir. For this reason, reservoir shores require continuous geodetic monitoring. Fast and accurate geodetic measurements covering shore sections several kilometers long, often in poorly accessible areas, are available using long range terrestrial laser scanning (TLS). The possibilities of using long range terrestrial laser scanning are shown on the example of the reservoir Jeziorsko on the Warta River (Central Poland). This reservoir, created in the years 1986-1992, is a typical retention reservoir, the annual fluctuations of which reach 5 m. Depending on the water level its surface area ranges from 42.3 to 19.6 km². The width of the reservoir is 2.5 km. The total shore length of the reservoir, developed in Quaternary till and sand-till sediments, is 44.3 km, including 30.1 km of the unreinforced shore. Out of the unreinforced shore 27% is subject to coastal erosion. The cliff heights vary from a few cm to 12.5 meters, and the current rate of the cliff recession ranges from 0 to 1.12 m/y. The study used a terrestrial long range laser scanner Riegl VZ-4000 of a range of up to 4000 m. It enabled conducting the measurements of the cliff recession from the opposite shore of the reservoir, with an angular resolution of 0.002°, which gives about 50 measurement points per 1 m². The measurements were carried out in the years 2014-2015, twice a year, in early spring before high water level, and in late autumn at a dropping water level. This allowed the separation of the impact of coastal processes and frost weathering on the cliff recession and their quantitative determination. The size and nature of changes in the cliff morphology were recognised in details.

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