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A century of sedimentation in a reservoir in central Europe – sedimentation rate and characteristics

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The sediments of the artificial Urft reservoir preserve a century of environmental information due to undisturbed sedimentation conditions. The Urft reservoir is located in the Eifel Mountains in western Germany and was built between 1900 and 1905. At the time of its construction, the Urft reservoir was the largest reservoir (45.51 million m³) and drove, with 12 MW, the most powerful water storage power plant in Europe. During construction works in November 2020, the reservoir was nearly completely drained. This offered the unique possibility to analyse the sediment volume and the composition deposited during the last 115 years.

We used high resolution maps with a scale of 1:1,000 from 1898 which were compiled to calculate the original storage volume of the reservoir. To assess the present-day surface, the entire lake area was photogrammetrically surveyed using an Unmanned Aerial Vehicle (UAV). Additionally, 10 drill cores were retrieved in 2020 to quantify the anthropogenic influence on the sediments in the form of mining-induced sediment-bound pollutants (e.g., heavy metals) and to relate this to the history of use in the catchment area. Furthermore, microplastics were studied in the sediments. To derive the sediment ages, a detailed Cs-137 chronology was created for one of the cores.

In summer 2021, the northern Eifel Mountains were impacted by a catastrophic flooding event, resulting in massive destructions in the catchment of the Urft and strong relocation of sediments in the floodplain. To assess these geomorphologic changes in the Urft reservoir, the water level was lowered again in December 2021. Consequently, an additional digital elevation model was produced by UAV surveying. Furthermore, additional sediment cores were taken to get information on changes in the sediment composition due to the flood event. In the upper part of the reservoir, up to 30 cm of sediments were deposited in summer 2021 while channels below the water surface experienced strong modifications.