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## Decadal sedimentary yield and provenance in the Gioveretto, San Valentino and Vernago reservoirs, western South Tyrol, Italy

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In mountain drainage basins, constraining source-to-sink sediment fluxes over decadal time scales is critical for evaluating hillslope and fluvial response to ongoing climate change and holds practical implications for sediment management. To this end, we combine geomorphic change detection (GCD) (Wheaton et al., 2010) and sediment provenance analysis in the reservoirs of Gioveretto (1850 m a.s.l.), Vernago (1665 m a.s.l.) and San Valentino (1499 m a.s.l.), western South Tyrol, Italy. The reservoirs are located in the Austroalpine domain and the main outcropping lithologies consist of metamorphic rocks (e.g., metapelites and gneisses).

Through GCD analysis conducted on recently acquired lake-bottom DTMs (i.e., SfM-UAV and multibeam surveys) and pre-dam (i.e., contour-based) counterparts, we have mapped the spatial distribution of erosion and deposition, and have assessed the relevant sediment yields over the last six decades. The three systems, which drain areas of 69 km<sup>2</sup> (Vernago), 77 km<sup>2</sup> (Gioveretto) and 163 km<sup>2</sup> (San Valentino), exhibit varying degree of glacier extent, and have experienced a different history of lake-bottom anthropogenic disturbance. Preliminary, conservative GCD results constrain net aggradation volumes that correspond to sediment yields of 35\*10<sup>3</sup> m<sup>3</sup>/yr at Gioveretto (1954-2019), and 68\*10<sup>3</sup> m<sup>3</sup>/yr at San Valentino (1959-2020). In this context, the much lower figure of 6.5\*10<sup>3</sup> m<sup>3</sup>/yr (1962-2021) at Vernago refers to a small portion (20%) of the lake bottom, which was spared from sediment removal during maintenance work occurred in 2001-2002.

To quantify the contribution of each tributary stream to the sediment yield in each reservoir, quantitative provenance analysis was carried out on 18 sand/silt samples collected from fluvial bars of major tributaries and on the 3 reservoirs. The similarity between petrographic composition of river sediments supplied by different combinations of diverse end-member sources (e.g., parent lithologies) and the observed detrital mode of the sediments in the reservoirs was quantified using a statistical distance. Next, the relative contribution to the total sediment load from each of these tributaries was calculated by forward mixing modelling (Garzanti et al., 2012). Sediments in the study streams are dominated by quartz, feldspars, and metamorphic lithic grains. Heavy minerals include hornblende, garnet, and epidote. Results of the provenance analysis indicate that in Lakes San Valentino, Gioveretto and Vernago, the dominant contributions derive respectively from Rio

Carlino (Mt. Palla Bianca – Weißkugel; 3738 m a.s.l.), Rio Plima (Mt. Cevedale – Zufallspitze; 3769 m a.s.l) and Tisentalbach (Mt. Similaun 3607 m a.s.l). This contribution is part of the *SedInOut* project (2019-2022), funded through the V-A Italia-Österreich Interreg Programme (European Regional Development Fund). Modern bathymetric data, processed by Cartorender Srl, are kindly made available by Alperia Srl.

## References

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