

# Channel morphology, sediment characterization and bedload transport of steep alpine streams. A case study in the Orobic Alps (Italy)

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## Introduction

Rivers are complex and dynamic systems with a strong influence on the territory. Headwater channels control the denudation rate, the hillslope stability and the shaping of valleys and their actions are transmitted downstream affecting the whole catchment (Larsen & Montgomery, 2012). The presence of high-altitude reservoirs affects the sediment transports downstream the dam and the geomorphological processes influencing the whole riverine ecosystem with ecological implications on biotic communities.

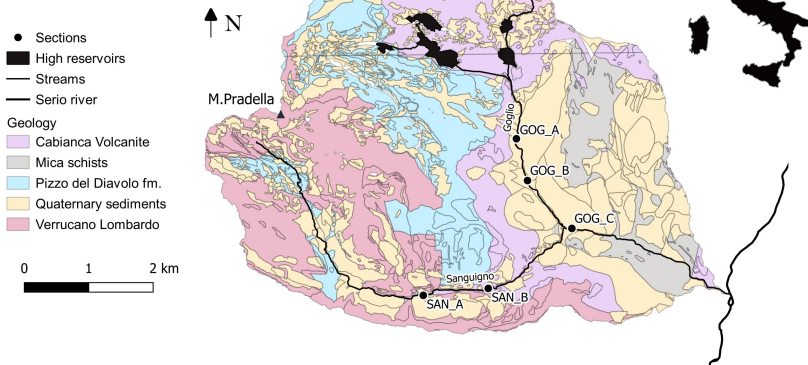
## Aim

1. To describe the morphology of the Goglio and Sanguigno, steep step-pool alpine streams located in the Orobic Alps (BG).
2. To characterize the grain size distribution and the composition of their sediments
3. To quantify the bedload transport to better understand the ecological implications of geomorphic changes on the stream functioning.

## Methods

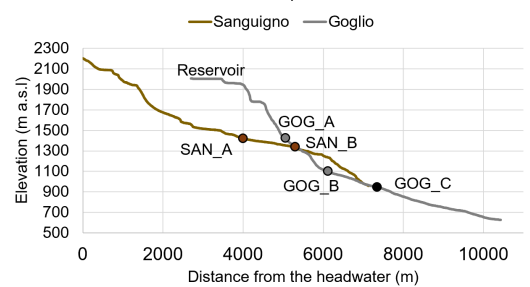
2 cross-sections in each stream plus one downstream the confluence characterizing the channel morphology, the sediment composition and the grain size distribution of the riverbed pebbles/cobbles. Monitoring of the bedload transport through painted tracers.

Valgoglio catchment (Orobic Alps)

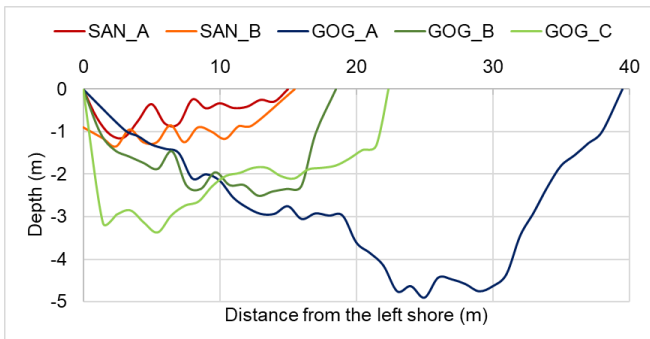


Sections	Elevation (m)	Area (km <sup>2</sup> )
SAN_A	1405	6.16
SAN_B	1320	8.04
GOG_A	1350	8.50
GOG_B	1090	12.52
GOG_C	975	24.88

Elevation profiles

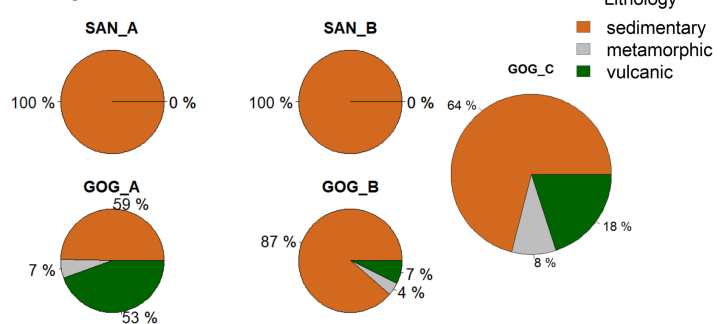


## Channel morphology



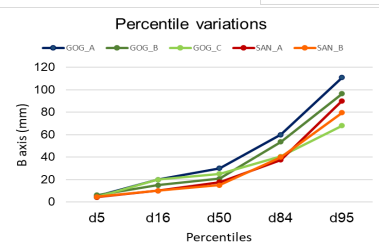
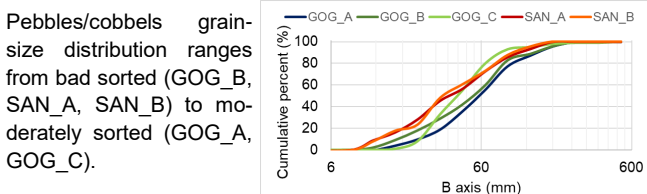
Channel width increases downstream in Sanguigno stream while decreases in the Goglio one. In the upper section (GOG\_A) Goglio stream carved strongly the valley due to the high slope so the riverbed is very wide.

## Composition



Sanguigno is characterized by sedimentary sediments (belonging to Verrucano Lombardo and Pizzo del Diavolo formation) while Goglio from both sedimentary (Pizzo del Diavolo fm.), volcanic (Cabiaca Volcanite) and metamorphic (scists). Between the two streams, the main sediment contribution is due to the Goglio since the percentage of volcanics (and scists) increases from GOG\_B to GOG\_C.

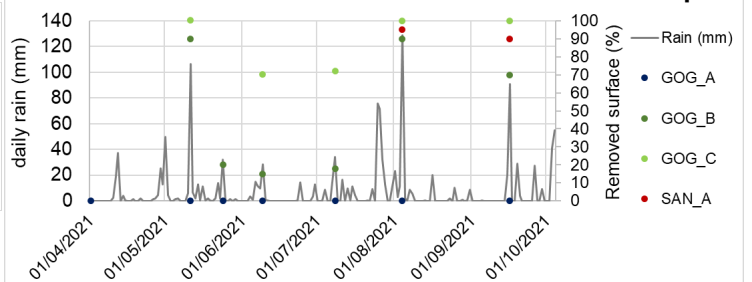
## Grain size distribution



painted pebble surface for bedload monitoring



## Bedload transport



Although channel morphology of Goglio stream reveals the potentially huge energy, in particular in the highest section, nowadays the bedload transport is limited due to the reservoirs that dab high floods events. Indeed bedload transport is zero in the upper sections while downstream (GOG\_C) increases also due to the Sanguigno.

**Conclusion** The study of the channel morphology and the riverbed sediments provide useful information to understand the riverine processes and how high reservoirs affects bedload transport.

WATCH THE VIDEO!!

