

# THE SIGNIFICANCE OF RUNOFF AND WATER CHEMISTRY MEASUREMENTS WITHIN THE LANDSCAPE ECOLOGICAL INVESTIGATIONS OF A SWISS ALPINE CATCHMENT AREA

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The sediment transport in the streamwater of Gemmi is an important parameter to characterise the development of soils. As the suspended sediment flux is increased by high precipitation or during the snowmelt which lasts until August, so soil development will be inhibited. To compare an arctic system with an alpine system, the difference between the sediment transport and the surface runoff into the stream are considered.

## THE ALPINE STUDY AREA

The drainage basin of the Lämmeren-Dala, with a size of 6 km<sup>2</sup>, drains into the Dauben-Lake and is located at an elevation of 2,350masl. The study area shows typical characterisation for a glacio-nival regime. For the comparable arctic study area (Spitsbergen) see M. Potschin, this volume.

## METHODS

Events of high water on the one hand as well as the results of minimal runoff on the other should be better characterised by the knowledge of temperature, radiation, wind, precipitation, and soil hydrology. Therefore, these landscape ecological parameters are studied in four test sites (Leser et al. 1990) from June-October over three years. Periodic measurements of suspended sediment concentrations were obtained by an automatic sampler (ISCO-Sampler, Mod. 2700). The record period depends on the runoff situation. In the case of heavy rainfall, in addition to the snowmelt, the sample interval was one hour. Under normal conditions, two probes per day (10:00 and 18:00 MEZ) were taken.

According to the events (snowmelt, precipitation, high radiation), the sediment concentrations were classified into different types (snowmelt-type, rain-type, fair weather-type, bad weather type).

## RESULTS

At this point, it does not seem adequate to present long-term results. 1995 will achieve a complete record of suspended sediment flux. The corrected and analysed data will be presented at the conference itself.

In general, the suspended sediment concentrations never exceeded 1.3g/l . Concentration of 1.15g/l are measured during snowmelt by a flood of 1 Mio l/min. The maximum values in fair weather with rain (mainly during the night) vary between 0.2-1.28g/l and average 0.3g/l when no storms are recorded (compare Table 1).

Table 1. Suspended Sediment Concentrations in Different Situations

Date	Character	Sediment flux (g/l) per day	
		<i>average</i>	<i>range</i>
26.06.1995	Snowmelt	0.78	(0.17-1.15)
14.07.1995	Fair weather with rain by night	0.51	(0.21-1.28)
20.07.1995	Fair weather without rain	0.07	(0.02-0.16)

## PREDICTIONS

As a result of a strong snowmelt, higher sediment flux was recorded at the beginning of measurements (end of June). As it has not been snowing so much in the basin of Lämmeren-Dala since 1980, a different climatic scenario (Global Change) will be discussed.

## SIMILARITIES AND CONTRASTS BETWEEN ARCTIC AND ALPINE SEDIMENT FLUX

The results of suspended sediments in the arctic drainage basin (Liefdefjorden, NW-Spitsbergen, 80°N) were recorded by the research group of Heidelberg (Barsch et al. 1992). The characteristics of amount and nutrient composition of the arctic Kvikkåa-runoff (Leser et al. 1992) will be compared with the alpine Lämmeren-Dala. For this interpretation temperatures, radiation and soil hydrology (Döbeli, 1995) are considered. The varied mountain topography has an influence on sediment processes (Clark, 1987). The high relief energy

in the Alps and the higher precipitations contribute to a higher sediment transport. The comparison of both systems will be discussed in detail at the conference.

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Intensification potential of aquatic ecosystems typical for alpine high mountain environments.

Alpine aquatic ecosystems support characteristics of microbial communities which have been naturally selected for the particular conditions of high mountain environments. The organisms, constantly challenged by extreme and extremely-variable living conditions, are well adapted. Some of them have to survive for more than half a year in the dark and cold under snow or under months under a thick snow cover. But, within a few days after snowmelt, they begin to grow and propagate. Some have to survive the