



Experimental method for water flow and sediment transport automatic measurements

G. Lollino, P. Allasia, M. Arattano and F. Maraga

CNR-IRPI, Torino, Italy (massimo.arattano@irpi.cnr.it / Fax: +39 011 343574)

A small basin (Valle della Gallina, Northwestern Italian Alps) has been equipped since 1982 with an integrated gauging station located at the basin outlet to collect both hydrometric and sedimentary data. The basin area is 1,08 km², the mean water runoff is 0.02 m³/s and the mean sediment delivery is 34 m³/year. Sediment transport occurs essentially by bed load processes that begin when the discharge threshold of 0.3 m³/s is exceeded. Sediment volumes are regularly surveyed in a sedimentary trap 5 m large, 8 m long and 1 m deep. Trapped sediments are characterised by grain size ranging from 0,06 to 256 mm. The accumulated material is removed after the measurement using a mechanical shovel that allows to maintain the efficiency of the gauging station. Sediment volumes range from 0 to 71 m³/year with corresponding water volumes of 579 and 576 thousands of m³/year, respectively. The annual yield of water and sediment depends by the morphological conditions existing in the channel bed. The amount of sediments that reaches the trap is in fact affected by the sediment transfer dynamics that occurs with bed load waves. To advance the understanding of sediment transport mechanisms a study of the relationship between water and sediment volumes transported during flood events was started. An innovative investigation system was designed, built and set up in 2001, to operate a continuous and simultaneous monitoring of water and sediments. A computerized balance constituted by a swinging steel plate (5 m large and 1 m long) attached to 4 load sensors was placed across the sedimentary trap immediately downstream of the trap wall. The trap wall and the steel plate were then covered with a rubber carpet to guarantee the channel bed continuity. The experimental system allows automatic and real-time weighing of the sediment/water flows. On the top of the plate was also installed a pressure transducer, useful to evaluate the flow height, extrapolate the water volume and filter the liquid phase from the solid/liquid mixture. Data are processed and then compared with the traditional

hydrometric and sedimentary data collected at the same gauging station.

The Valle della Gallina basin is included in the European network of Experimental and Representative Basins (ERB) and is currently managed by F. Di Nunzio, F. Godone, R. Massobrio and G. Rivelli.