



Use of artificial tracers and nuclear techniques in river basins: two case studies

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In two river basins of Marche Region there are two stations for monitoring the liquid discharge (Q , m³/s), one for monitoring the suspended sediment transport (G_s , ton) and 6 stations for rainfall height and temperature measurement. Since 1985, these basins have been equipped for river process monitoring: the first station (along Esino river) is located very close to the Adriatic sea, about 0,5 km; the second station (along Musone river) is located at 3,5 km by the Adriatic sea. Controls of morphological and sedimentological thalwegs variations have been carried out in some cross sections localized in the alluvial deposits. Furthermore, 6 stations for rainwater quantity measurement are installed in the areas of the two basins, placed between 10 m and 950 m in altitude above sea level. During the past years several measures of liquid discharge were carried out by means of artificial tracers in some cross section along the two rivers. These measurements are essential to assess water flow when compared with conventional methods of hydrology. In this work the results will be introduced of some field data set, performed with the use of Rhodamine-WT as artificial tracer, to measure the liquid discharge in different points of the river. The use of such tracing it results simple, economic, of easy interpretation, and it has given results profits to calibrate our measuring stations for level and discharge downstream. An application of nuclear isotope techniques in measuring suspended sediment transport is performed. In the measuring station located to 3,5 kms from the mouth of the Musone River it is installed a gamma rays probe detector, set in water to around 40 cms of distance from a radioactive source (Am-241), emitting gamma radiations. The principle of operation of such probe is based on the measure of the attenuation of gamma rays when liquid and turbid mean it is mediate between the probe and the source. Through appropriate setting of the same probe, performed in laboratory and in field, with increasing

sediments concentrations, it is possible to go from the readings of the measured cps (counts per second) to the concentration of suspended sediment. An evaluation of the suspended solid transport in the river it is therefore possible. Furthermore, it is possible to evaluate the total suspended solid load of the river by equipping different sections with probes of this kind. Such measure is a lot of main point for the proper management of the whole hydrographic basin. At present time we are installing a new station for measuring the suspended solid transport near the mouth of the Esino River.