



## **Sediment budget and interannual variations of suspended sediment load in the Rio Cordon (Italy). Three decades of monitoring and investigations (1987-2014).**

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This work shows the results of 28 years of measurements carried out in the Rio Cordon catchment, an Alpine watershed where a measuring station continuously recorded water discharge, bedload and suspended sediment transport since 1987. Hourly values of discharge and suspended sediment transport (or 5 min interval during flood events) have been studied throughout the whole study period. Annual and seasonal variations of suspended sediment load during the study period were analyzed along with their contribution to the total sediment yield. Comparing these almost three decades, the highest suspended solid transport occurred in 1994, 2001, 1987, 1998, 2002 and 2009, during which it was 2521.5, 1568.5, 792, 745, 551 and 514.8 t year<sup>-1</sup>, respectively. Summer and autumn contributions were significant in 1989, 1994, 1996, 1998, 2002, and 2005; on the other hand 2001 was characterized by a snowmelt flood that generated almost all the suspended load. A notable variability of the suspended solid transport can be observed taking in count snowmelt floods. Also 1987, 2001, 2008, 2009 and 2010 are characterized by a very important role of this kind of runoff. Data collected in the Rio Cordon for 28 years show that 75.2% of the total sediment load (10597.8 t of 14088.8 t) was due to suspended sediment transport. In 1994 and 2001, a large portion of the suspended sediment load was mainly supplied during the flood events that occurred in September 1994 and May 2001, which produced 198 and 1017.5 t respectively. Averaging 28 years of data, the mean annual specific sediment yield turns out to be around 102.9 t km<sup>-2</sup> year<sup>-1</sup>. However, this value includes the 1986-1993 period characterized by ordinary flood events during which the mean sediment production was 65.34 t km<sup>-2</sup> year<sup>-1</sup>, the massive sediment yield in 1994 (803.4 t km<sup>-2</sup> year<sup>-1</sup>), the 1995-2000 period (93.2 t km<sup>-2</sup> year<sup>-1</sup>), the 2001 (343.8 t km<sup>-2</sup> year<sup>-1</sup>) and the 2002-2014 period (54.5 t km<sup>-2</sup> year<sup>-1</sup>). The highest values correspond to 1994, 2001, 1998 and 1987, respectively. Sediment availability decreased during the latest ten years, in which only snowmelt floods contributed significantly to the total suspended sediment yield. The reduction of the annual sediment budget in this period indicates an armoring process that is taking place in the riverbed. This research was funded by both Italian Research Project PRIN2010-2011-N° 20104ALME4-ITSE: National network for monitoring, modeling, and sustainable management of erosion processes in agricultural land and hilly-mountainous area and EU Project SedAlp: sediment management in Alpine basins, integrating sediment continuum, risk mitigation and hydropower, 83-4-3-AT.