



## **Local-scale hydraulics and morphology in a steep channel, Italian Dolomites**

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We investigated linkages between local-scale hydraulics, reach-scale hydraulics, and channel bed morphology using detailed three-dimensional velocity measurements, salt dilution measurements, and topographic surveys along step-pool reaches of the Rio Cordon, Italy. This field site was selected because of the availability of both discharge and sediment transport data and a time series of channel morphology surveys, and because of the contrast it represents to more stable step-pool systems we have studied elsewhere. Surveys were completed in three step-pool reaches with gradients of 0.11 to 0.14 m/m. During May and June 2004, at discharges of 0.82 to 1.3 m<sup>3</sup>/s (36-57% of  $Q_{bf}$ ), over 200 vertical velocity profiles were measured using a Flow-Tracker Acoustic Doppler Velocimeter (ADV), allowing detailed characterization of downstream, cross-stream, and vertical velocity components and of related turbulence characteristics. Field data are used to explore lateral and longitudinal variations in three-dimensional velocity and turbulence in the Rio Cordon, investigate relationships between the local-scale hydraulics and bed topography, and compare local-scale velocities (measured with the ADV) with reach-scale velocities (measured using salt dilution). Further, the Rio Cordon hydraulics data are compared to a similar data set we collected in East St. Louis Creek, Colorado, USA, a step-pool channel with similar drainage area and gradient but with different climate, land-use history, and geology. Preliminary data analysis suggests that, in the Rio Cordon, pool velocities are high and turbulence-related energy dissipation in these pools is low compared to the Colorado study site. Differences in step-pool structure and in related hydraulic characteristics between study sites may reflect differences in the time since the last step-forming

flood event and in the availability of large woody debris.