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River Platform for Monitoring Erosion (RIPLE) in mountainous rivers

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The RIPLE platform has been developed to allow a continuous monitoring at high temporal frequency ($\sim$ 10 min) of water and solid fluxes in mountainous rivers. The scientific context of this development is defined as follows: (i) the simultaneous measurements of water discharge, bedload, suspension load and river bed topography contribute to the establishment of comprehensive mass balance at the catchment scale; (ii) measurements of the physical properties of fine sediments (size, shape, composition) provide information on the spatial origin of sediments within the catchment, the conditions for erosion and sedimentation processes within the river and the potential to transport other substances such as nutrients, metals, microorganisms. For the design of the platform, priority has been given to non-intrusive instruments due to their robustness. The basic prototype of the platform integrates the following instruments: water level and surface velocity radars, turbidimeters, conductivity probe, hydrophone, cameras, automatic water sampler and depth sounder. Other instruments are progressively integrated, such as the SCAF (system characterizing the sediment's settling velocity), an acoustic Doppler profiler and a spectrophotometer. A wireless telecommunication has been set up to allow remote interactions with the platform and data transmission. The RIPLE platform has been designed to facilitate its use and maintenance: user interface allowing data monitoring and remote configuration, sending alerts (SMS, mail) according to programmed conditions, flexibility of on-site installation and energy autonomy allowing to easily move the platform from one site to another site. In September 2016, the RIPLE platform was installed on a bridge across the Romanche river at Bourg d'Oisans (45.1159 °N, 6.0135 °E) for a testing period. After a presentation of the architecture of the platform, the first results derived from in situ measurements are discussed: the intercomparison of surface velocity measurements (velocity radar versus Large Scale Particle Image Velocimetry), the direct estimation of water discharge using the surface velocity and water level measurements and the comparison with the historical stage-discharge rating curve, the intercomparison of turbidity measurements and the calibration of the turbidity-SSC (suspended sediment concentration) relationships, the investigation of periods with bedload transport and the characterization of the corresponding hydraulic conditions. The next steps in the exploitation of the results of the RIPLE platform are finally addressed.