

3D-flow measurements (ADCP) during a flood event ant the upper River Rhine between Constance-DE und Basel-CH

Client: SEBA Hydrometrie GmbH & Co. KG and the Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg (LUBW – regional environmental office)

Location: Hochrhein, Baden-Württemberg, Germany

Scope of work: Survey of the discharge during a flood event at the gauging stations Konstanz, Kadelburg and Hauenstein

Method: ADCP-flow velocity measurements with a *Remote Operated Vehicles* (ROV)

INTRODUCTION

For the validation of existing rating curves, the gauging stations in Konstanz, Kadelburg and Hauenstein were measured with a high resolution ADCP flow velocity probe during a flood event in 2016.



Fig. 1: Locations of the gauging stations in Konstanz, Kadelburg and Hauenstein

METHOD

Due to the high flow velocities, up to 4 m/s, measurements are only possible with a ROV (Fig 2). Our ROV can reach up to 8 m/s above ground and can be remotely controlled up to 1000 m – when visibility is given. For each gauging station, eight transects were measured. The data was transmitted to the hand-held PC in real time. For the post processing of the measurements the software system AGILA was applied.

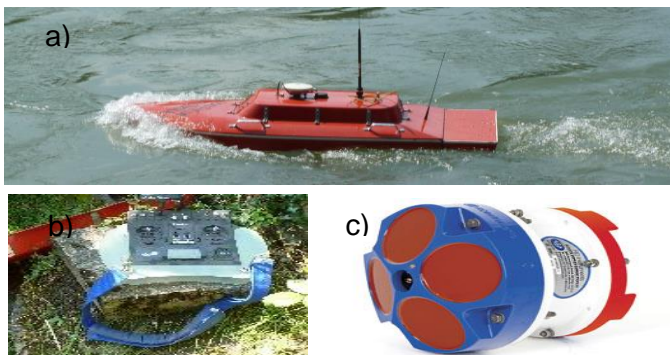


Fig. 2: a) ROV for ADCP measurements, b) Remote control and c) ADCP

RESULTS

Due to the very steady position of the ROV in the water, flow velocities up to 3.8 m/s could be recorded with a resolution of 20 cm. The deviation of the total discharge was below 1%.

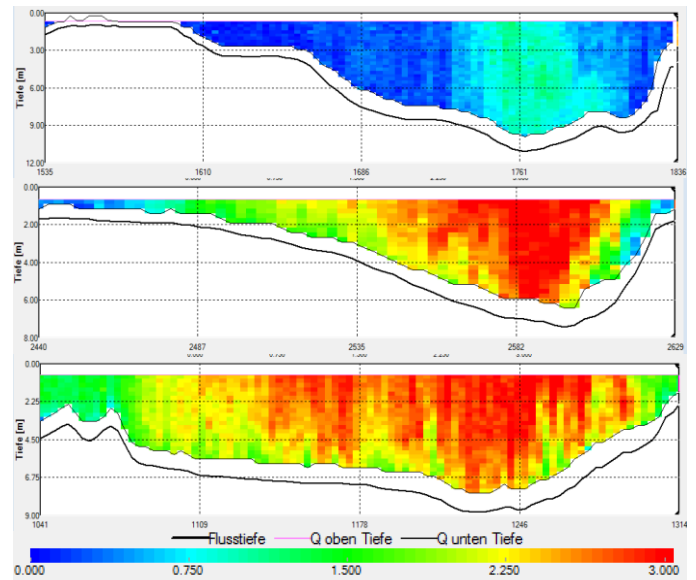


Fig 3: Flow velocities at the gauging stations in Konstanz, Kadelburg and Hauenstein

The field application showed that both the applied measurement technique and transmission method is suitable for measurements under extreme conditions. It needs to be considered that the ROV can only be applied with sufficient power reserves to ensure maneuverability in the mainstream. This is especially relevant for restricted view conditions (less than 250 m) and the occurrence of objects such as drifting wood.