Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09807, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09807
EGU General Assembly 2008

On the use of Raman, infra-red, and green waveforms in bathymetric LiDAR for very shallow waters.

T. Allouis (1), **J.S Bailly** (2),

(1) Cemagref, UMR TETIS, Maison de la Télédétection, 500 rue Jean François Breton, 34093 Montpellier Cedex 5, France, (2) AgroParisTech, UMR TETIS, Maison de la Télédétection, 500 rue Jean François Breton, 34093 Montpellier Cedex 5, France, allouis@teledetection.fr / Phone: 33-467-54-87-54

Bathymetry and topography are crucial points for sustainable management of rivers. In this context, bathymetric LiDAR appears as an adapted technology for river topography with both high data density and acquisition rate. Nevertheless, even if it exists some references of this technique's precision on coastal areas, few exist on continental waters. Today, LiDAR services providers can deliver full waveform LiDAR signals in addition to processed data. In this context, we wanted to analyze efficiency, quality and precision of bathymetric LiDAR data and waveforms on very shallow coastal waters in order to study a transfer of this technology to rivers. In this paper we present our work on the Morbihan bay (France) data set acquired by SHOM (hydrographic and oceanographic service of French navy) on 2005 with SHOALS system providing Raman, infra-red, and green waveforms.

This work is focusing on data quality related to the use of Raman, infra-red, and green waveforms in data processing for surface and water bottom topography. In a first time, we computed bottom altimetrical LiDAR data precision on 9 representative very shallow waters ($<$3m) areas. Results showed that processed data have a mean error of -7.6 cm with a standard deviation of 37.4 cm. Using usual data process, depths are extracted from only 55% of LiDAR beams. Bathymetry failures are mainly due (for 72 %) to bottom non-detection that use only green waveform. When water surface is detected, Raman, infra-red, and green waveforms are used for respectively 45%, 30%, and 25% of beams.

In a second time, we tested two signal processing algorithms using green and infra-red waveforms in order to re-estimate non detected depths. With these processes, depth value for 95% of LiDAR beams have been extracted, with a mean error of -1.3cm and a standard deviation of 37.7 cm. In addition, we applied a method (Pe'eri 2007) that aim to increase shallow water detection using Raman red waveforms. In our context , this method did not succeeded. However, we showed in this study that the use of multi-spectral LiDAR waveforms is quite useful even in case of very shallow waters.

Thanks to SHOM for having provide LiDAR data.