Performances comparison of bathymetry on rivers from various visible high resolution images.

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Bathymetry data on river are crucial elements for hydro-morphology and hydro-
ecology but difficult and costly to measure. In case of clear water river, the use of
remote-sensing images might suit to produce realistic depth maps of shallow water
areas [Carboneau et al., 2004].

In this study, three sites have been studied on the graved-bed river Durance (France).
On these test sites, a high quantity of ground data were available. Three Very High
Spatial Resolution images shoted at same time as ground data were compared: two
aerial images acquired by plane (Bd-Ortho© IGN) or ULM (Avion Jaune Company)
in natural colours (Red, Green, Blue) with 0.5 m resolution and one provided by the
Quickbird satellite in multispectral (R, G, B, Infrared) with 2.4 m and 0.7 m resolu-
tions. For each shot, a model of the relation between colors and depth has been fitted
using linear regression. In the case of simple linear regressions, a determination coef-
ficient of 0.4 was found in the best case and most models are very poorly relevant. On
the contrary, results using a stepwise multi-linear regression according Lysenga equa-
tion are more significant with a maximum of determination coefficient up to 0.71.
In most cases, only two spectral bands were identified as significant to establish a

fairly good model for each shot. According to the error maps, a link is supposed on the one hand between high depths and under-assessment by the method and, on the other hand, between algae excess and over-assessment.Image pre-treatment and resolution appear to be two important parameters influencing the model fitting. Tests of model inter-crossing between each shot and images were realised in order to assess their suitability and generalization ability. These first results shows a difficult direct generalisation of regression models and highlights, for aerial images, the necessity of the images "normalization" using some radiometric pre-treatments.