



Morphologic segmentation of rivers from satellite high spatial resolution multi-spectral images

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In Mediterranean countries, big morphologic changes may occur along seasons. Rivers beds, as gravel-bed rivers, present a specific morphology with large major channels. In case of low run-off, only the central part is under water and the river appears as a succession of various water bodies: ponds with stationary waters and high depths (up to 2 m), channels with low velocities, and rapids with high velocity and low depths (0.2 to 0.3 m). Fish life purposes need a good knowledge of precise geometry, run-offs and velocities. When dealing with long distances along rivers and in case of repetitive huge morphologic changes, due to flash floods, in situ measurements with GPS or topographic station are not adapted. Remote sensing appears as a good alternative to map these items. Due to the fine resolution and geometry of very high resolution satellite images, a very detailed looks possible.

In this study, we used image segmentation and clustering methods on high spatial resolution multi-spectral images in order to map morphological features on an underwater river-bed. Quick-bird multi-spectral images (0.70 m resolution in panchromatic) were acquired along 50 km of the Durance gravel-bed river, south of France. After geo-referencing and image combination, the process develop a hierarchical segmentation of the river in three steps: 1-water—no-water discrimination, then in waters, 2-ponds—channels and rapids discrimination. In a final step, a finer segmentation is run within each category of the water bodies in order to define homogeneous segments where

both depth-range and velocity-range are estimated. The resulting maps look accurate enough for fish habitat issues at meso-scales.

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