UNIL | Université de Lausanne
Faculté des géosciences
et de l'environnement

Master of Science in Environmental Geoscience

Estimating the discharge of large rivers using remotely sensed information

Bungener Rachel

Sous la direction du Prof. Grégoire Mariéthoz
Codirection du Dr. David Sebag

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Abstract

Water is the most important resource on earth as it is necessary to every living system. A lot of populated areas are near rivers and human activities are strongly linked to rivers. River discharge is a key value for water management and water monitoring. However, their values are not known in many parts of the world due to rare, non-existent or proprietary river gauge measurements (Gleason and Smith, 2014). Remotely sensed information offer an important alternative to obtaining river discharges, as they are accessible and provide a better temporal and spatial overview. Different methods exist but they often depend on in-situ measurements and apply on very large rivers. In this study, a new approach is developed. It combines knowledge from three different disciplines. An image analysis is done to estimate the river width. Then, relations from open-channel hydraulics are used with a probabilistic inversion. Probabilistic inversion is a method widely used for example in Geophysics. It has been proved that it is a very efficient way to analyze *highly nonlinear problems with complex a priori information and data with an arbitrary noise distribution* (Mosegaard and Tarantola, 1995). The method is tested on the Nyong River located in Cameroon which is a relatively small river comparing to usual case studies in the field of interest. Width is obtained from WorldView-3 and Landsat 7 images and the method is implemented in Matlab. The results obtained are very promising which prove that probabilistic inversion is a powerful tool to estimate river discharge using remotely sensed information. It should be the object of further research and interesting developments.