

Morphological river changes by using satellite images

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Abstract

The processes controlling the fluvial morphodynamics have been the focus of research seeking to evaluate river's dynamics. The knowledge of the river's pattern changes is fundamental in designing adequate restoration projects and in preserving the ecological equilibrium in fluvial environment and neighboring areas. Some researchers [among others 1, 2] exalted the role of vegetation on river's dynamics, others [see as an example 3] suggest to consider the flood effects as fundamental to understand the controlling processes on fluvial morphology. The difficulty in investigating the controlling mechanisms of river's dynamism is related to the difficulty in stream monitoring: many river floodplains are inaccessible and often densely vegetated [4, 5, 6]. Over the last two decades the use of technologies such as near-infrared Light Detection and Ranging (LIDAR) and Experimental Advanced Airborne Research LIDAR (EAARL) has improved our ability to map of sub-aerial topography and fluvial environments. But, these technologies has shown uncertainties in rivers because of the reflection in the air-water interface. Image-based techniques (LSPIV) have been increasingly used for surface velocity measurements in field. These techniques are non-intrusive and allow obtaining simultaneous spatial information about the instantaneous velocity components also in unsteady flows [7]. Thus, it is possible to yield a large amount of data in a rather short measuring time and to calculate simultaneously the average values for identical spatial windows over many images. In the present study the river's pattern changes are identified to detect information from satellite images easily available from Google Earth. The adopted methodology has allowed us to obtain indications on the combined effects of the vegetation dynamics and of the different size of flood events in a selected reach of the Tagliamento River (Italy).

Key words: Rivers, ecological equilibrium, evolution, prediction, vegetation, floods, satellite images

Image

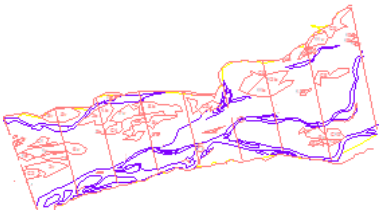


Figure 1: Examined river reach with indication of vegetated areas in the subareas and of the active channels.

Recent Publications (minimum 5)

1. Métivier, F. and Barrier, L.: Alluvial landscape evolution: what do we know about metamorphosis of gravel bed meandering and braided streams, in: Gravel-bed Rivers: processes, tools, environments, chapter 34, edited by: Church, M., Biron, P., and Roy, A., Wiley&Sons, Chichester, 474–501, 2012
2. Termini D. 2016. Experimental analysis of the effect of vegetation on flow and bed shear stress distribution in high-curvature bends. *Geomorphology* Volume 274.
3. Bertoldi W., Zanoni L., Tubino M. 2010. Assessment of morphological changes induced by flow and flood pulses in a gravel bed braided river: The Tagliamento River (Italy). Geomorphology 114 348–360
4. Trigg, M.A., Bates, P.D., Wilson, M.D., Schumann, G., Bauch, C., 2012. Floodplain channel morphology and networks of the middle Amazon River. Water Resour. Res. 48(10).
5. Trigg,M.A.,Michaelides, K., Neal, J.C., Bates, P.D., 2014. Surfacewater connectivity dynamics of a large scale extreme flood. J. Hydrol. 505:138–149.
6. O'Loughlin, F.O., Trigg, M.A., Schumann, G.J.-P., Bates, P.D., 2013. Hydraulic characterization Remote Sensing of Channels and Riparian Zones with a Narrow-Beam Aquatic-Terrestrial LIDAR *Remote Sens.* 2009, *1*, 1065-1096; doi:10.3390/rs1041065
7. Termini, D., Di Leonardo A. 2018. Efficiency of a digital particle image velocimetry (DPIV) method for monitoring the surface velocity of hyper-concentrated flows. GEOSCIENCES. Volume 8, Issue 10, 19

Biography

Donatella Termini, Ph.D., Full professor of Hydraulics at Department of Engineering, University of Palermo (Italy). Leader or collaborator of national or EU research projects and Guest Editor of International Journals. In 2007 she had "Karl Emil Hilgard Hydraulic Prize". Present research efforts include the investigation in fluvial hydraulics and eco-hydraulics (flow resistance, effect of vegetation, sediment transport, effects of bed roughness), prediction of river morphological evolution (meandering and braiding) both through experimental investigations and by the development of numerical simulation codes. More than 180 papers published in proceedings of national and international congresses and in international scientific journals.

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Category (Oral presentation/ Poster presentation/Young researcher forum/E-poster): Oral presentation
Research interest: river morphodynamics, eco-hydraulics, measurement techniques

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