

Developing an improved methodology for the characterisation of river ecomorphodynamics using multispectral satellite imagery

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Project overview

Medium-resolution, multispectral satellite data can provide a wealth of information on the ecomorphodynamics of large rivers and improved availability of historical data (e.g. NASA's Landsat archive) is now enabling studies of change that combine long (decadal) time spans with relatively high (up to weekly) measurement frequencies (Henshaw et al., 2013). This project, timed to coincide with the launch of NASA's Landsat 8 satellite, aimed to explore the utility of a range of spectral indices for distinguishing key ecomorphologically-relevant properties of the gravel bed braided Tagliamento River in NE Italy. Fieldwork was undertaken at sites along the river (Figure 1) to obtain ground measurements of vegetation and channel characteristics using standard survey and dendrochronological techniques for comparison with index values derived from near-synchronous satellite images.

Project outcomes

The fieldwork and subsequent data analysis confirmed the utility of existing spectral indices to distinguish between key ecomorphological units at the field sites and has enabled improved estimation of reach-scale vegetation dynamics along the Tagliamento (Henshaw et al., 2014). Funding from the BSG enabled travel to the field

sites and the purchase of new equipment (increment borers). The research provided a platform for the development of a Leverhulme Trust grant application and two PhD projects on (i) the role of floods as ecomorphodynamic controls in braided rivers (EU Erasmus-Mundus) and (ii) understanding the behavioural characteristics of braided river channels using graph theory (QMUL).



Figure 2: Photo and Landsat false colour composite image of Flagogna field site (main channel of Tagliamento River in foreground).

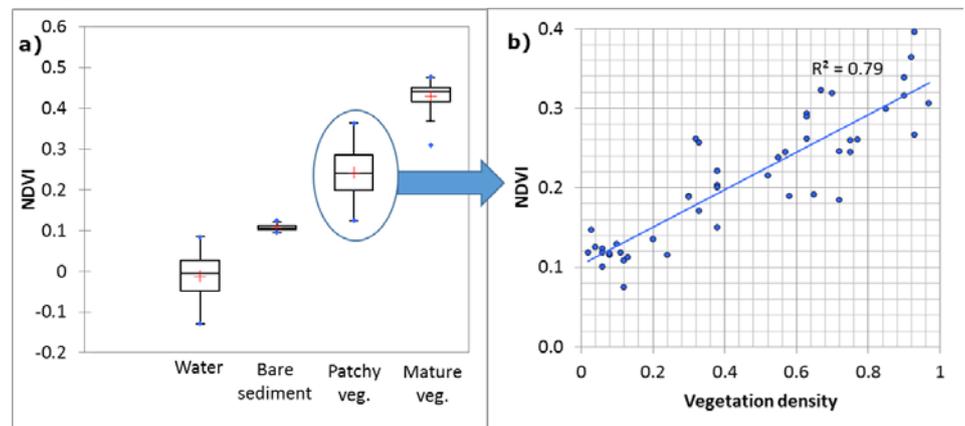


Figure 1: (a) Variation in Landsat-derived NDVI values for key land cover types; and (b) relationship between vegetation density and NDVI for pixels containing patchy vegetation.

References

- Henshaw, A.J. et al. (2013) An assessment of the degree to which Landsat TM data can support the assessment of fluvial dynamics, as revealed by changes in vegetation extent and channel position, along a large river. *Geomorphology*, 202, 74-85.
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