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RCEM2017
BACK TO ITALY

10th Symposium on River, coastal and estuarine morphodynamics

Trento - Padova
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Quantifying shape and multiscale structure of meanders with wavelets

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Meandering river planforms are easily observable features in the landscape, but the processes shaping them, act on a wide range of spatial and temporal scales. This results in meanders that curve at several spatial scales with smaller scale curves embedded in larger scale curves.
Here, we show how to quantify the multi-scale structure of meanders from the valley scale until the sub-meander scale based on continuous wavelet transforms of the planform curvature. The zero crossings and maximum lines of the wavelet transform capture the main characteristics of the meander shape and their structure is quantified in a scale-space tree (Figure 1). The tree is used to identify meander wavelength and how meanders are embedded in larger scale features. The submeander structure determines meander shape, which is quantified with two parameters: skewness and fattening. The method is applied to the Mahakam River planform, which features very sharp, angular bends. Strong negative fattening is found for this river which corresponds to angular non-harmonic meanders which are characterized by strong flow recirculation and deep scouring.

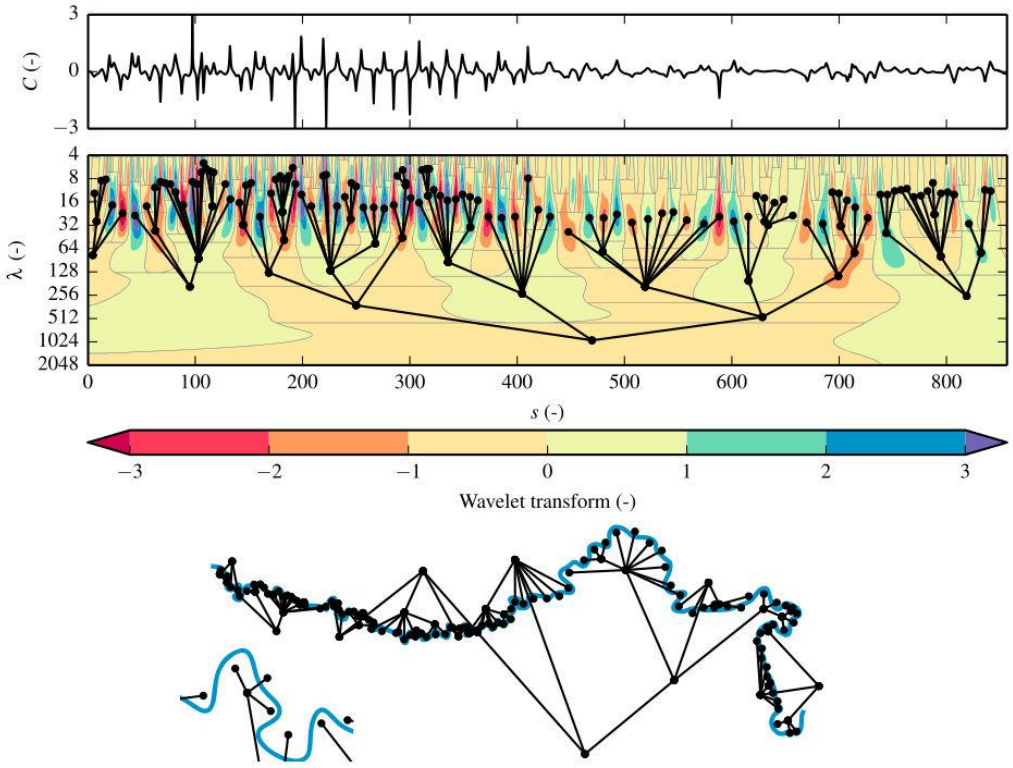

Figure 1. Based on the curvature of the planform of the Mahakam River (top panel) the continuous wavelet transform is determined (middle panel). The transform is used to construct a scale space tree based on zero crossing lines (gray lines) and local maxima (dots). The lowest panel shows the same tree as the middle panel, but now drawn in connection to the planform.