Quantitative Methods: Student Work

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I used a signal processing method called the Continuous Wavelet Transform to characterise the complex patterns and scales of channel change that have occurred on the Sacramento River, USA over three decades, and to link these patterns to different geomorphologic drivers.

How did you apply quantitative methods in your work?

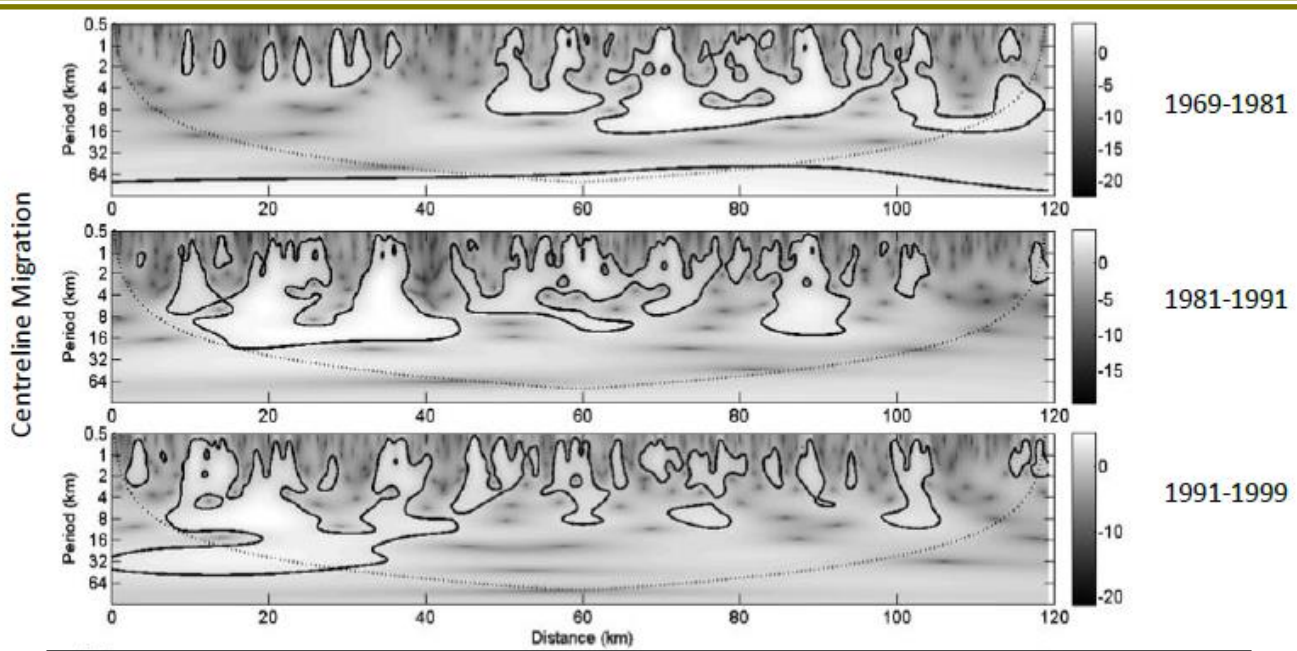
- I used remote sensing and GIS analyses to quantify downstream signals of river bank line change rates over three decades at a high resolution.
- I applied continuous wavelet transforms to the channel change signals. These demonstrated the existence of a number of characteristic scales of channel change, superimposed on each other.
- Scale-averaging of the wavelet transforms enabled the downstream location and relative strength of the difference scales of channel change to be quantified, and for statistically significant regions of change at each characteristic scale to be highlighted.

What did you find?

The wavelet transforms revealed very complex patterns of channel change and showed that the channel evolves through non-stationary processes operating at a range of scales, magnitudes and locations.

Assessors View

'This work is an excellent example of how a multi-disciplinary, quantitative approach to investigating a geographical phenomena can reveal and make sense of the complex dynamics inherent in many environmental systems.'



Continuous wavelet transform power spectra for the channel centreline migration signals for the time period 1969-1999. Areas inside the bold lines indicate significant regions of channel change. In each case, the scale of the change is indicated on the y-axis and the downstream location is indicated on the x-axis.