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Sinuosity and meander belt scarring: Tectonics and stream dynamics across the Baton Rouge Fault Zone

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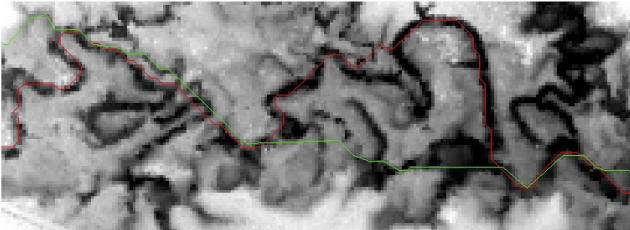
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This study focuses on the sinuosity of alluvial rivers flowing across the Baton Rouge fault zone (BRFZ). The BRFZ is a little studied normal fault system extending roughly from Baton Rouge, LA east to about the Mississippi border. We hypothesize that the sinuosity is measurably different in channel reaches upstream and downstream of the fault trace. To gather sinuosity data we use two methods. The first is field surveying using a laser range finder and GPS; this method is only used over limited reaches, because covering the entire river system in this way is prohibitively time consuming. The second method uses ArcGIS to analyze LIDAR data that are freely available for the entire state of Louisiana. The LIDAR data have a 5 meter resolution. The largest channels are easily identified by eye in the LIDAR data and can be digitally traced by hand. On most of the smaller rivers, however, it is difficult to discern the exact trace of the channel. In these cases we use the ArcGIS hydrology tools to determine the path of the rivers. In order to check the accuracy we do this twice, once with the LIDAR data and once with the USGS 10 m data. However, the two data sets often produce very different river paths. Upon further investigation it appears that the rivers show a large amount of scarring throughout the meander belt, making it impossible to discern the exact trace of the channel. In fact, field surveying indicates that often times the channel traces from both data sets are incorrect. As a result, in areas where there is no clear channel trace, we calculate a local relief across the meander belt as a proxy for the degree of meandering. We find that in channels where it is possible to calculate sinuosity, there are distinct patterns related to local faulting; in those channels in which we cannot calculate sinuosity, meander belt relief patterns indicate increased channel meandering in proximity to the fault zone.



The red and green paths correspond to the USGS 10m and LIDAR respectively. Both were obtained using automated river mapping.
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