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L. Rivera-Soler [1], A. Vargas-Luna[1], J. D. Giraldo-Osorio[1] and A. Crosato [2,3]

[1] Pontificia Universidad Javeriana, Civil Engineering Department, Bogotá D.C, Colombia. vivianlrivera@javeriana.edu.co, avargasl@javeriana.edu.co, j.giraldoo@javeriana.edu.co

[2] IHE Delft Institute for Water Education, Department of Water Resources and Ecosystems, Delft, The Netherlands. a.crosato@un-ihe.org

[3] Delft University of Technology, Faculty of Civil Engineering and Geosciences, Delft, The Netherlands.

1. Introduction

Meandering rivers dynamics has intrigued scientists since the nineteen fifties (Hooke, 2013). Meander migration models are regularly used to predict planimetric changes (Crosato, 2018), but they have not considered the figure, the reconstructed historical channel is shown. This alignment was obtained from the analysis of the existent water marks and channel trajectories that can be identified in satellite imagery. reconstruction of their historical alignments. This study deals with the reconstruction of a 9 km long reach of the Bodoquero River (see Figure 1), located in the Caquetá department, Colombia, combining the potential of meander migration models and vegetation succession to validate the modeled historical alignments.

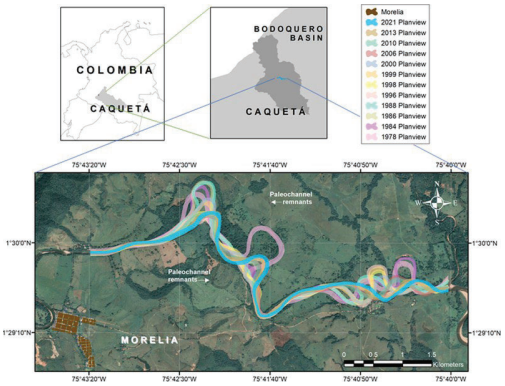

Figure 1. Study area – Bodoquero river.

2. Materials and methods

The data set used in this study includes hydrological series, satellite imagery, bathymetric data from the study reach and. Vegetation patterns were obtained from the satellite imagery, while the detailed characterization was carried out during the field campaign. The meander migration model MIANDRAS was used for the reconstruction of past river alignments, with retrospective modelling starting from 1984 until later dates. After calibration, the model was used to reproduce the river alignment of 1978. The validation of the obtained historical channel reconstruction was based on information on channel filling rates, vegetation succession and on the age of the oldest trees in the area of the abandoned channels.

3. Results

The sectorized parameters calibrated for each period in the study area were unified to perform the numerical modelling. In total, 8 zones were defined as shown in Figure 2. In this figure, the reconstructed historical channel is shown. This alignment was obtained from the analysis of the existent water marks and channel trajectories that can be identified in the satellite imagery.

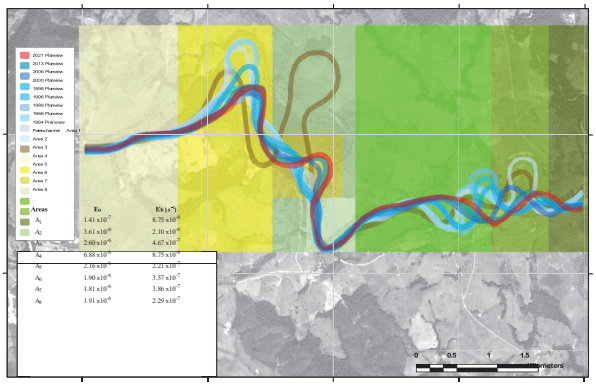

Figure 2. Erodibility parameters and initial channel alignment used for historical reconstruction..

The simulation of the channel alignment was performed until the first recorded satellite image (1978), obtaining a duration of 4780 days equivalent to 13 years. This means that the proposed alignment corresponds to the year of 1965.

Based on the channel filling rates and the tree ages, a total of 54 years is obtained. Thus, subtracting this value from the last year of analysis (2021) we obtained that the proposed historical channel was active in 1967.

4. Conclusions

This study shows the potential of the methodology applied in the historical reconstruction of the morphological evolution of meandering rivers in areas of limited information. The analysis indicated that the abandoned channels were active until 1967 while the year obtained by the meander migration model corresponds to 1965, resulting in a difference of only 2 years.

References

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