



EGU24-11424, updated on 09 Mar 2024  
<https://doi.org/10.5194/egusphere-egu24-11424>  
EGU General Assembly 2024  
© Author(s) 2024. This work is distributed under  
the Creative Commons Attribution 4.0 License.



## Long-term Dynamics of Carbon Sequestration in Tropical Meandering Rivers through Remote Sensing, Numerical Modeling, and Stochastic Processes

Carlo Camporeale et al. ▶

This research explores the long-term impacts of intricate dynamics of fluvial corridors on the carbon cycle, focusing on the interaction with tropical meandering rivers during formative events and riparian vegetation, particularly large wood recruitment. A multidisciplinary approach – including satellite data analysis, deterministic modeling and stochastic processes – is employed to assess the magnitude of carbon exported by these rivers.

Meandering rivers exhibit lateral migration, with continuous erosion and deposition shaping their dynamics. Riparian vegetation, impacted by flooding and cutoff events, plays a pivotal role in carbon recruitment. A satellite-guided methodology across the Amazon basin correlates river-induced forest cover loss with eroded areas to estimate carbon recruitment.

To understand the long-term river dynamics, a stochastic toy model linking river evolution, sinuosity and carbon export is proposed. The model equation for sinuosity growth includes deterministic and noisy terms, accounting for river elongation and cutoff events, respectively. In particular, a compound Poisson process is used to describe the evolution of sinuosity over time, revealing the impact of cutoff events on long-term dynamics. The calibration of the parameters characterizing the Poisson process is performed through the results of numerical simulations for river planar evolution, based on Zolezzi and Seminara (2001) morphodynamic model.

This study indicates a close relationship between the carbon sequestration and the dynamics of tropical rivers, emphasizing the negative impact of alterations like damming and mining on river morphodynamics and carbon storage. This research provides valuable insights into the complex interactions within fluvial corridors, contributing to our understanding of carbon cycling in these critical ecosystems.

**How to cite:** Camporeale, C., Bassani, F., and Salerno, L.: Long-term Dynamics of Carbon Sequestration in Tropical Meandering Rivers through Remote Sensing, Numerical Modeling, and Stochastic Processes, EGU General Assembly 2024, Vienna, Austria, 14–19 Apr 2024, EGU24-11424, <https://doi.org/10.5194/egusphere-egu24-11424>, 2024.