

# SWOT River Water Surface Elevation Data in the Pantanal: A Sub-Regional Performance Assessment



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## INTRODUCTION

The Pantanal, the world's largest tropical wetland, is characterized by its diverse hydrological dynamics across its 11 sub-regions and its very flat topography. These sub-regions are defined by their flooding patterns, topography, soil types, and vegetation.

Accurate data on water surface elevation (WSE) are crucial for managing this ecosystem, particularly given increasing threats from extreme hydrological events. However, in situ monitoring is limited. This study assesses the potential of the Surface Water and Ocean Topography (SWOT) mission by evaluating the accuracy of the Level 2 KaRIn high-rate river single-pass vector product (L2\_HR\_RiverSP), specifically the reach subproduct, for WSE monitoring in the Pantanal.

## MATERIALS & METHODS

The study focuses on Lake Uberaba (LU) and its neighboring water bodies in the southern Pantanal (Cáceres subregion) (Figure 2), near the Brazil-Bolivia border. There is a lack of studies on lake turbidity and transparency in this region.

Figure 1 - Data processing workflow for SWOT L2\_HR\_RiverSP water surface elevation (WSE) validation in the Pantanal.

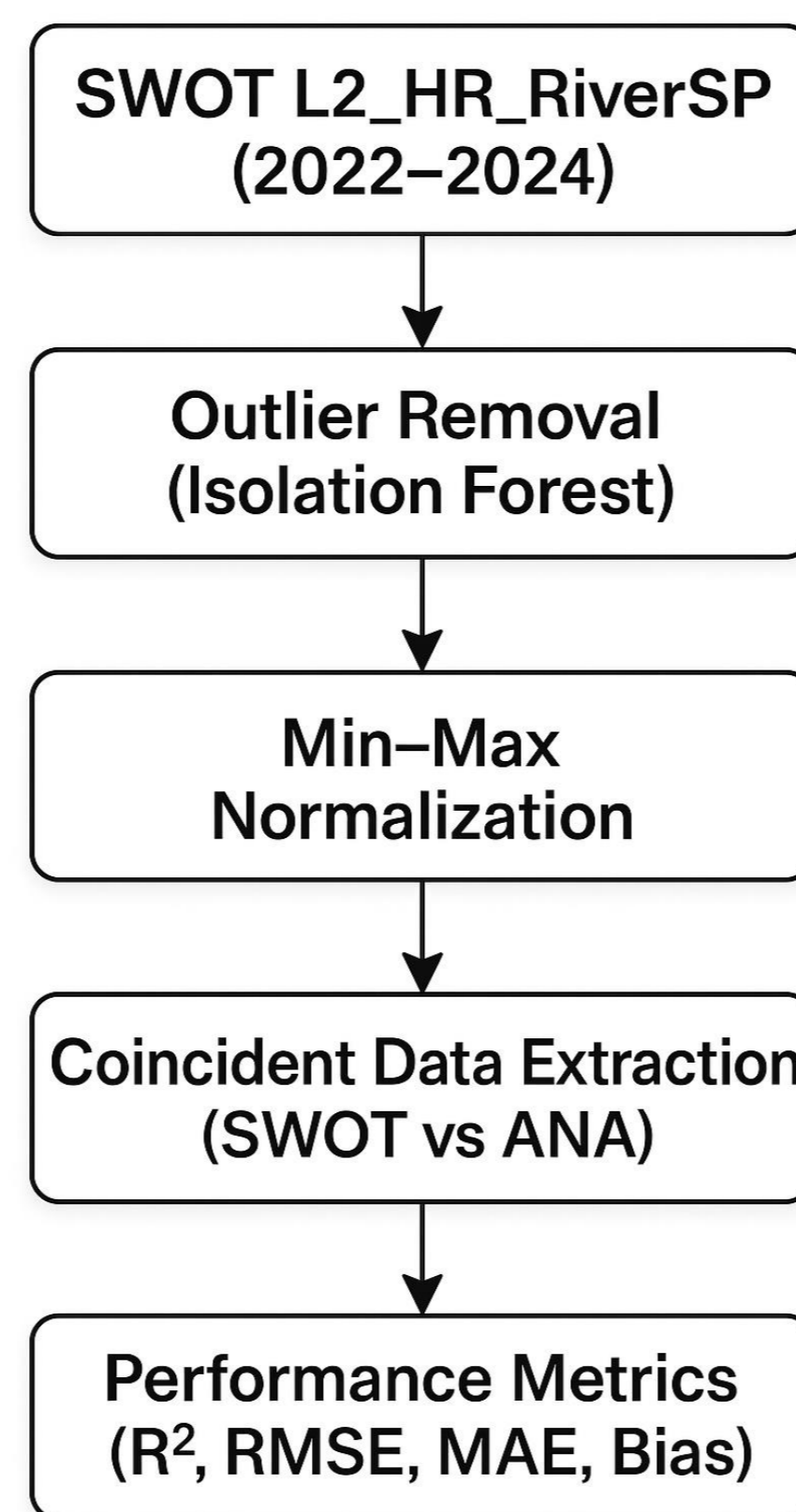
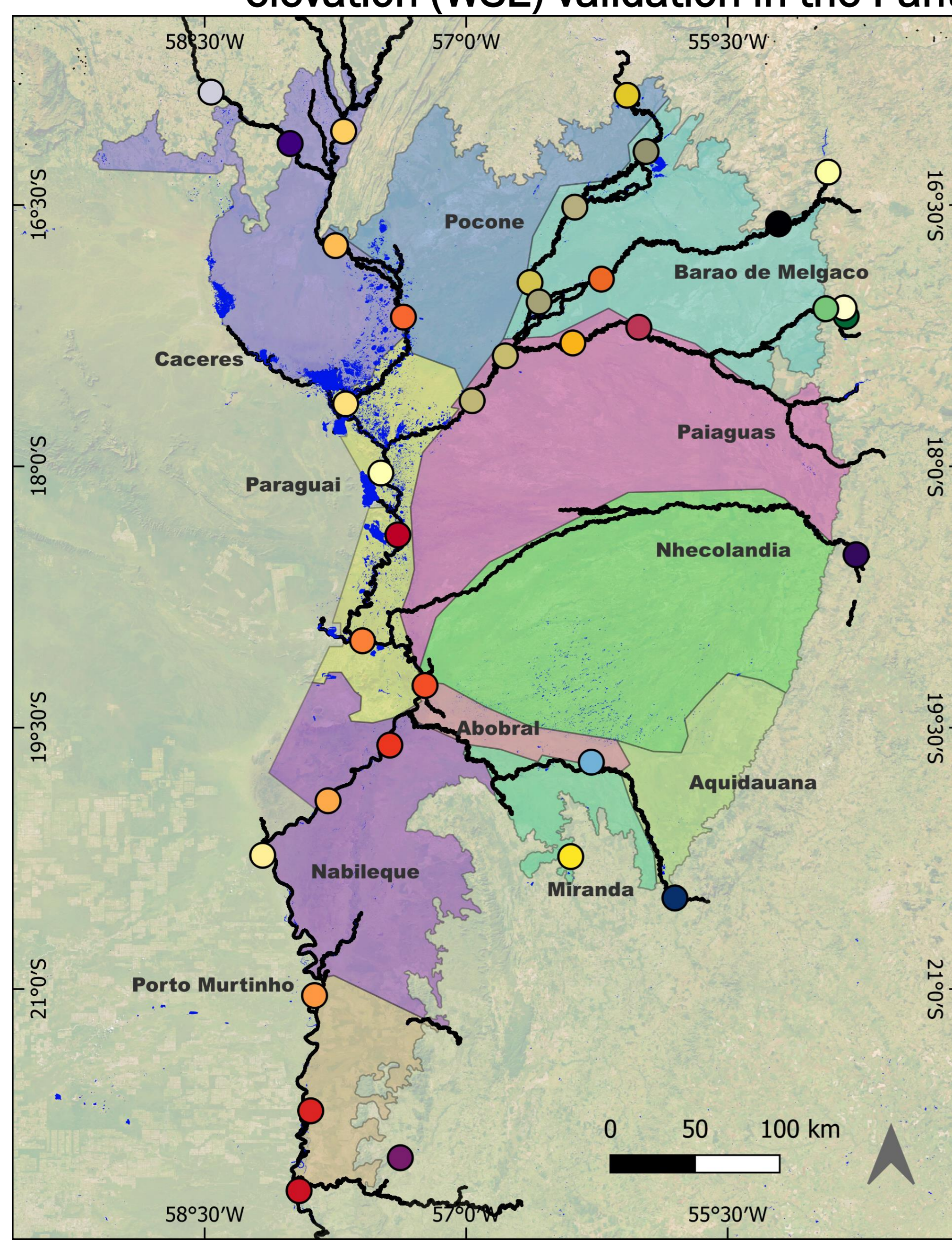


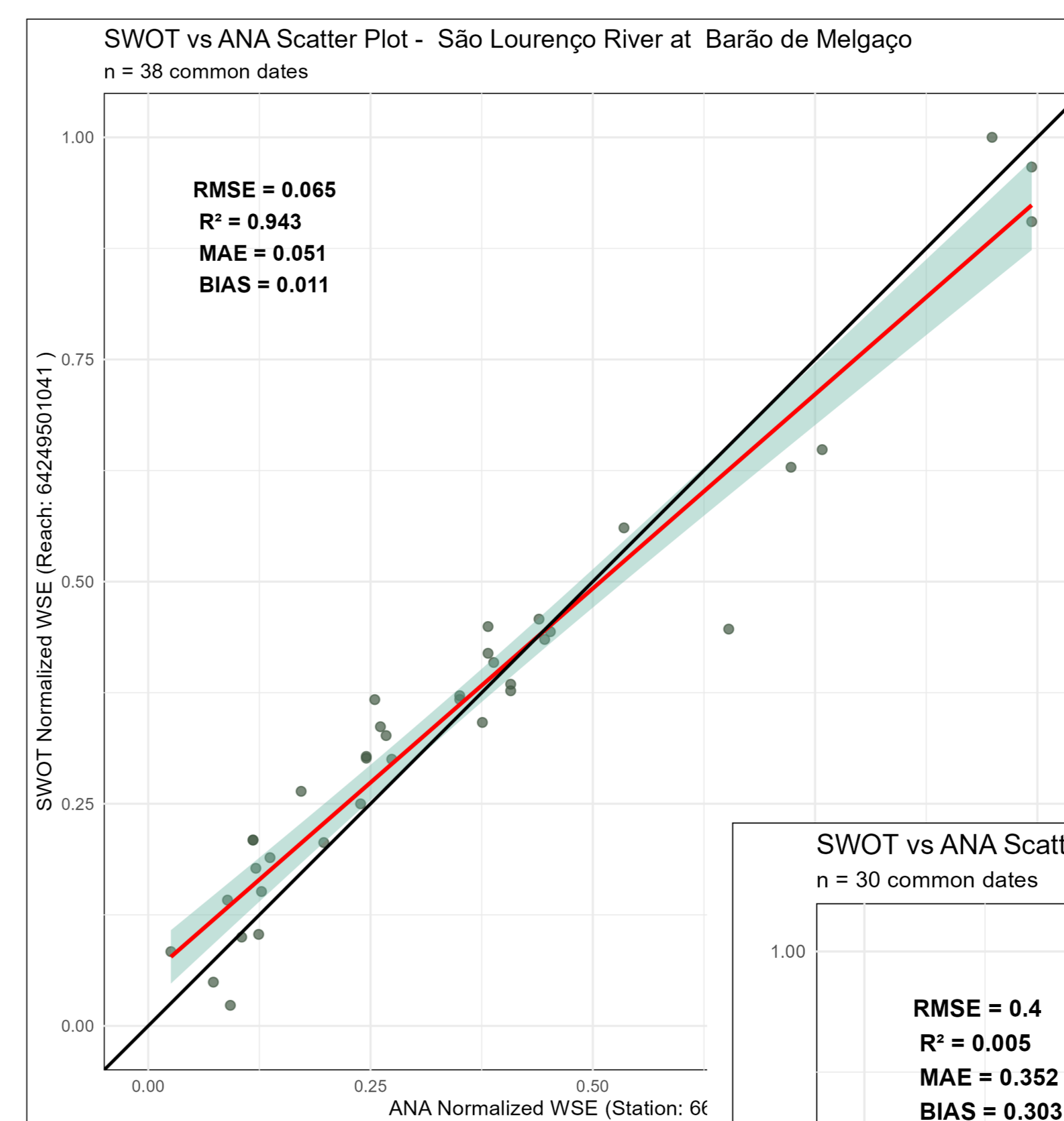
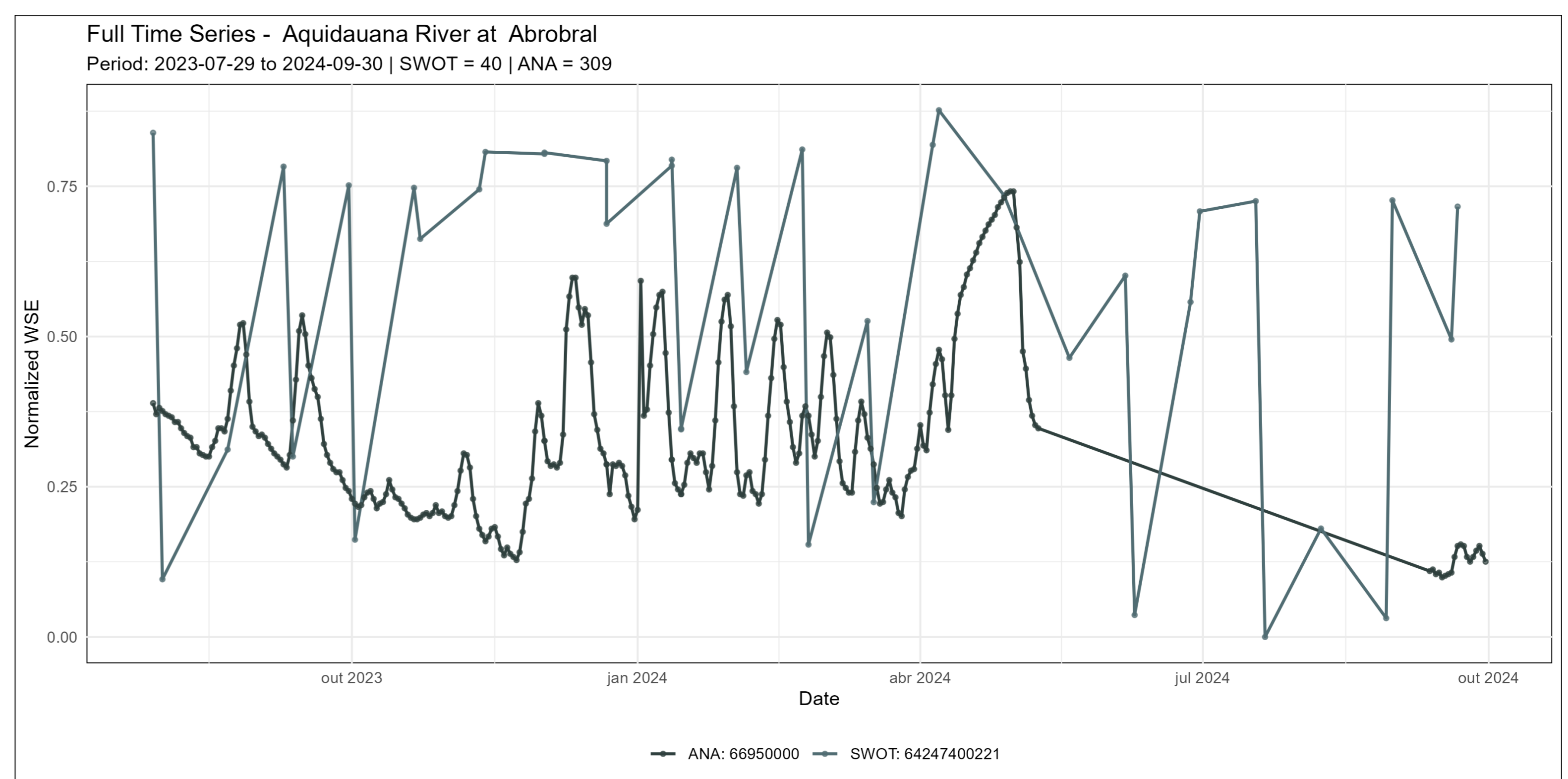
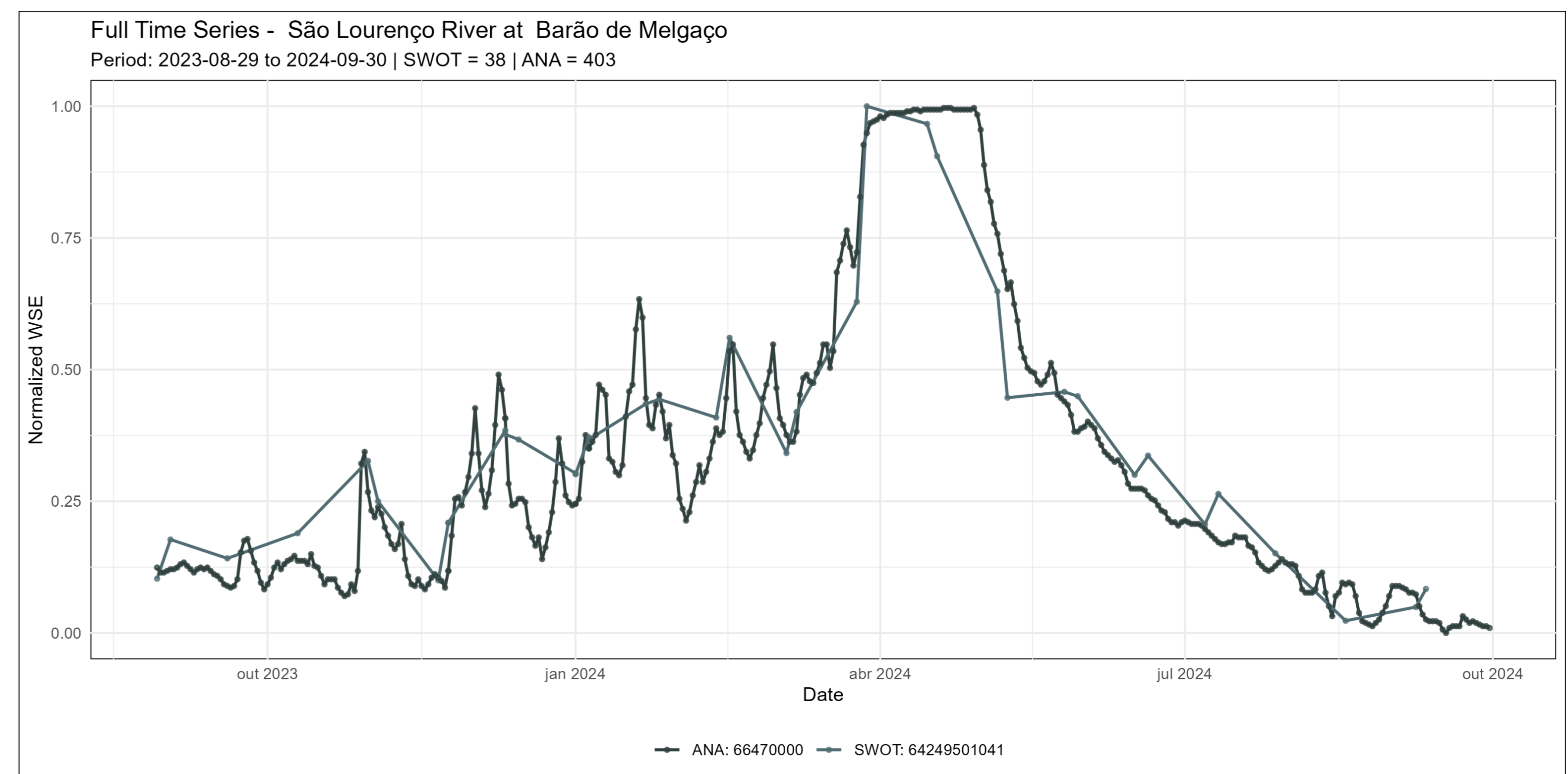
Figura 2. Spatial distribution of ANA in situ stations and SWOT river reaches across the Pantanal sub-regions.

## RESULTS & DISCUSSION

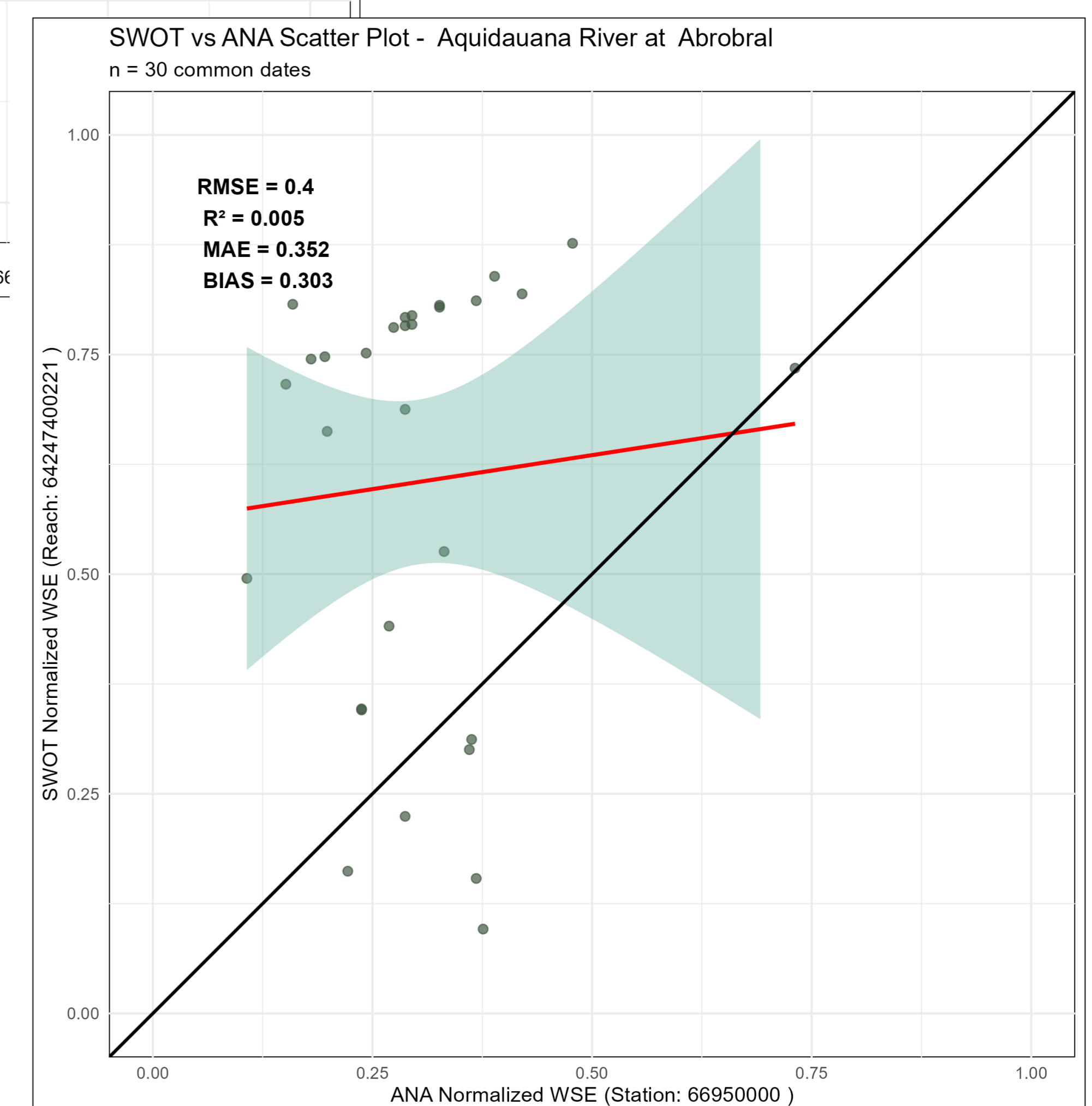
Tabela 1 – SWOT performance by sub-region

Sub-region	Main Rivers	Mean RMSE (m)	Mean R <sup>2</sup>	Mean Bias (m)	n (stations)	Best Reach (R <sup>2</sup> )	Worst Reach (RMSE)
Cáceres	Paraguay, Jauru	0.22	0.27	0.10	2	Jauru (0.48)	Paraguay (0.31)
Poconé	Paraguay	0.31	0.08	0.22	1	—	—
Paraguai	Paraguay	0.24	0.41	0.16	3	0.59	0.28
Barão de Melgaço	Cuiabá, São Lourenço	0.26	0.51	0.19	5	São Lourenço (0.94)	Cuiabá (0.61)
Paiaguás	Cuiabá, Piquiri	0.22	0.62	0.13	4	Cuiabá (0.95)	Piquiri (0.39)
Nhecolândia	Taquari	0.37	0.85	-0.31	1	—	—
Aquidauana	Aquidauana	0.42	0.09	0.40	1	—	—
Abobral	Paraguay, Aquidauana	0.37	0.31	0.32	2	Paraguay (0.62)	Aquidauana (0.40)
Nabileque	Paraguay	0.21	0.72	0.17	2	0.90	0.24
Porto Murtinho	Paraguay	0.25	0.40	0.21	2	0.56	0.29

Table 1 summarizes SWOT WSE performance across Pantanal sub-regions, showing strong spatial variability. Sub-regions such as Paiaguás and Nabileque performed best, while Aquidauana and Poconé showed higher errors. Below are ANA-SWOT time series and scatterplots for stations 66470000 (best) and 66950000 (worst), illustrating this variability.



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