Project Update: May 2023

General information

In April 2023 we sampled three stations in the mangrove forests of the Piraquê Açú-Mirim estuary on the Southeast Brazilian coast (ES: state of Espírito Santo, 19°57'S, 40°10'W; PA: Piraquê-Açú, PM: Piraquê-Mirim, and Conf: Confluence). At each station we sampled one core at each mudflat and mangrove forest about 6 m distant from each other. For this sample we were able to use the car and boat from the Universidade Federal do Espírito Santo without costs. Samples are being analyzed as part of Bethânia Dal Col Lehrback PhD thesis.

Study area and sampling procedures

The mangrove forests of the Piraquê Açú-Mirim estuary on the southeast Brazilian coast (ES: state of Espírito Santo, 19°57'S, 40°10'W) are in a municipal protected area with little development and pollution, being one of the most pristine estuaries on the southeast Brazilian coast (the most populated region in Brazil; Hadlich et al. 2018; Bernardino et al. 2018; Costa et al. 2020). This Y-shaped estuary has 1746 ha of mangrove forests dominated by *Rhizophora mangle* (84%), followed by *Laguncularia racemosa* and *Avicennia schaueriana* within similar species composition and structure along the estuarine gradient; and extensive mudflats under a semi-diurnal microtidal regime (< 2 m; Servino et al. 2018). As a tropical estuary, this region experiences a dry winter with rainfall from 53 to 97 $mm.mo^{-1}$ from April to September and a wet period from October to March (101 to 212 $mm.mo^{-1}$ Servino et al., 2018; Gomes and Bernardino, 2020).

The cores were sectioned in a field from 1 to 1 cm until 10 cm, from 2 to 2 cm up to 30 cm, and 5 to 5 cm up to the end of the core. After that, samples were stored in aluminum lunch boxes. In the laboratory, each sample being dried at 50 °C up to reach a constant weight.

Table 1: General information about the total of samples collected in the PAM estuary.

Legend	Recovery	Number of samples per core
PAF (Piraquê-Açú Forest)	36 cm	21
PAMF (Piraquê-Açú Mudflat)	45 cm	23
PMF (Piraquê-Mirim Forest)	35 cm	19
PMMF (Piraquê-Mirim Mudflat)	40 cm	22
CONF (Confluence Forest)	35 cm	21
CONMF (Confluence Mudflat)	36 cm	21

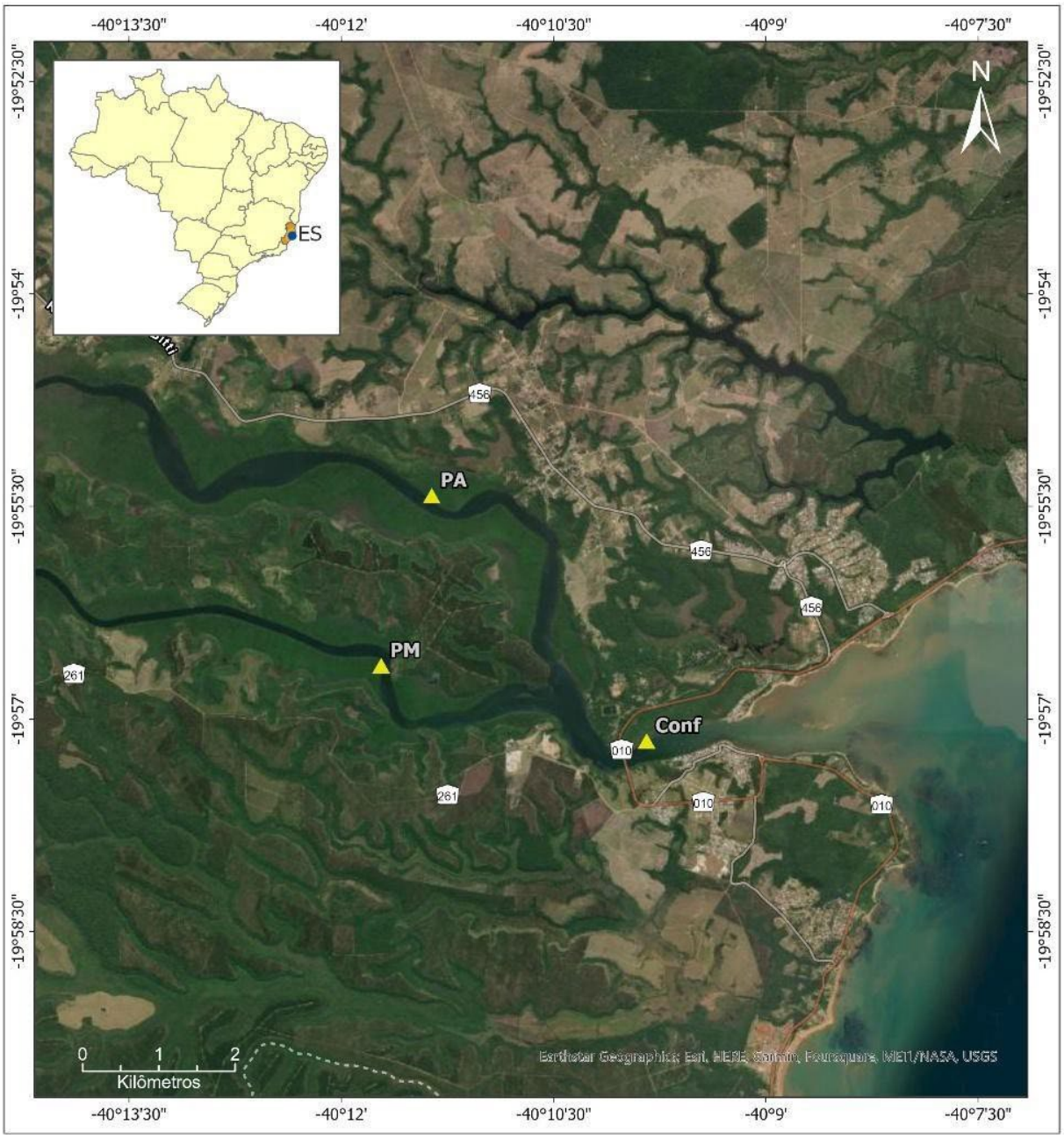

Figure 1. Map indicating the three sampling stations at the Piraquê Açú-Mirim estuary on the Southeast Brazilian coast.

Figure 2. Photo of the sampling stations at the Piraquê Açú-Mirim estuary.

Figure 3. Photo of one of the sediment cores sampled at the Piraquê Açú-Mirim estuary.

Laboratory analyses

Microplastics (MP) extraction are being performed by resuspension via density in saline solution (NaCl, 1.2 g/ml) in decantation columns. The supernatant was transferred to 1L beakers, and 130 ml of H_2O_2 was added at 50 °C overnight for organic matter analysis (OM). After removal from the oven, each sample was filtered through a vacuum pump with 47 mm filters. Each filter was inspected for visual identification of each PM, being characterized in color, size and shape.

Table 2. Status of analyzes of each processing step.

Core		Section (cm)	Dry weight (g)	MP processing	Number of filters	Filter Status	OM analysis	Granulometry
1	PAF	0-1	14					
2	PAF	1-2	15					
3	PAF	2-3	26					
4	PAF	3-4	19					
5	PAF	4-5	23					
6	PAF	5-6	17					
7	PAF	6-7	27					
8	PAF	7-8	23					
9	PAF	8-9	54					
10	PAF	9-10	44					
11	PAF	10-12	113					
12	PAF	12-14	105					
13	PAF	14-16	87					
14	PAF	16-18	114					
15	PAF	18-20	90					
16	PAF	20-22	76					
17	PAF	22-24	85					
18	PAF	24-26	73					
19	PAF	26-28	32					
20	PAF	28-30	160					
21	PAF	30-35	190					
22	PAF	35-40	279					
23	PAF	40-45	230					
24	PAF	45-50	335					
25	PMF	0-1	48	processed	2		ok	
26	PMF	1-2	46	processed	4		ok	
27	PMF	2-3	45	processed	3		ok	
28	PMF	3-4	54	processed	2		ok	
29	PMF	4-5	30	processed	2		ok	
30	PMF	5-6	49	processed	2		ok	
31	PMF	6-7	55	processed	2		ok	

32	PMF	7-8	43	processed	2	ok	ok	
33	PMF	8-9	37	processed	2	ok	ok	
34	PMF	9-10	33	processed	2		ok	
35	PMF	10-12	62	processed	2		ok	
36	PMF	12-14	59	processed	2	ok	ok	
37	PMF	14-16	58	processed	2	ok	ok	
38	PMF	16-18	69	processed	2	ok	ok	
39	PMF	18-20	73	processed	1	ok	ok	
40	PMF	20-22	54	processed	2	ok	ok	
41	PMF	22-24	57	processed	2	ok	ok	
42	PMF	24-30	87	processed	2	ok	ok	
43	PMF	30-35	162	processed	3	ok	ok	
44	CONF	0-1						
45	CONF	1-2						
46	CONF	2-3						
47	CONF	3-4						
48	CONF	4-5						
49	CONF	5-6						
50	CONF	6-7						
51	CONF	7-8						
52	CONF	8-9						
53	CONF	9-10						
54	CONF	10-12						
55	CONF	12-14						
56	CONF	14-16						
57	CONF	16-18						
58	CONF	20-22						
59	CONF	22-24						
60	CONF	24-26						
61	CONF	26-28						
62	CONF	28-30						
63	CONF	30-35						
64	PAMF	0-1						
65	PAMF	1-2						
66	PAMF	2-3						
67	PAMF	3-4						
68	PAMF	4-5						
69	PAMF	5-6						
70	PAMF	6-7						
71	PAMF	7-8						
72	PAMF	8-9						
73	PAMF	9-10						
74	PAMF	10-12						
75	PAMF	12-14						
76	PAMF	14-16						
77	PAMF	16-18						

78	PAMF	18-20						
79	PAMF	20-22						
80	PAMF	22-24						
81	PAMF	24-26						
82	PAMF	26-28						
83	PAMF	28-30						
84	PAMF	30-35						
85	PAMF	35-40						
86	PAMF	40-45						
87	PMMF	0-1						
88	PMMF	1-2						
89	PMMF	2-3						
90	PMMF	3-4						
91	PMMF	4-5						
92	PMMF	5-6						
93	PMMF	6-7						
94	PMMF	7-8						
95	PMMF	8-9						
96	PMMF	9-10						
97	PMMF	10-12						
98	PMMF	12-14						
99	PMMF	14-16						
100	PMMF	16-18						
101	PMMF	18-20						
102	PMMF	20-22						
103	PMMF	22-24						
104	PMMF	24-26						
105	PMMF	26-28						
106	PMMF	28-30						
107	PMMF	30-35						
108	PMMF	35-40						
109	CONMF	0-1						
110	CONMF	1-2						
111	CONMF	2-3						
112	CONMF	3-4						
113	CONMF	4-5						
114	CONMF	5-6						
115	CONMF	6-7						
116	CONMF	7-8						
117	CONMF	8-9						
118	CONMF	9-10						
119	CONMF	10-12						
120	CONMF	12-14						
121	CONMF	14-16						
122	CONMF	16-18						
123	CONMF	18-20						

124	CONMF	20-22						
125	CONMF	22-24						
126	CONMF	24-26						
127	CONMF	26-28						
128	CONMF	28-30						
129	CONMF	30-36						

Next steps

We collected three cores instead of one for the mangroves and mudflats to bring more representativeness to the estuary. We will be analysing the collected samples at the Piraquê Açú-Mirím.

In July/August 2023 we will be sampling in the state of Rio de Janeiro looking for plastic burial and impacts over the mangrove forest. The necessary equipment has already been requested and is on its way to the base of the NGO Guardiões do Mar.

References

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