Supplementary Information

Image from Sentinel-2 to locations A through F with their respective five plots (indicated by the shapes), totaling 30 plots, and their respective areas (ha) that were used in the stage of model validation for yield prediction.

Figure S1**.** Location A in the Farm Aurora with five productions plots indicated as A-1 (8.71 ha), A-2 (4.46 ha), A-3 (8.03 ha), A-4 (4.04 ha), and A-6 (7.22 ha) during the harvest in 2022. São Paulo, Brazil.

Figure S2**.** Location B in the Farm Aurora with five productions plots indicated as B-7 (8.58 ha), B-8 (9.88 ha), B-9 (7.62 ha), B-10 (7.02 ha), and B-12 (11.07 ha) during the harvest in 2022. São Paulo, Brazil.

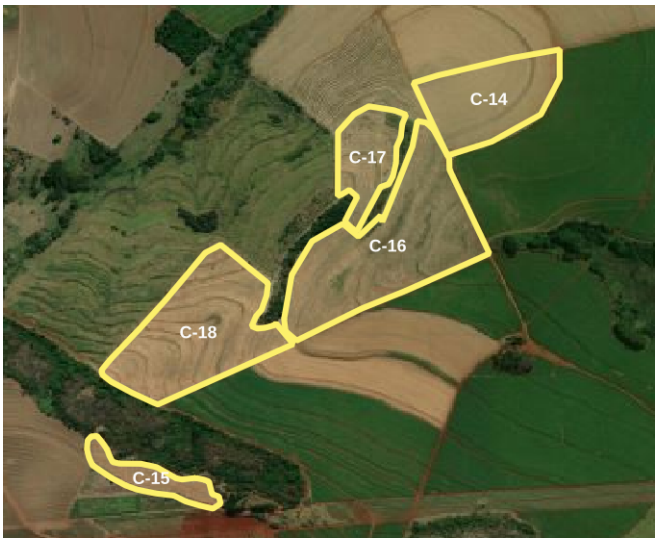

Figure S3**.** Location C in the Farm Aurora with five productions plots indicated as C-14 (5.75 ha), C-15 (1.27 ha), C-16 (11.68 ha), C-17 (2.48 ha), and C-18 (9.37 ha) during the harvest in 2022. São Paulo, Brazil.

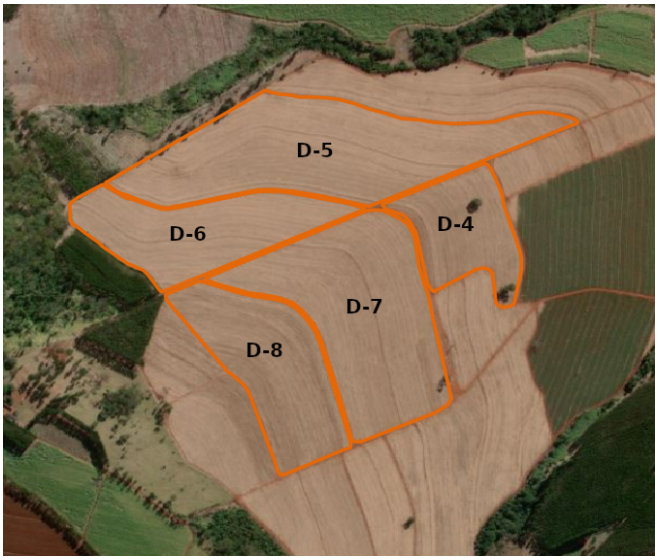

Figure S4**.** Location D in the Farm Boa Vista 6 with five productions plots indicated as D-4 (4.45 ha), D-5 (12.32 ha), D-6 (6.36 ha), D-7 (11.47 ha), and D-8 (7 ha) during the harvest in 2022. São Paulo, Brazil.

Figure S5. Location E in the Farm São Vicente with five productions plots indicated as E-1 (7.15 ha), E-2 (12.66 ha), E-3 (8.64 ha), E-4 (17.1 ha), and E-5 (8.78 ha) during the harvest in 2022. São Paulo, Brazil.

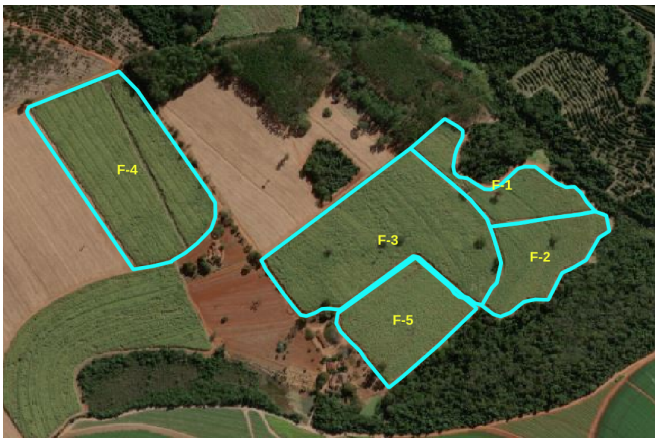

Figure S6. Location F in the Farm São Vicente 1 with five productions plots indicated as F-1 (2.81 ha), F-2 (2.65 ha), F-3 (8.1 ha), F-4 (8.29 ha), and F-5 (3.69 ha) during the harvest in 2022. São Paulo, Brazil.

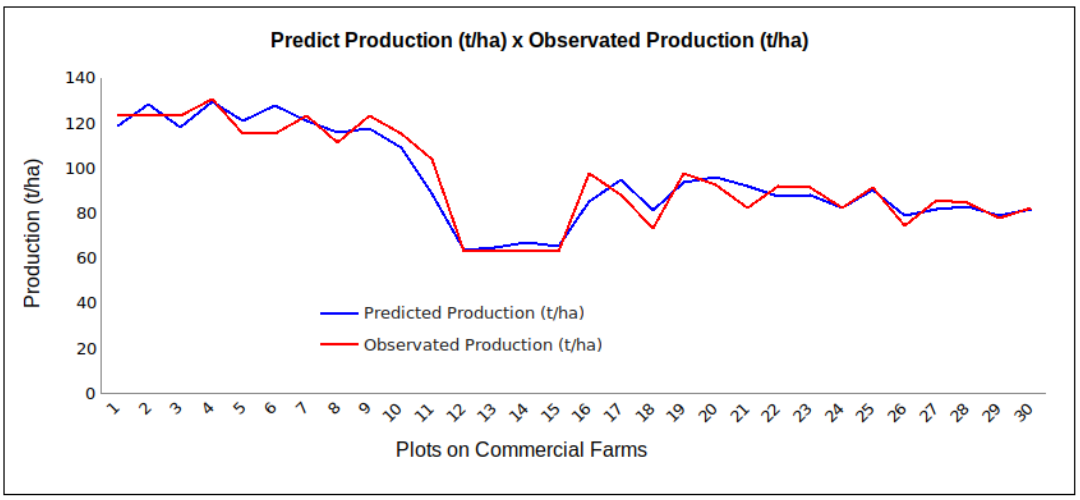

Figure S7. Graphic of data comparison between Predicted Production (blue line) and Observed Production (red line) for all plots tested during the model validation.

Table S1 – Data of observed production, NDVI, and VARI of two experimental fields (Field A and Field B) applied in the development of the sugarcane prediction model.

Experimental plot number	Sugarcane Variety	Block	Experimental Field	Production (t/ha)	NDVI	VARI
1	CV_0618	B1	B	105.56	0.82	0.44
2	CV_7870	B1	B	107.41	0.83	0.49
3	CV_0618	B1	B	124.07	0.83	0.42
4	CV_0618	B1	B	103.7	0.82	0.42
5	CV_7870	B1	B	166.67	0.82	0.42
6	CV_7870	B1	B	137.04	0.84	0.4
7	RB_966928	B1	B	112.96	0.84	0.4
8	CTC_1007	B1	B	109.26	0.84	0.4
9	RB_966928	B1	B	131.48	0.86	0.31
10	CTC_1007	B1	B	129.63	0.86	0.37
11	RB_966928	B1	B	131.48	0.82	0.3
12	CV_0618	B1	B	116.67	0.82	0.38
13	RB_966928	B1	B	144.44	0.83	0.31
14	CV_7870	B1	B	125.93	0.84	0.31
15	CV_0618	B1	B	103.7	0.84	0.34
16	RB_966928	B1	B	127.78	0.83	0.33
17	CV_7870	B1	B	103.7	0.77	0.33
18	CTC_1007	B1	B	109.26	0.83	0.42
19	CV_0618	B1	B	96.3	0.84	0.26
20	CV_0618	B1	B	94.44	0.83	0.31
21	CV_7870	B1	B	164.81	0.84	0.45
22	RB_966928	B1	B	142.59	0.83	0.49
23	CTC_1007	B1	B	153.7	0.83	0.47
24	CV_7870	B1	B	174.07	0.84	0.44
25	CTC_1007	B1	B	187.04	0.84	0.41

Experimental plot number	Sugarcane Variety	Block	Experimental Field	Production (t/ha)	NDVI	VARI
26	CTC_1007	B1	B	164.81	0.83	0.42
27	RB_966928	B1	B	124.07	0.85	0.36
28	CTC_1007	B1	B	120.37	0.84	0.37
29	RB_966928	B2	B	120.37	0.85	0.29
30	CV_7870	B2	B	118.52	0.88	0.29
31	CV_0618	B2	B	124.07	0.88	0.31
32	RB_966928	B2	B	118.52	0.83	0.31
33	CTC_1007	B2	B	168.52	0.82	0.35
34	CV_7870	B2	B	101.85	0.83	0.3
35	RB_966928	B2	B	116.67	0.83	0.26
36	CV_7870	B2	B	114.81	0.84	0.24
37	CV_7870	B2	B	114.81	0.83	0.25
38	CTC_1007	B2	B	122.22	0.82	0.35
39	CV_7870	B2	B	83.33	0.79	0.24
40	CV_0618	B2	B	81.48	0.72	0.25
41	RB_966928	B2	B	155.56	0.84	0.4
42	CV_7870	B2	B	177.78	0.85	0.48
43	CTC_1007	B2	B	142.59	0.84	0.46
44	RB_966928	B2	B	183.33	0.84	0.49
45	CV_0618	B2	B	164.81	0.85	0.44
46	RB_966928	B2	B	157.41	0.85	0.32
47	CV_0618	B2	B	159.26	0.84	0.21
48	CV_0618	B2	B	112.96	0.83	0.24
49	CTC_1007	B2	B	124.07	0.84	0.31
50	RB_966928	B2	B	111.11	0.84	0.25

Experimental plot number	Sugarcane Variety	Block	Experimental Field	Production (t/ha)	NDVI	VARI
51	CV_0618	B2	B	98.15	0.84	0.24
52	CTC_1007	B2	B	137.04	0.83	0.35
53	CTC_1007	B2	B	140.74	0.83	0.33
54	CV_7870	B2	B	105.56	0.83	0.25
55	CTC_1007	B2	B	133.33	0.83	0.36
56	CV_0618	B2	B	111.11	0.84	0.3
57	CV_7870	B3	B	135.19	0.84	0.34
58	CV_7870	B3	B	118.52	0.84	0.32
59	CV_0618	B3	B	92.59	0.84	0.29
60	RB_966928	B3	B	107.41	0.82	0.35
61	CV_7870	B3	B	155.56	0.85	0.44
62	RB_966928	B3	B	146.3	0.85	0.49
63	CTC_1007	B3	B	149.91	0.85	0.42
64	CTC_1007	B3	B	151.85	0.84	0.4
65	RB_966928	B3	B	155.56	0.85	0.38
66	CTC_1007	B3	B	150	0.84	0.42
67	RB_966928	B3	B	177.78	0.85	0.39
68	CV_7870	B3	B	175	0.85	0.26
69	CTC_1007	B3	B	150	0.84	0.35
70	CV_0618	B3	B	122.22	0.84	0.26
71	RB_966928	B3	B	105.56	0.88	0.28
72	CV_7870	B3	B	94.44	0.86	0.23
73	CV_0618	B3	B	94.44	0.78	0.16
74	CV_7870	B3	B	109.26	0.83	0.32
75	CV_0618	B3	B	114.81	0.85	0.31

Experimental plot number	Sugarcane Variety	Block	Experimental Field	Production (t/ha)	NDVI	VARI
76	CTC_1007	B3	B	116.67	0.82	0.29
77	RB_966928	B3	B	118.52	0.82	0.25
78	CV_0618	B3	B	87.04	0.83	0.28
79	CV_0618	B3	B	98.15	0.84	0.28
80	CTC_1007	B3	B	112.96	0.81	0.36
81	CV_0618	B3	B	165.37	0.84	0.36
82	RB_966928	B3	B	140.74	0.85	0.35
83	RB_966928	B3	B	168.52	0.85	0.32
84	CTC_1007	B3	B	140.74	0.84	0.32
85	CV_0618	B4	B	150	0.85	0.28
86	CTC_1007	B4	B	179.63	0.84	0.33
87	RB_966928	B4	B	111.11	0.83	0.34
88	CV_7870	B4	B	107.41	0.83	0.23
89	CV_0618	B4	B	112.96	0.84	0.23
90	CV_7870	B4	B	111.11	0.85	0.28
91	CTC_1007	B4	B	114.81	0.84	0.33
92	CTC_1007	B4	B	131.48	0.83	0.38
93	RB_966928	B4	B	103.7	0.83	0.36
94	CV_7870	B4	B	120.37	0.85	0.4
95	RB_966928	B4	B	107.41	0.83	0.28
96	CV_7870	B4	B	111.11	0.86	0.31
97	RB_966928	B4	B	101.85	0.83	0.31
98	RB_966928	B4	B	151.85	0.84	0.27
99	RB_966928	B4	B	157.41	0.85	0.29
100	CTC_1007	B4	B	140.74	0.84	0.26

Experimental plot number	Sugarcane Variety	Block	Experimental Field	Production (t/ha)	NDVI	VARI
101	CV_0618	B4	B	166.67	0.85	0.24
102	CV_0618	B4	B	137.04	0.83	0.2
103	CV_0618	B4	B	131.48	0.83	0.22
104	CV_7870	B4	B	137.04	0.82	0.18
105	RB_966928	B4	B	107.41	0.82	0.17
106	CV_0618	B4	B	100	0.81	0.1
107	CTC_1007	B4	B	116.67	0.82	0.26
108	CTC_1007	B4	B	125.93	0.82	0.36
109	CV_7870	B4	B	120.37	0.8	0.29
110	CV_7870	B4	B	116.67	0.8	0.29
111	CTC_1007	B4	B	116.67	0.83	0.35
112	CV_0618	B4	B	77.78	0.77	0.26
113	CV_0618	B1	A	120.48	0.8	0.64
114	CV_7870	B1	A	102.67	0.79	0.53
115	CV_0618	B1	A	75.64	0.76	0.44
116	CV_0618	B1	A	82.13	0.77	0.34
117	CV_7870	B1	A	79.2	0.76	0.39
118	CV_7870	B1	A	83.6	0.78	0.37
119	RB_966928	B1	A	85.28	0.79	0.41
120	CTC_1007	B1	A	111.68	0.8	0.68
121	RB_966928	B1	A	96.17	0.79	0.46
122	CTC_1007	B1	A	80.04	0.77	0.46
123	RB_966928	B1	A	74.38	0.78	0.36
124	CV_0618	B1	A	83.81	0.77	0.37
125	RB_966928	B1	A	77.52	0.76	0.3

Experimental plot number	Sugarcane Variety	Block	Experimental Field	Production (t/ha)	NDVI	VARI
126	CV_7870	B1	A	74.38	0.79	0.39
127	CV_0618	B1	A	139.33	0.8	0.55
128	RB_966928	B1	A	82.34	0.78	0.28
129	CV_7870	B1	A	59.71	0.76	0.21
130	CTC_1007	B1	A	89.68	0.79	0.58
131	CV_0618	B1	A	93.03	0.78	0.53
132	CV_0618	B1	A	79.83	0.78	0.44
133	CV_7870	B1	A	77.73	0.79	0.39
134	RB_966928	B1	A	117.96	0.81	0.41
135	CTC_1007	B1	A	103.71	0.78	0.43
136	CV_7870	B1	A	87.37	0.77	0.29
137	CTC_1007	B1	A	88.42	0.79	0.29
138	CTC_1007	B1	A	96.17	0.8	0.42
139	RB_966928	B1	A	86.95	0.78	0.34
140	CTC_1007	B1	A	105.81	0.8	0.37
141	RB_966928	B2	A	125.3	0.8	0.45
142	CV_7870	B2	A	68.72	0.77	0.26
143	CV_0618	B2	A	92.82	0.76	0.38
144	RB_966928	B2	A	80.67	0.75	0.34
145	CTC_1007	B2	A	87.37	0.78	0.6
146	CV_7870	B2	A	76.69	0.78	0.42
147	RB_966928	B2	A	77.1	0.77	0.39
148	CV_7870	B2	A	73.96	0.79	0.51
149	CV_7870	B2	A	70.19	0.77	0.32
150	CTC_1007	B2	A	84.44	0.78	0.54

Experimental plot number	Sugarcane Variety	Block	Experimental Field	Production (t/ha)	NDVI	VARI
151	CV_7870	B2	A	92.4	0.79	0.53
152	CV_0618	B2	A	93.24	0.78	0.44
153	RB_966928	B2	A	84.02	0.78	0.46
154	CV_7870	B2	A	72.08	0.77	0.31
155	CTC_1007	B2	A	124.04	0.79	0.61
156	RB_966928	B2	A	80.67	0.77	0.32
157	CV_0618	B2	A	96.17	0.79	0.55
158	RB_966928	B2	A	97.43	0.78	0.42
159	CV_0618	B2	A	82.13	0.8	0.3
160	CV_0618	B2	A	79.62	0.79	0.43
161	CTC_1007	B2	A	83.39	0.79	0.44
162	RB_966928	B2	A	103.71	0.79	0.44
163	CV_0618	B2	A	82.76	0.78	0.33
164	CTC_1007	B2	A	112.1	0.79	0.48
165	CTC_1007	B2	A	89.05	0.77	0.19
166	CV_7870	B2	A	76.9	0.77	0.1
167	CTC_1007	B2	A	82.55	0.79	0.32
168	CV_0618	B2	A	92.19	0.8	0.28
169	CV_7870	B3	A	76.48	0.78	0.33
170	CV_7870	B3	A	87.58	0.78	0.38
171	CV_0618	B3	A	88	0.77	0.35
172	RB_966928	B3	A	80.67	0.79	0.34
173	CV_7870	B3	A	86.53	0.79	0.44
174	RB_966928	B3	A	97.43	0.8	0.46
175	CTC_1007	B3	A	101.62	0.81	0.63

Experimental plot number	Sugarcane Variety	Block	Experimental Field	Production (t/ha)	NDVI	VARI
176	CTC_1007	B3	A	91.14	0.81	0.5
177	RB_966928	B3	A	75.43	0.79	0.31
178	CTC_1007	B3	A	89.05	0.8	0.47
179	RB_966928	B3	A	75.43	0.79	0.33
180	CV_7870	B3	A	76.9	0.8	0.41
181	CTC_1007	B3	A	89.05	0.8	0.45
182	CV_0618	B3	A	80.46	0.8	0.41
183	RB_966928	B3	A	72.91	0.8	0.42
184	CV_7870	B3	A	85.49	0.8	0.49
185	CV_0618	B3	A	84.65	0.8	0.48
186	CV_7870	B3	A	72.29	0.8	0.39
187	CV_0618	B3	A	91.14	0.8	0.49
188	CTC_1007	B3	A	99.1	0.81	0.5
189	RB_966928	B3	A	98.06	0.8	0.53
190	CV_0618	B3	A	85.9	0.81	0.42
191	CV_0618	B3	A	84.02	0.81	0.39
192	CTC_1007	B3	A	101.2	0.81	0.42
193	CV_0618	B3	A	88	0.8	0.35
194	RB_966928	B3	A	88.21	0.81	0.41
195	CV_7870	B3	A	76.48	0.81	0.41
196	CTC_1007	B3	A	110	0.81	0.53
197	CV_0618	B4	A	83.18	0.78	0.49
198	CTC_1007	B4	A	112.1	0.79	0.51
199	RB_966928	B4	A	88.21	0.79	0.39
200	CV_7870	B4	A	68.72	0.79	0.38

Experimental plot number	Sugarcane Variety	Block	Experimental Field	Production (t/ha)	NDVI	VARI
201	CV_0618	B4	A	84.02	0.8	0.47
202	CV_7870	B4	A	79.83	0.79	0.45
203	CTC_1007	B4	A	92.4	0.8	0.71
204	CTC_1007	B4	A	83.6	0.79	0.46
205	RB_966928	B4	A	103.71	0.79	0.41
206	CV_7870	B4	A	77.1	0.79	0.4
207	RB_966928	B4	A	87.58	0.79	0.45
208	CV_7870	B4	A	68.1	0.79	0.39
209	RB_966928	B4	A	76.69	0.79	0.5
210	RB_966928	B4	A	92.19	0.81	0.69
211	RB_966928	B4	A	83.39	0.79	0.4
212	CTC_1007	B4	A	104.76	0.79	0.46
213	CV_0618	B4	A	83.81	0.79	0.36
214	CV_0618	B4	A	77.1	0.78	0.37
215	CV_0618	B4	A	78.99	0.79	0.45
216	CV_7870	B4	A	70.61	0.79	0.42
217	RB_966928	B4	A	112.1	0.8	0.58
218	CV_0618	B4	A	75.22	0.8	0.42
219	CTC_1007	B4	A	92.82	0.8	0.32
220	CTC_1007	B4	A	89.05	0.8	0.43
221	CV_7870	B4	A	82.76	0.78	0.29
222	CV_7870	B4	A	79.62	0.8	0.39
223	CTC_1007	B4	A	82.76	0.79	0.43
224	CV_0618	B4	A	98.48	0.8	0.56

Table S2 – Data of predicted and observed production,NDVI, and VARI of six commercial locations and their plots, cultivated with sugarcane (Locations A to F). This data was used during the validation of the sugarcane prediction model.

Location	Farm name	Farm	Plot	Predicted (t/ha)	Observated (t/ha)	NDVI	VARI	Coordenates (lat/long)
1	Aurora	A	A-1	119.05	123.33	0.83	0.48	-21.81 -47.35
2	Aurora	A	A-2	128.54	123.30	0.85	0.49	-21.81 -47.36
3	Aurora	A	A-3	118.48	123.41	0.81	0.44	-21.82 -47.36
4	Aurora	A	A-4	129.86	130.78	0.78	0.37	-21.82 -47.36
5	Aurora	A	A-6	121.24	115.48	0.82	0.39	-21.81 -47.36
6	Aurora	B	B-7	128.06	115.48	0.81	0.35	-21.80 -47.35
7	Aurora	B	B-8	121.31	123.62	0.82	0.36	-21.80 -47.35
8	Aurora	B	B-9	115.88	111.28	0.83	0.48	-21.80 -47.35
9	Aurora	B	B-10	117.56	123.61	0.85	0.48	-21.80 -47.35
10	Aurora	B	B-12	109.35	115.48	0.84	0.44	-21.80 -47.35
11	Aurora	C	C-14	88.97	104.09	0.80	0.32	-21.81 -47.35
12	Aurora	C	C-15	63.86	63.42	0.85	0.49	-21.82 -47.36
13	Aurora	C	C-16	64.74	63.18	0.77	0.33	-21.81 -47.35
14	Aurora	C	C-17	66.99	63.07	0.81	0.42	-21.81 -47.36
15	Aurora	C	C-18	65.7	63.27	0.82	0.44	-21.81 -47.36
16	Boa Vista 6	D	D-4	85.1	97.90	0.82	0.40	-21.59 -47.17
17	Boa Vista 6	D	D-5	95.12	88.13	0.80	0.33	-21.59 -47.17
18	Boa Vista 6	D	D-6	81.2	73.42	0.84	0.42	-21.59 -47.17
19	Boa Vista 6	D	D-7	93.62	97.91	0.79	0.34	-21.60 -47.17
20	Boa Vista 6	D	D-8	95.87	93.01	0.78	0.31	-21.60 -47.17

Location	Farm name	Farm	Plot	Predicted (t/ha)	Observated (t/ha)	NDVI	VARI	Coordenates (lat/long)
21	Sao Vicente	E	E-1	92.2	82.54	0.82	0.39	-21.58 -47.14
22	Sao Vicente	E	E-2	87.64	92.00	0.82	0.39	-21.59 -47.15
23	Sao Vicente	E	E-3	88.29	91.64	0.84	0.47	-21.58 -47.15
24	Sao Vicente	E	E-4	82.61	82.33	0.81	0.40	-21.58 -47.14
25	Sao Vicente	E	E-5	90.2	91.64	0.81	0.47	-21.58 -47.14
26	Sao Vicente 1	F	F-1	78.9	74.44	0.85	0.11	-21.58 -47.13
27	Sao Vicente 1	F	F-2	82.07	85.92	0.86	0.12	-21.58 -47.13
28	Sao Vicente 1	F	F-3	83.03	84.72	0.84	0.13	-21.58 -47.14
29	Sao Vicente 1	F	F-4	78.91	77.83	0.81	0.11	-21.58 -47.14
30	Sao Vicente 1	F	F-5	82	82.38	0.83	0.11	-21.58 -47.13