

# Assessment of Burned Area During the 2020 Pantanal Fire Crisis Using Sentinel-2 Images

Yosio Edemir Shimabukuro <sup>1,\*</sup>, Gabriel de Oliveira <sup>2</sup>, Gabriel Pereira <sup>3,4</sup>, Egidio Arai <sup>1</sup>, Francielle Cardozo <sup>5</sup>, Andeise Cerqueira Dutra <sup>1</sup> and Guilherme Mataveli <sup>1</sup>

<sup>1</sup> Earth Observation and Geoinformatics Division, National Institute for Space Research, São José dos Campos 12227-010, Brazil; egidio.arai@inpe.br (E.A.); andeise.dutra@inpe.br (A.C.D.); mataveli@alumni.usp.br (G.M.)

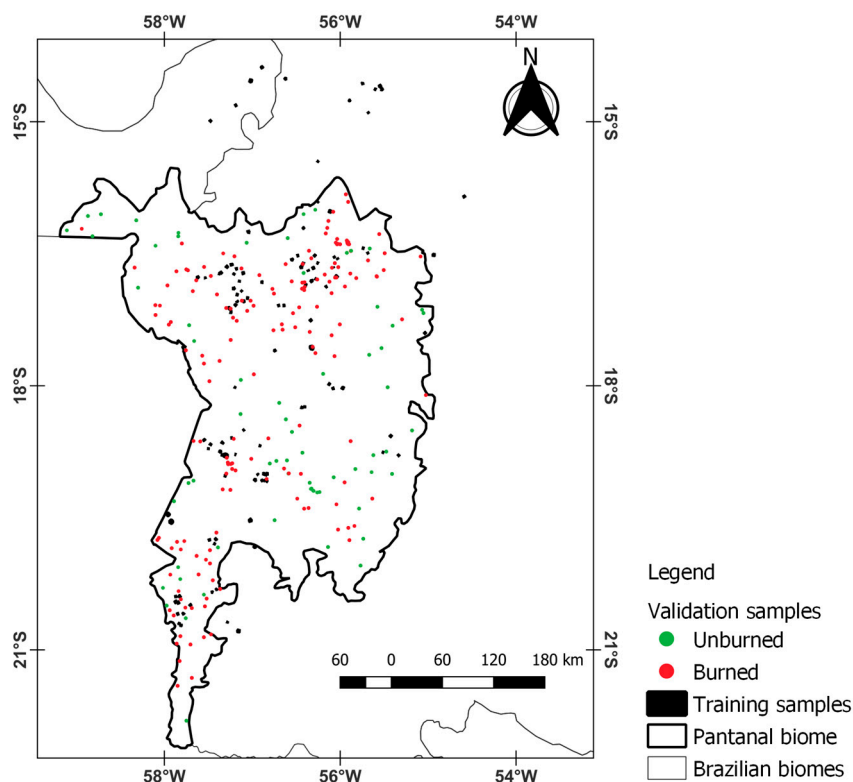
<sup>2</sup> Department of Earth Sciences, University of South Alabama, Mobile, AL 36688, USA; deoliveira@southalabama.edu

<sup>3</sup> Department of Geosciences, Federal University of São João del-Rei, São João del-Rei 36307-352, Brazil; pereira@ufsj.edu.br

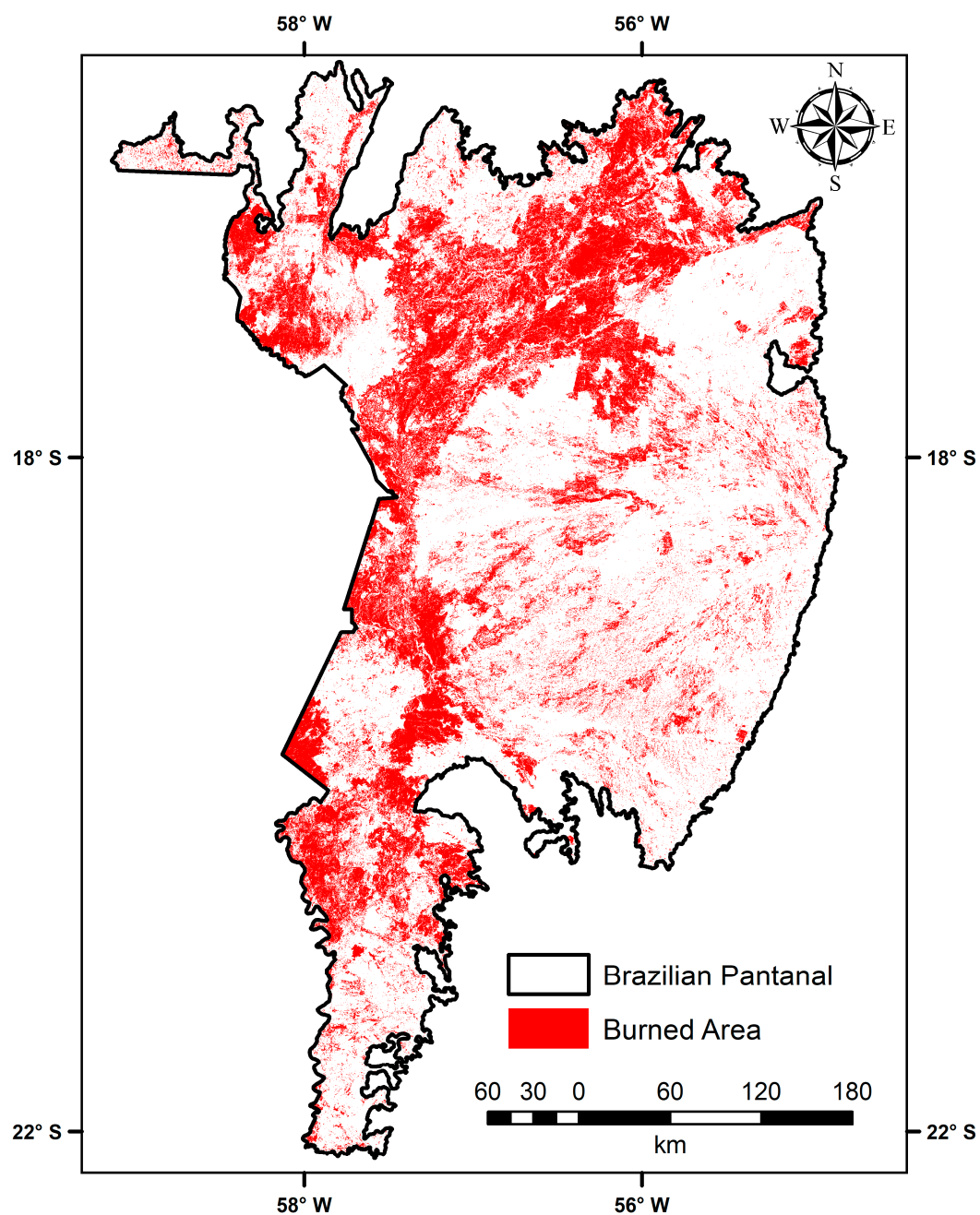
<sup>4</sup> Department of Geography, University of São Paulo, São Paulo 05508-000, Brazil

<sup>5</sup> Graduate Program in Geography, Federal University of São João del-Rei, São João del-Rei 36301-360, Brazil; franciellecadozo@ufsj.edu.br

\* Correspondence: yosio.shimabukuro@inpe.br; Tel.: +55-12-3208-6483



**Figure S1.** Spatial distribution of training (black polygons) and validation samples from burned (red dots) and unburned (green dots) areas in 2020 across the Pantanal biome, Brazil. Training and validation samples are separate datasets, representing 115 and 194 samples, respectively, without any overlay. Note that the representation has been enlarged to enhance visualization.



**Figure S2.** Spatial distribution of the burned area mapped in the Brazilian Pantanal biome during the 2020 fire crisis using MSI sensor images onboard the Sentinel-2 satellites.

**Table S1.** Confusion matrix based on the validation samples (reference) and the MapBiomass Fogo BA classification for the year 2020 (prediction) showing the overall accuracy (OA), confidence interval (CI), producer accuracy (PA) and user accuracy (UA).

		<i>Prediction</i>		<b>Total</b>	<b>UA (%)</b>
		<b>Not Burned</b>	<b>Burned</b>		
<i>Refer- ence</i>	Not Burned	48	3	51	94.1
	Burned	63	80	143	55.9
	<b>Total</b>	111	83	194	
	<b>PA (%)</b>	43.2	96.4		
<b>OA, 95% CI (%)</b>		65.9, 58.8 – 72.6 (p-value > 0.05)			
<b>Precision</b>		0.94			
<b>Recall</b>		0.43			

**Table S2.** Confusion matrix based on the validation samples (reference) and the MCD64A1 BA classification for the year 2020 (prediction) showing the overall accuracy (OA), confidence interval (CI), producer accuracy (PA) and user accuracy (UA).

		<i>Prediction</i>		<b>Total</b>	<b>UA (%)</b>
		<b>Not Burned</b>	<b>Burned</b>		
<i>Refer- ence</i>	Not Burned	46	5	51	90.2
	Burned	52	91	143	63.6
	<b>Total</b>	98	96	194	
	<b>PA (%)</b>	46.9	94.8		
<b>OA, 95% CI (%)</b>		70.6, 63.7 – 76.9 (p-value < 0.05)			
<b>Precision</b>		0.90			
<b>Recall</b>		0.46			

**Table S3.** Confusion matrix based on the validation samples (reference) and the GABAM Fire BA classification for the year 2020 (prediction) showing the overall accuracy (OA), confidence interval (CI), producer accuracy (PA) and user accuracy (UA).

		<i>Prediction</i>		<b>Total</b>	<b>UA (%)</b>
		<b>Not Burned</b>	<b>Burned</b>		
<i>Refer- ence</i>	Not Burned	49	2	51	96.1
	Burned	86	57	143	39.9
	<b>Total</b>	135	59	194	
	<b>PA (%)</b>	36.3	96.6		
<b>OA, 95% CI (%)</b>		54.6, 47.3 – 61.8 (p-value > 0.05)			
<b>Precision</b>		0.96			
<b>Recall</b>		0.36			

**Table S4.** Confusion matrix based on the validation samples (reference) and the Fire\_cci BA classification for the year 2020 (prediction) showing the overall accuracy (OA), confidence interval (CI), producer accuracy (PA) and user accuracy (UA).

		<i>Prediction</i>		<b>Total</b>	<b>UA (%)</b>
		<b>Not Burned</b>	<b>Burned</b>		
<i>Refer- ence</i>	Not Burned	45	6	51	88.2
	Burned	40	103	143	72.0
	<b>Total</b>	85	109	194	
<b>PA (%)</b>		52.9	94.5		
<b>OA, 95% CI (%)</b>		76.3, 69.7 – 82.1 (p-value < 0.05)			
<b>Precision</b>		0.88			
<b>Recall</b>		0.52			