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The use of Sentinel-2 images to identify *Eragrostis plana* invasion in Pampa biome rangelands

Presented by: ELIANA LIMA DA FONSECA

Institution/Country: UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL - BRAZIL

Email: eliana.fonseca@ufrgs.br

Session Name: ECOSYSTEMS

Date: Wednesday, August 8 – Afternoon



Sentinel-2 images to identify *Eragrostis plana* invasion in Pampa biome

Eragrostis plana invasion

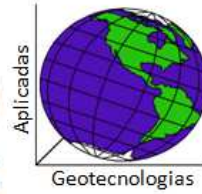
- *Eragrostis plana* is also called “Capim Annoni” or “Lovegrass”
- The biological invasions are a phenomenon recognized as one of the greatest threats to the planet's biodiversity.
- The use of satellite images for mapping the occurrence of invasive species *Eragrostis plana* Nees in rangelands areas of the Pampa biome presents a high degree of difficulty due to this species having anatomy, morphology and phenology similar to most native species.



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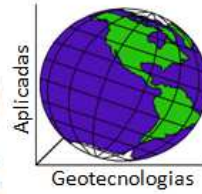




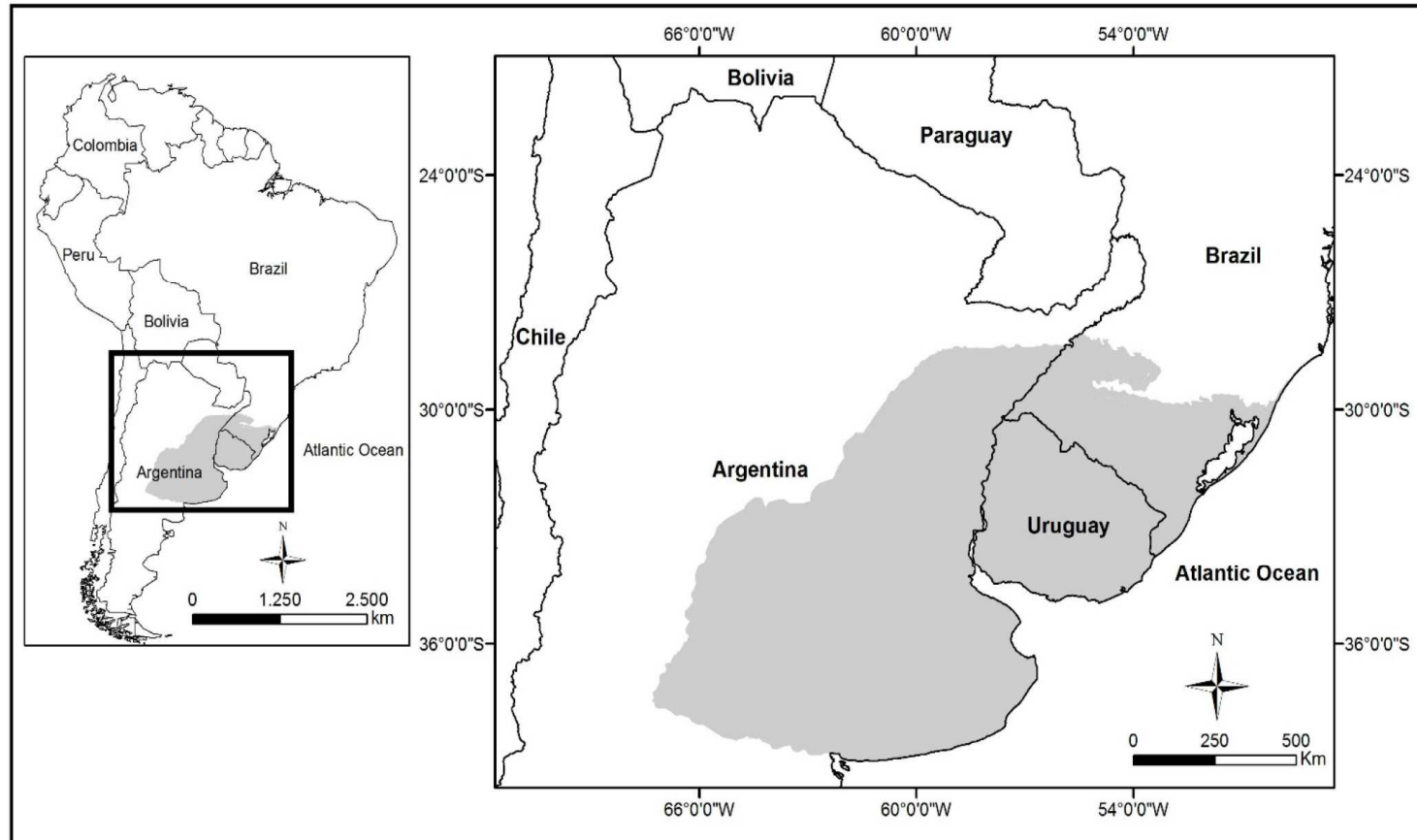
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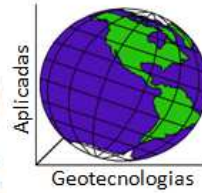
Pampa biome



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Objectives:

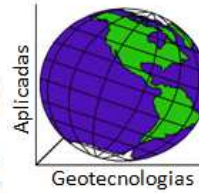
The objective of this work was to identify and classify the areas invaded with *E.plana* in Pampa biome using the Sentinel-2 satellite images.



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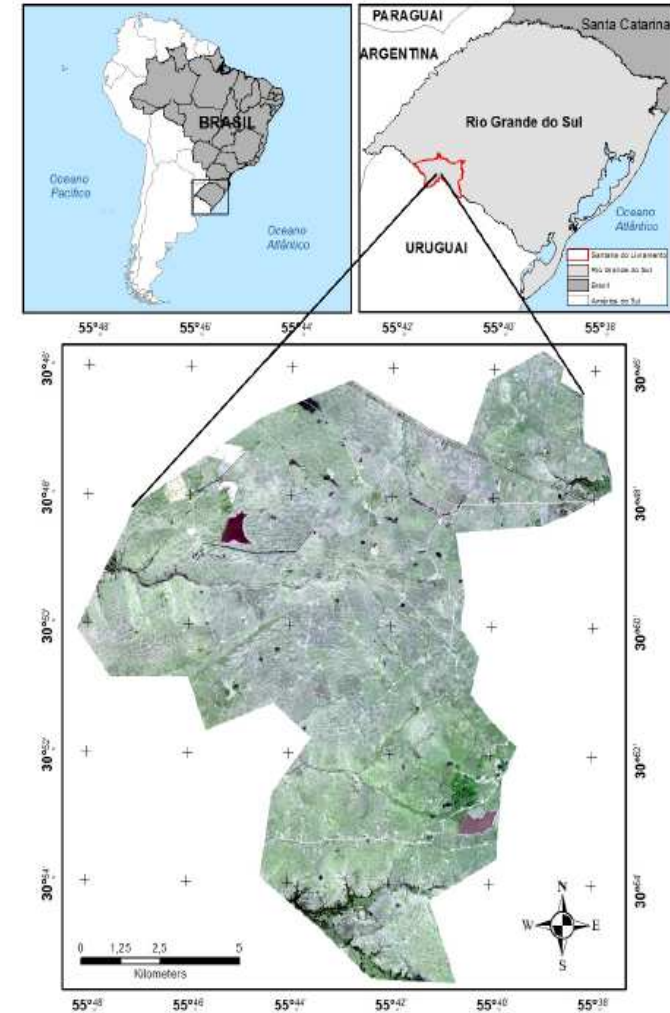


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- The study area:

- 15,000 hectares
- Cerro Chato Wind Farms
- Santana do Livramento municipality, Rio Grande do Sul state, Brazil

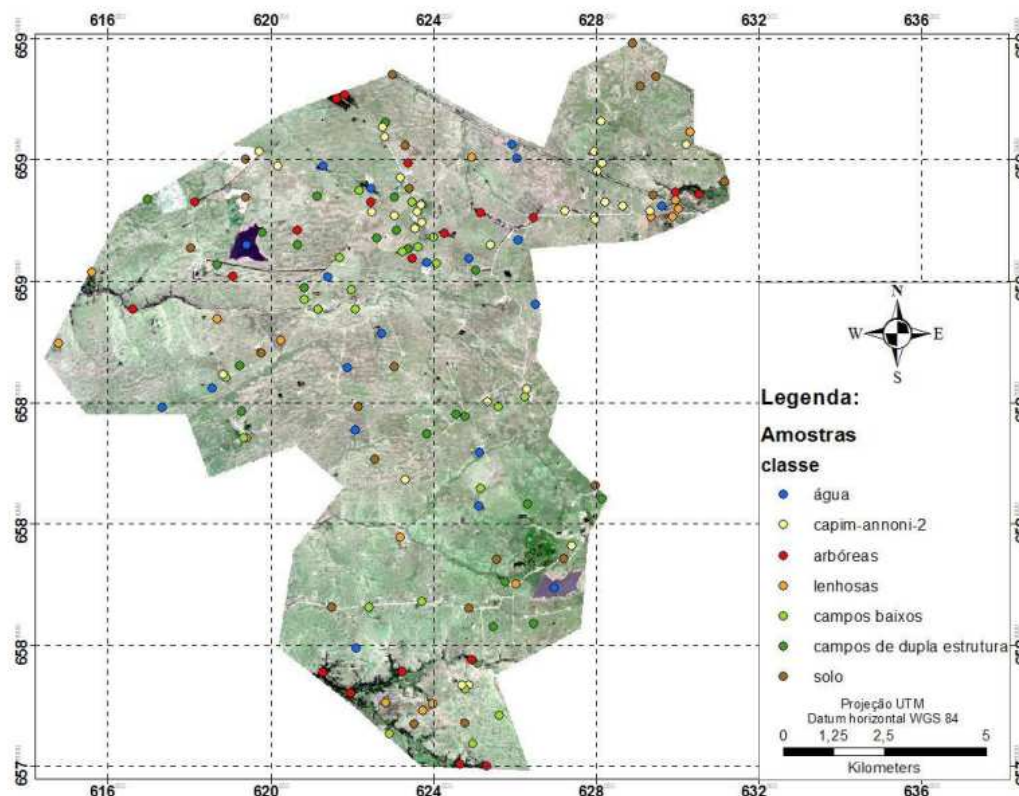


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Fieldwork 154 samples

Land Cover Classes:

- Water
- E. Plana
- Trees
- Mosaic trees-rangelands
- Rangelands
- Rangelands (cespitosus)
- Soil





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Image processing

- Sentinel 2A level 1C / 17 **March** 2016 / TOA reflectance
 - # March -> end of the main growth season
 - # differences in spectral response pattern between invaded and non invaded areas
 - # the cattle avoid *E.plana*, due its high levels of lignin
- Extration and Classification of Homogeneous Objects (ECHO) - software Multispec 3.2
- Two datasets:
 1. B2 - 490nm, B3 -560nm, B4 - 665nm, B8 - 842nm -> **10m**
 2. Dataset 1 + B5 - 705nm, B6 - 740nm, B7 - 783nm, B8a- 865 nm, B11 - 1610nm, B12 - 2190nm -> **20m**

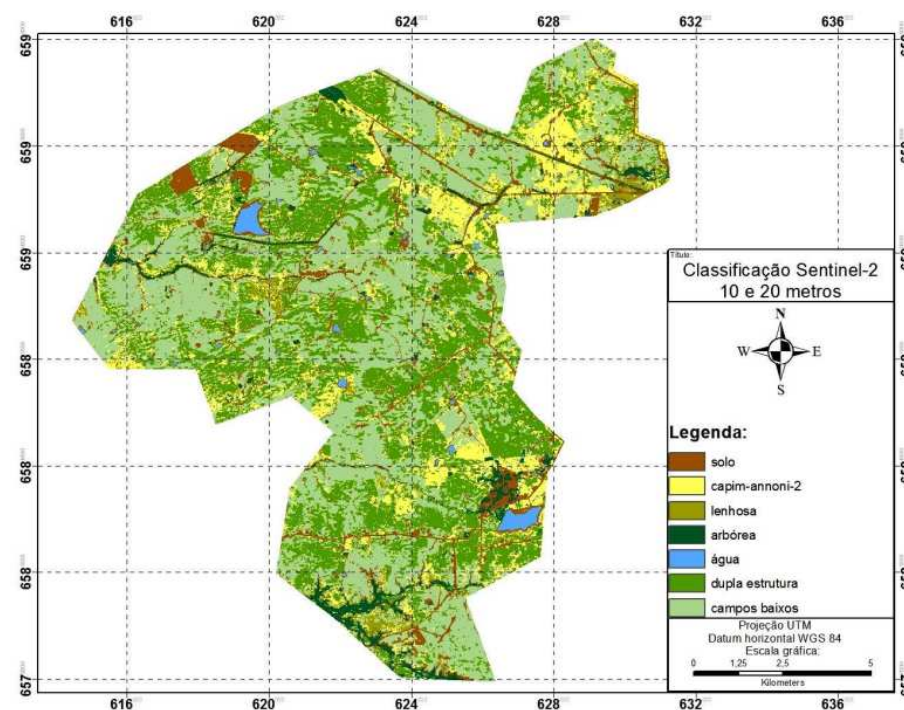
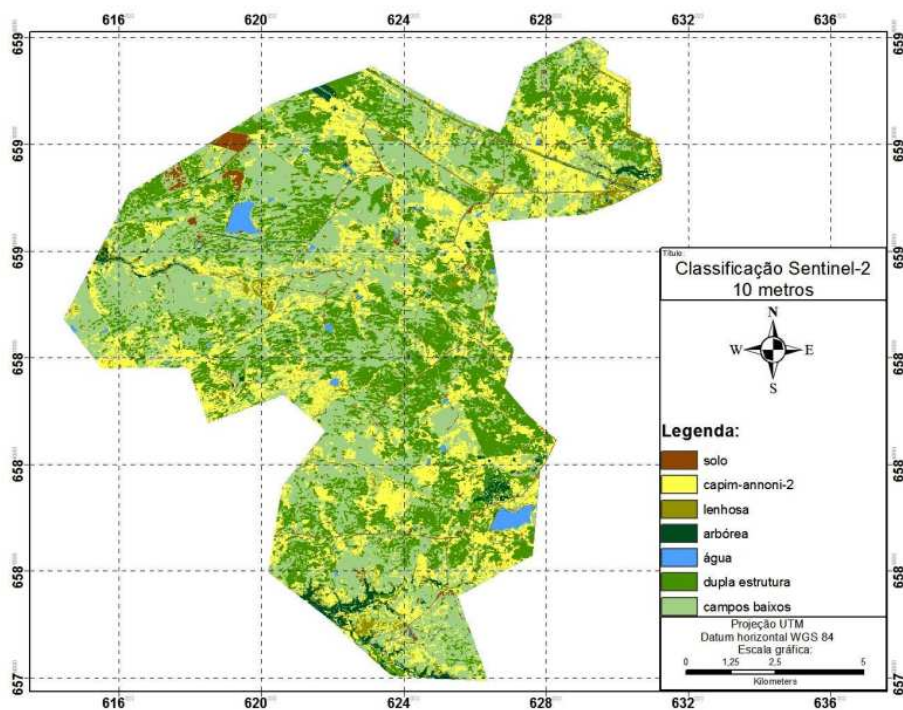


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Results

- Our results showed that overall classification performance was improved with more spectral bands, especially those located in the red edge region, which allow separated the invaded and non invaded areas with *E.plana*, despite of bands spatial resolution.

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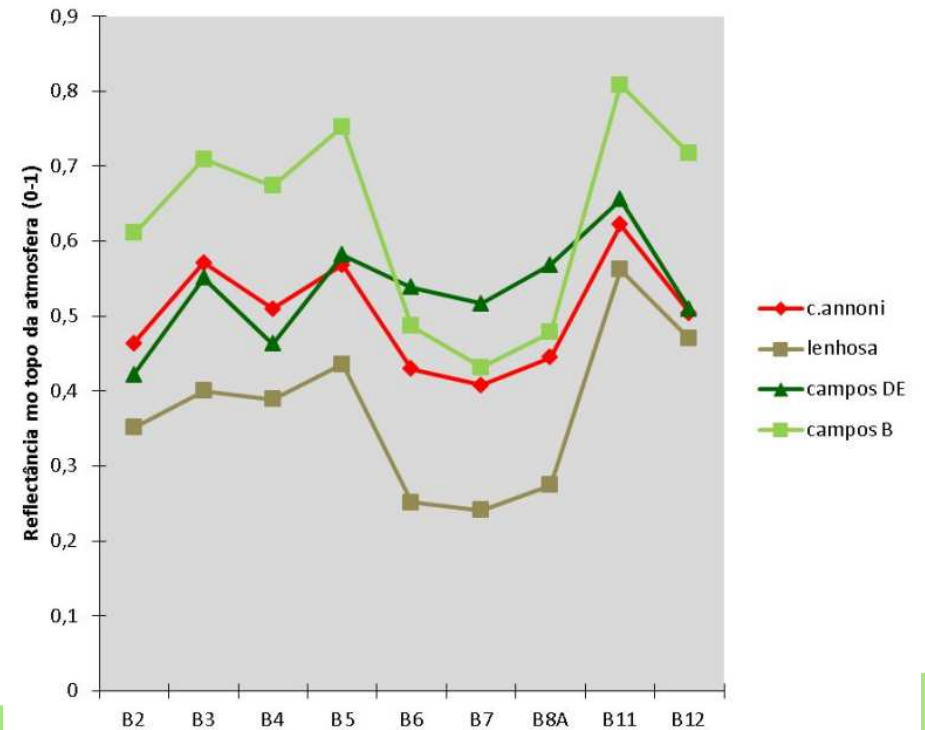
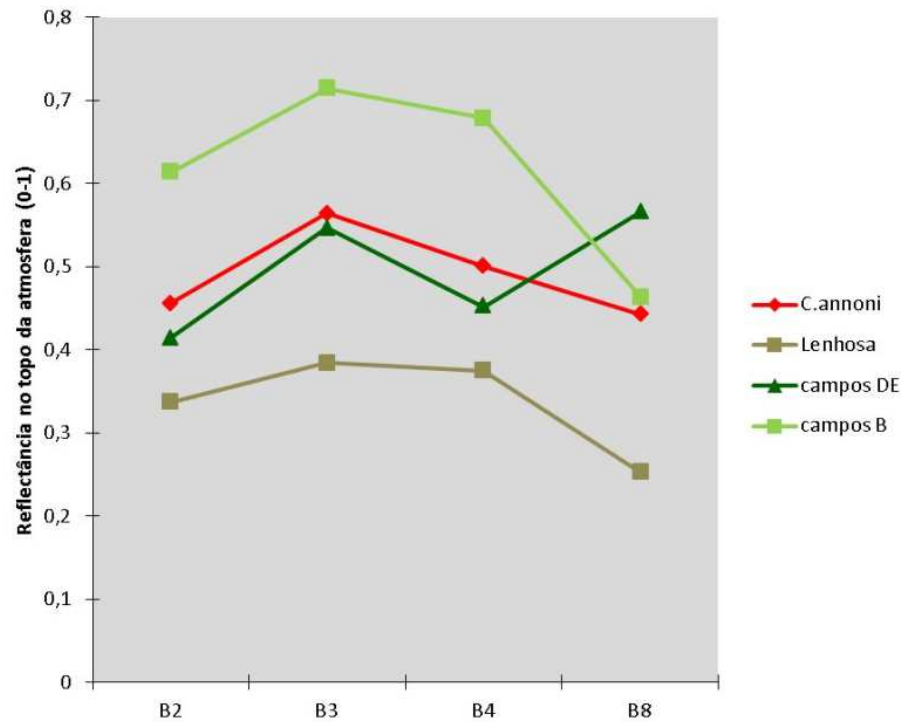
Tabela 5 – Matriz de confusão da classificação da imagem 10 metros.

Classe	Solo	C.annoni	Lenhosa	Arbóreo	Água	Campos DE	Campos B	Total
Solo	20	0	0	0	2	0	0	22
C.annoni	0	20	0	0	0	4	6	30
Lenhosa	0	2	13	1	0	0	0	16
Arbóreo	0	0	0	16	2	0	0	18
Água	0	0	0	0	19	0	0	19
Campos DE	0	6	0	0	0	14	4	24
Campos B	0	4	0	0	0	3	18	25
								154
TOTAL	20	32	13	17	23	21	28	
Acur. Usuário	100%	62,50%	100%	94,10%	82,60%	66,70%	64,30%	
Acur. Produtor	90,90%	66,70%	81,30%	88,90%	100%	58,30%	72,00%	
Acurácia global (120 / 154) = 77,9%								Kappa (x100)= 74,0%

Tabela 6 – Matriz de confusão da classificação da imagem 10 e 20 metros.

Classe	Solo	C.annoni	Lenhosa	Arbóreo	Água	Campos DE	Campos B	Total
Solo	21	0	0	0	1	0	0	22
C.annoni	2	24	0	0	0	4	0	30
Lenhosa	0	2	12	1	0	1	0	16
Arbóreo	0	0	0	18	0	0	0	18
Água	0	0	0	0	19	0	0	19
Campos DE	0	2	0	0	0	20	2	24
Campos B	2	0	0	0	0	3	20	25
								154
TOTAL	25	28	12	19	20	28	22	
Acur. Usuário	84,00%	85,70%	100%	94,70%	95,00%	71,40%	90,90%	
Acur. Produtor	95,50%	80,00%	75,00%	100%	100%	83,30%	80,00%	
Acurácia global (134 / 154) = 87,0%								Kappa (x100)= 84,7%

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Beneficiaries

Or final users

The total area invaded by *E.plana* is unknown.

- Decision makers
- Ecologists
- Farmers



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Moving forward

- Combine these results with others results that we have for this same species in order to map the *E.plana* invasion in Pampa biome using GEE.



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How can your project

Institution collaborate with AmeriGEOSS?

- Capacity building:

Graduate course in Remote Sensing (PPGSR) with Master and Doctor degree in Remote Sensing at Rio Grande do Sul Federal University



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Thanks!

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DANIEL FERNANDES GOMES , ELIANA LIMA DA FONSECA
UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL - BRAZIL

eliana.fonseca@ufrgs.br