



Disciplina: SER 300 - Introdução ao Geoprocessamento

Atividade 2: Data Access

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I) Buscar (ex. Catálogo da INDE) pelo menos dois conjuntos de dados de interesse para o seu trabalho indicando como estão disponíveis para acesso.

- **Quais serviços? Quais as URL's dos serviços?**

a) 1º Conjunto de dados escolhido foi o de “Estação pluviométrica (dados consistidos e brutos)” disponibilizado pela ANA - Agência Nacional de Águas e Saneamento Básico para a mesorregião Sul de Goiás, cujo retângulo envolvente (*bounding box*) é formado pelos pontos aproximados a duas casas decimais (-53.25L, -19.50N) e (-47.12L, -14.97N). O provedor oferece esse conjunto através do serviço:

- WMS (Web Map Service)

<https://www.snirh.gov.br/arcgis/services/INDE/Camadas/MapServer/WMS/Server?service=WMS&version=1.1.0&request=GetMap&layers=48&styles=&bbox=-53.25,-19.50,-47.12,-14.97&width=249&height=245&tiled=true&srs=EPSG:4326&format=image/png&transparent=true>

b) O 2º Conjunto de dados foi o “Mapa de teor de areia do solo a 0-5 cm do Brasil na resolução espacial de 90 m – Versão 2021” disponibilizado pela EMBRAPA Solos - Empresa Brasileira de Pesquisa Agropecuária para a mesorregião Sul de

Goiás, cujo retângulo envolvente é o mesmo informado para o 1º conjunto de dados: (-53.25L, -19.50N) e (-47.12L, -14.97N). O provedor oferece esse conjunto através do serviço:

- WMS (Web Map Service)

https://geoinfo.cnps.embrapa.br/geoserver/ows?service=WMS&version=1.1.0&request=GetMap&layers=geonode:br_90m_sand_content_0_5cm_pred&styles=&bbox=-53.25,-19.50,-47.12,-14.97&width=296&height=245&tiled=true&srs=EPSG:4326&format=image/png&transparent=true

II) Interagir com o serviço STAC disponível em <https://data.inpe.br/>

- **Identificar quais as coleções são oferecidas**

a) Ao acessar <https://data.inpe.br/>, é possível visualizar as 20 (vinte) coleções oferecidas, são elas:

1. AMAZONIA-1/WFI - Level-4-SR - Cloud Optimized GeoTIFF
<https://data.inpe.br/stac/browser/collections/AMZ1-WFI-L4-SR-1>
2. CBERS-4/MUX - Level-4-SR - Cloud Optimized GeoTIFF
<https://data.inpe.br/stac/browser/collections/CB4-MUX-L4-SR-1>
3. CBERS-4/MUX - Level-4-SR - Data Cube - LCF 2 months
<https://data.inpe.br/stac/browser/collections/CBERS4-MUX-2M-1>
4. CBERS-4/WFI - Level-4-SR - Cloud Optimized GeoTIFF
<https://data.inpe.br/stac/browser/collections/CB4-WFI-L4-SR-1>
5. CBERS-4/WFI - Level-4-SR - Data Cube - LCF 16 days
<https://data.inpe.br/stac/browser/collections/CBERS4-WFI-16D-1>
6. CBERS-4A/WFI - Level-4-SR - Cloud Optimized GeoTIFF

- <https://data.inpe.br/stac/browser/collections/CB4A-WFI-L4-SR-1>
7. CBERS-4A/WPM - Multispectral and Panchromatic Bands Fused
<https://data.inpe.br/stac/browser/collections/CB4A-WPM-PCA-FUSED-1>
 8. CBERS/WFI - Level-4-SR - Data Cube - LCF 8 days
<https://data.inpe.br/stac/browser/collections/CBERS-WFI-8D-1>
 9. GOES-16 Cloud & Moisture Imagery
<https://data.inpe.br/stac/browser/collections/GOES16-L2-CMI-1>
 10. Landsat Collection 2 - Level-2
<https://data.inpe.br/stac/browser/collections/landsat-2>
 11. Landsat Collection 2 - Level-2 - Data Cube - LCF 16 days
<https://data.inpe.br/stac/browser/collections/LANDSAT-16D-1>
 12. MOD13Q1 v006 - Cloud Optimized GeoTIFF
<https://data.inpe.br/stac/browser/collections/mod13q1-6.0>
 13. MYD13Q1 v006 - Cloud Optimized GeoTIFF
<https://data.inpe.br/stac/browser/collections/myd13q1-6.0>
 14. Sentinel-1 - Level-1 - Interferometric Wide Swath Ground Range Detected
High Resolution
<https://data.inpe.br/stac/browser/collections/sentinel-1-grd-bundle-1>
 15. Sentinel-2 - Level-1C
https://data.inpe.br/stac/browser/collections/S2_L1C_BUNDLE-1
 16. Sentinel-2 - Level-2A
https://data.inpe.br/stac/browser/collections/S2_L2A_BUNDLE-1

17. Sentinel-2 - Level-2A - Cloud Optimized GeoTIFF

https://data.inpe.br/stac/browser/collections/S2_L2A-1

18. Sentinel-2 Image Mosaic of Brazilian Cerrado Biome - 2 Months

<https://data.inpe.br/stac/browser/collections/mosaic-s2-cerrado-2m-1>

19. Sentinel-2/MSI - Level-2A - Data Cube - LCF 16 days

<https://data.inpe.br/stac/browser/collections/S2-16D-2>

20. Sentinel-3/OLCI - Level-1B Full Resolution

<https://data.inpe.br/stac/browser/collections/sentinel-3-olci-l1-bundle-1>

As coleções podem ser visualizadas no site conforme **Figura 1**.

Figura 1: Coleções do serviço STAC do INPE

AMAZONIA-1/WFI - Level-4-SR - Cloud Optimized GeoTIFF AMAZONIA-1/WFI Surface Reflectance product over Brazil. L4 SR product provides orthorectified surface reflectance images. This dataset is provided as Cloud Optimized GeoTIFF (COG). 1/1/2024, 12:00:00 AM UTC - 3/31/2024, 12:00:00 AM UTC	CBERS-4A/WFI - Level-4-SR - Cloud Optimized GeoTIFF CBERS-4A/WFI Surface Reflectance product over Brazil. L4 SR product provides orthorectified surface reflectance images. This dataset is provided as Cloud Optimized GeoTIFF (COG). 3/1/2023, 12:00:00 AM UTC - 3/31/2024, 12:00:00 AM UTC	Landsat Collection 2 - Level-2 - Data Cube - LCF 16 days Earth Observation Data Cube generated from Landsat Level-2 product over Brazil extension. This dataset is provided in Cloud Optimized GeoTIFF (COG) file format. The dataset is processed with 3... 1/1/2015, 12:00:00 AM UTC - 12/31/2020, 12:00:00 AM UTC	Sentinel-2 - Level-2A Copernicus Sentinel-2/MSI Level-2A product over Brazil. Level-2A product provides orthorectified surface reflectance images (Bottom-Of-Atmosphere - BOA). 8/19/2021, 20:04:09 PM UTC - 4/18/2024, 2:57:31 PM UTC
CBERS-4/MUX - Level-4-SR - Cloud Optimized GeoTIFF CBERS-4/MUX Surface Reflectance product over Brazil. L4 SR product provides orthorectified surface reflectance images. This dataset is provided as Cloud Optimized GeoTIFF (COG). 7/1/2023, 12:00:00 AM UTC - 3/31/2024, 12:00:00 AM UTC	CBERS-4A/WPM - Multispectral and Panchromatic Bands Fused This collection contains 2 meter high-resolution, RGB products, generated using the Principal Components Fusion (PCA) method, with values coded between 1 and 255, with 0 being reserved for 'No Data'... 3/3/2023, 3:00:00 AM UTC - 3/30/2024, 12:00:00 AM UTC	MOD13Q1 v006 - Cloud Optimized GeoTIFF The Terra Moderate Resolution Imaging Spectroradiometer (MODIS) Vegetation Indices (MOD13Q1) Version 6.0 data are generated every 16 days at 250 meter (m) spatial resolution as a Leve... 2/18/2000, 12:00:00 AM UTC - 2/2/2023, 12:00:00 AM UTC	Sentinel-2 - Level-2A - Cloud Optimized GeoTIFF Copernicus Sentinel-2/MSI Level-2A product over Brazil. Level-2A product provides orthorectified surface reflectance images (Bottom-Of-Atmosphere - BOA). This dataset is provided as Cloud... 1/1/2023, 11:23:39 PM UTC - 4/18/2024, 2:57:31 PM UTC
CBERS-4/MUX - Level-4-SR - Data Cube - LCF 2 months Earth Observation Data Cube generated from CBERS-4/MUX Level-4 SR product over Brazil extension. This dataset is provided in Cloud Optimized GeoTIFF (COG) file format. The dataset is processed... 1/1/2024, 12:00:00 AM UTC - 12/31/2024, 12:00:00 AM UTC	CBERS/WFI - Level-4-SR - Data Cube - LCF 8 days Earth Observation Data Cube generated from CBERS-4/WFI and CBERS-4A/WFI Level-4 SR products over Brazil extension. This dataset is provided in Cloud Optimized GeoTIFF (COG) file format. The dataset... 1/1/2023, 12:00:00 AM UTC - 1/24/2024, 12:00:00 AM UTC	MYD13Q1 v006 - Cloud Optimized GeoTIFF The Aqua Moderate Resolution Imaging Spectroradiometer (MODIS) Vegetation Indices (MYD13Q1) Version 6.0 data are generated every 16 days at 250 meter (m) spatial resolution as a Leve... 7/4/2002, 12:00:00 AM UTC - 2/25/2023, 12:00:00 AM UTC	Sentinel-2 Image Mosaic of Brazilian Cerrado Biome - 2 Months Sentinel-2 image mosaic of Brazilian Cerrado biome with 10m of spatial resolution. The mosaic was prepared in support of TerraClass project. The false color composition is based on the MSI bands 8, 4... 11/1/2023, 12:00:00 AM UTC - 2/29/2024, 12:00:00 AM UTC
CBERS-4/WFI - Level-4-SR - Cloud Optimized GeoTIFF CBERS-4/WFI Surface Reflectance product over Brazil. L4 SR product provides orthorectified surface reflectance images. This dataset is provided as Cloud Optimized GeoTIFF (COG). 1/1/2023, 12:00:00 AM UTC - 3/31/2024, 12:00:00 AM UTC	GOES-16 Cloud & Moisture Imagery The GOES-16 Advanced Baseline Imager (ABI) L2 Cloud and Moisture Imagery provides 16 spectral bands with high temporal resolution over the American continent. The significance of the GOES... 4/8/2024, 12:00:00 AM UTC - 4/8/2024, 11:50:00 PM UTC	Sentinel-1 - Level-1 - Interferometric Wide Swath Ground Range Detected High Resolution Copernicus Sentinel-1 Level-1 Ground Range Detected (GRD) products consist of focused SAR data that has been detected, multi-looked and projected to ground range using an Earth ellipsoid mode... 11/2/2021, 8:20:40 AM UTC - 4/18/2024, 9:43:57 PM UTC	Sentinel-2/MSI - Level-2A - Data Cube - LCF 16 days Earth Observation Data Cube generated from Copernicus Sentinel-2/MSI Level-2A product over Brazil. This dataset is provided in Cloud Optimized GeoTIFF (COG) file format. The dataset is processed... 1/1/2019, 12:00:00 AM UTC - 4/5/2024, 12:00:00 AM UTC
CBERS-4/WFI - Level-4-SR - Data Cube - LCF 16 days Earth Observation Data Cube generated from CBERS-4/WFI Level-4 SR product over Brazil extension. This dataset is provided in Cloud Optimized GeoTIFF (COG) file format. The dataset is processed... 1/1/2016, 12:00:00 AM UTC - 1/16/2024, 12:00:00 AM UTC	Landsat Collection 2 - Level-2 Landsat Collection 2 Level-2 Science Products (https://www.usgs.gov/landsat-missions/landsat-collection-2-level-2-science-products), consisting of atmospherically corrected surface... 1/1/2000, 12:00:00 AM UTC - 4/16/2024, 12:00:00 AM UTC	Sentinel-2 - Level-1C Copernicus Sentinel-2/MSI Level-1C product over Brazil. Level-1C product provides orthorectified Top-Of-Atmosphere (TOA) reflectance images. 12/24/2020, 4:06:59 PM UTC - 4/18/2024, 2:57:31 PM UTC	Sentinel-3/OLCI - Level-1B Full Resolution Copernicus Sentinel-3/OLCI Level-1B product OL_1_EFR (EO processing mode for Full Resolution) over Brazil. 3/4/2023, 11:42:56 AM UTC - 4/18/2024, 2:11:53 PM UTC

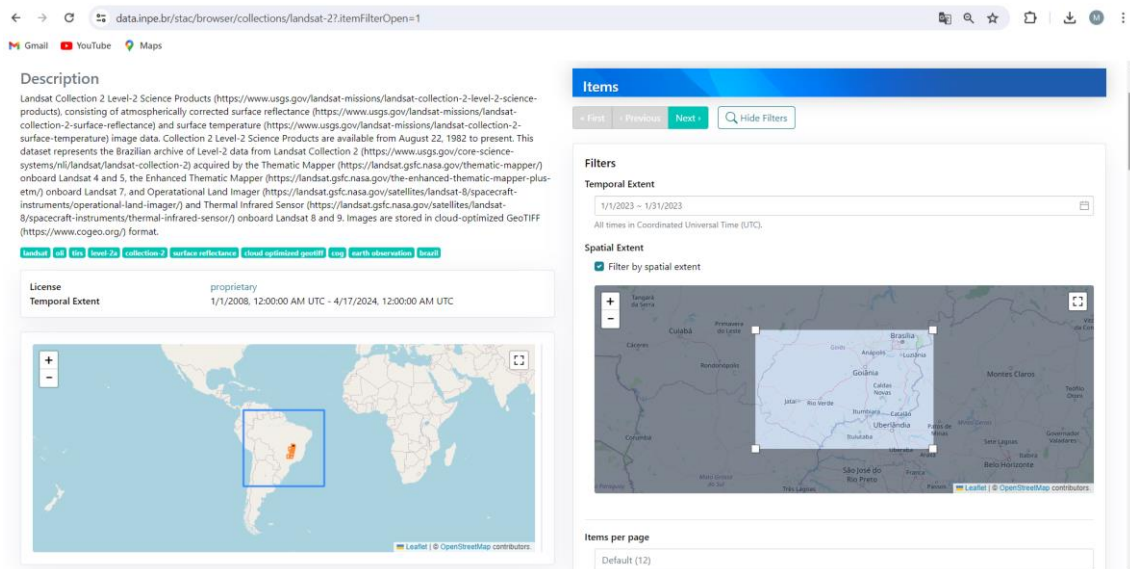
Fonte: [INPE, 2024](#)

- Listar os itens disponíveis em uma coleção de seu interesse e uma área de seu interesse

b) Coleção de Interesse: Sentinel-2 - Level-2A

Para acesso dos dados, selecionou-se por exemplo as imagens da área de interesse para 1 ano (de 1 de janeiro de 2023 a 31 de dezembro de 2023) (**Figura 2**).

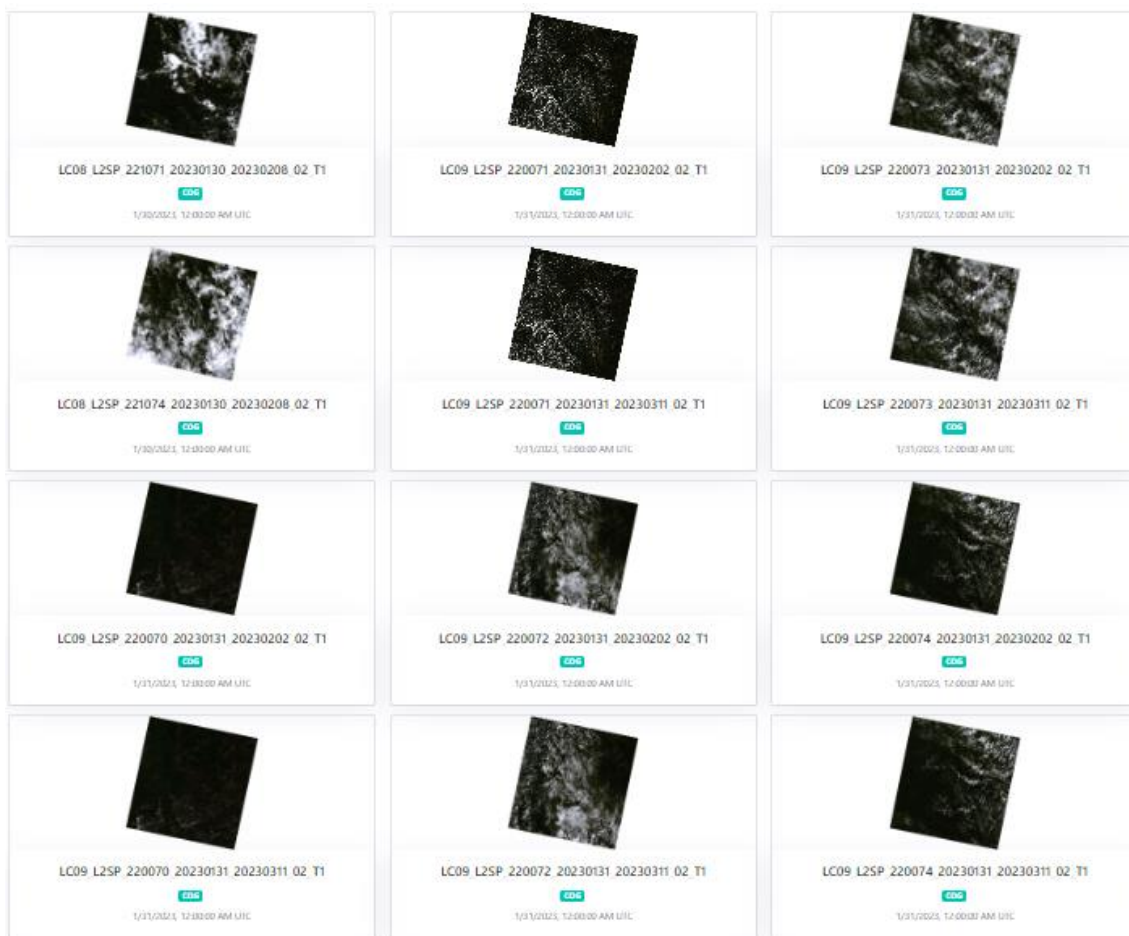
Figura 2: Uso do filtro para seleção dos itens



Fonte: [INPE, 2024](#)

Foram encontrados diversos itens para a área no intervalo considerado, sendo exibidos 12 por página (**Figura 3**). Como o ano selecionado foi 2023, foram disponibilizadas imagens do Landsat 8 e 9.

Figura 3: Itens que apareceram na primeira página para as seleções utilizadas no filtro



Fonte: [INPE, 2024](#)

Acessando, por exemplo, o item que aparece na primeira fileira e primeira coluna na **Figura 3**, chamado [“LC08 L2SP 221071 20230130 20230208 02 T1”](#), é possível observar os ativos (*assets*), isto é, os arquivos (recursos) geoespaciais de cada item (**Figura 4**).

Figura 4: Ativos do item LC08_L2SP_221071_20230130_20230208_02_T1

Assets	
> ang	DATA COG
> red	DATA COG
> blue	DATA COG
> green	DATA COG
> nir08	DATA COG
> st_qa	DATA COG
> lwir11	DATA COG
> swir16	DATA COG
> swir22	DATA COG
> coastal	DATA COG
> mtl.txt	DATA COG
> mtl.xml	DATA COG
> st_drad	DATA COG
> st_emis	DATA COG
> st_emsd	DATA COG
> st_trad	DATA COG
> st_urad	DATA COG
> qa_pixel	DATA COG
> st_atran	DATA COG
> st_cdist	DATA COG
> qa_radsat	DATA COG
> thumbnail	THUMBNAIL PNG
> qa_aerosol	DATA COG

Fonte: [INPE, 2024](#)

Como visto na **Figura 4**, esses ativos incluem os valores de reflectância de superfície com correção atmosférica para diversas bandas: vermelho (*red*), azul (*blue*), verde (*green*), infravermelho próximo (*nir08*), infravermelho médio 1 (*swir16*), infravermelho médio 2 (*swir22*) e infravermelho termal (*lwir11*). Ao clicar no ativo desejado, por exemplo, a banda do vermelho, é possível ver os metadados da imagem e o download (**Figura 5**).

Figura 5: Metadados do ativo correspondente à reflectância na banda do vermelho

red DATA COG

Cloud-Optimized GeoTIFF image

Download Copy URL Show on map

Metadata

General

Created	4/23/2023, 11:01:24 PM UTC
Updated	4/23/2023, 11:01:24 PM UTC

Bdc

Size	96,603,390
Chunk Size	X: 256 Y: 256
Raster Size	X: 7,571 Y: 7,691

Checksum

Multihash	1220095d52a7c960ad4e8a98289e760c5d18550c444922846795f99436b670c67e6b
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Fonte: [INPE, 2024](#)

III) Onde você pode encontrar as Bases cartográficas contínuas – Brasil, do IBGE? Para download e por serviços.

As bases cartográficas contínuas – Brasil do IBGE podem ser baixadas pelo serviço WMS (Web Map Service) no endereço: https://geoservicos.ibge.gov.br/geoserver/ows?service=WMS&version=1.1.0&request=GetMap&layers=CGEO:ANMS2010_09_SCN_BC_250&styles=&bbox=-74.7265473051134,-34.0004772833774,-34.5002900901443,5.605716672106287&width=249&height=245&tiled=true&sr=EPSG:4326&format=image/png&transparent=true.

Outro modo de fazer o download das bases é pelo serviço de download do IBGE no endereço: [https://www.ibge.gov.br/geociencias/downloads-geociencias.html?caminho=cartas e mapas/bases cartograficas contnuas/bc250/versao2023/](https://www.ibge.gov.br/geociencias/downloads-geociencias.html?caminho=cartas%20e%20mapas/bases%20cartograficas%20contnuas/bc250/versao2023/).

Ademais, há uma forma de fazer o download das bases cartográficas através de uma aplicação, isto é, o usuário interage com um front-end que permite que o download seja feito “apertando botões” em vez de utilizar a URL. Essa aplicação é Plataforma Geográfica Interativa no endereço <https://www.ibge.gov.br/apps/basescartograficas/>.