



## **Bancos de Dados Geográficos**

# **Armazenamento e Recuperação de Dados Matriciais PostGIS Raster**

**Gilberto Ribeiro de Queiroz**

**12 de Setembro de 2018**

# PostGIS Raster

# Organizando uma imagem em Tiles

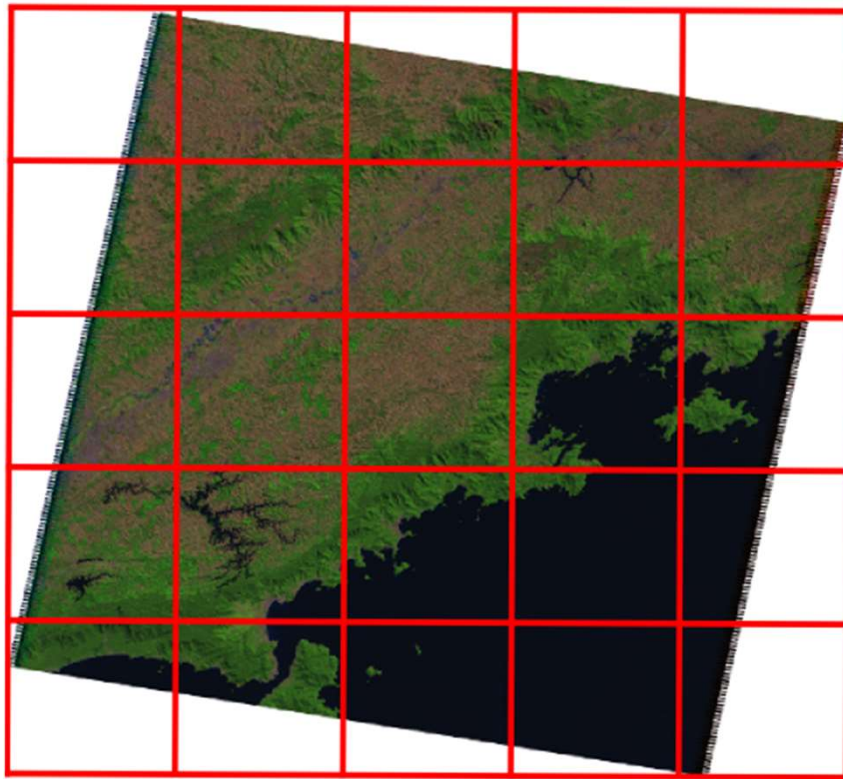
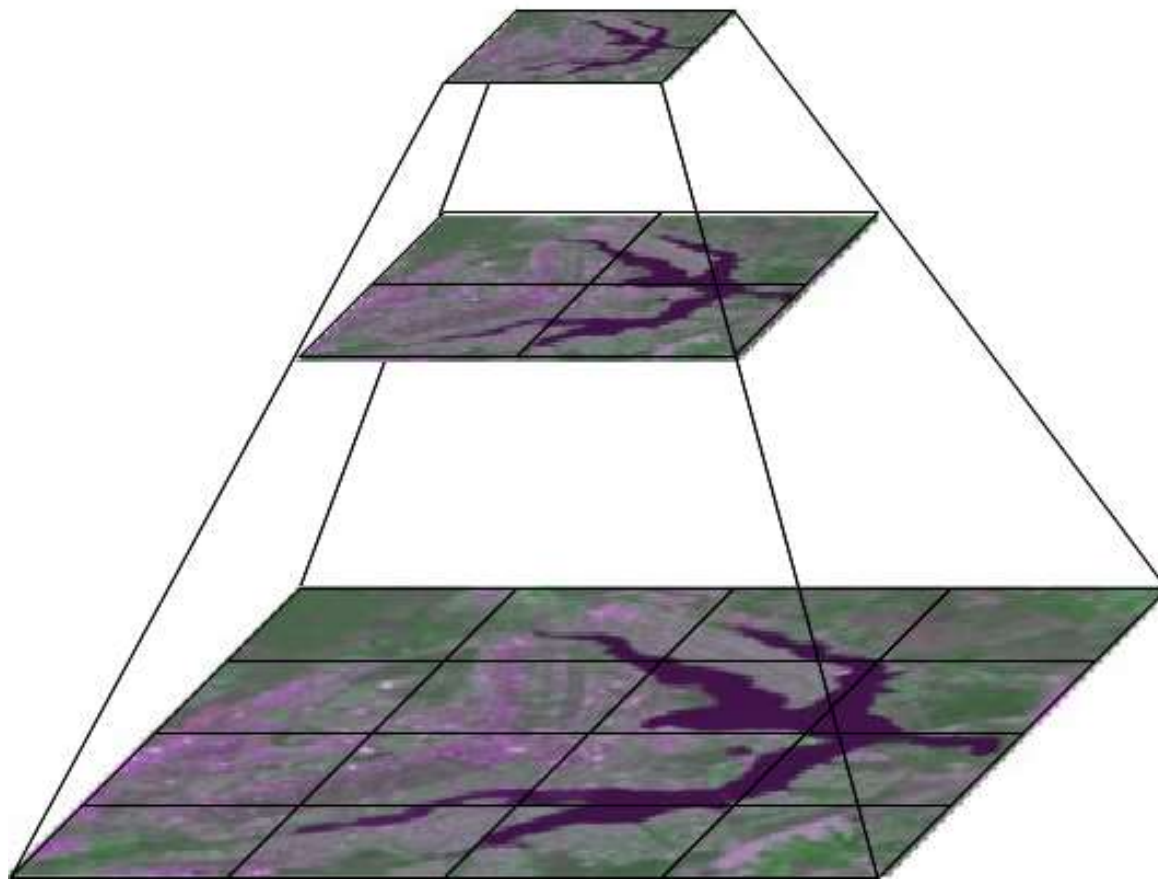


Tabela: imagem_sp	
gid	raster_tile
1	
2	
...	

# Pirâmide Multiresolução (Overview)

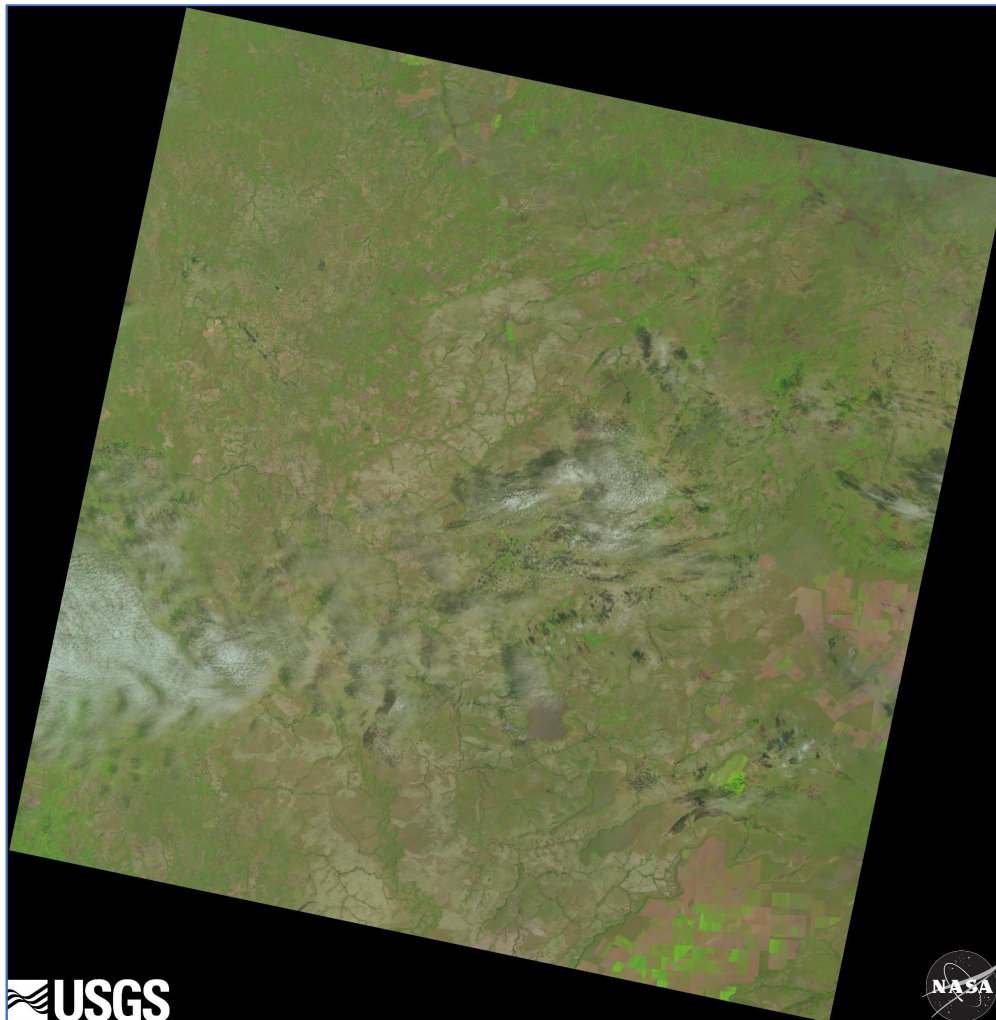


$$R_2 = R \times 2^2$$

$$R_1 = R \times 2^1$$

$$R_0 = R \times 2^0$$

# Carregando Dados PostGIS Raster



## **Imagem Landsat 8 – Sensor OLI**

- WRS-2 Path/Row: 221/067

**Data:** 28/12/2016

**Bandas:** 4 (RED), 5 (NIR), 6 (SWIR-1)

**Resolução Espacial:** 30 metros

**Dimensões:** 7581 colunas x 7721 linhas

**Tamanho Cena:** 170 km N-S x 183 km L-O

**CRS:** UTM Zona 23N / WGS84

**SRID:** 32623

**Formato Imagem:** GeoTIFF

**Tipo de Dados:** 16-bit sem sinal

**Nome Tabela:** img\_landsat

**Imagem Falsa Cor (Bandas 6,5,4)**

**Fonte:** [USGS](https://usgs.gov)

**Acesso:** 12 de Setembro de 2018

raster2pgsql



# raster2pgsql

```
Prompt de Comando
RELEASE: 2.4.4 GDAL_VERSION=22 (r16526)
USAGE: raster2pgsql [<options>] <raster>[ <raster>[ ...]] [[<schema>.]<table>]
Multiple rasters can also be specified using wildcards (*,?).

OPTIONS:
-s <sruid> Set the SRID field. Defaults to 0. If SRID not
  provided or is 0, raster's metadata will be checked to
  determine an appropriate SRID.
-b <band> Index (1-based) of band to extract from raster. For more
  than one band index, separate with comma (,). Ranges can be
  defined by separating with dash (-). If unspecified, all bands
  of raster will be extracted.
-t <tile size> Cut raster into tiles to be inserted one per
  table row. <tile size> is expressed as WIDTHxHEIGHT.
  <tile size> can also be "auto" to allow the loader to compute
  an appropriate tile size using the first raster and applied to
  all rasters.
-P Pad right-most and bottom-most tiles to guarantee that all tiles
  have the same width and height.
-R Register the raster as an out-of-db (filesystem) raster. Provided
  raster should have absolute path to the file
(-d|a|c|p) These are mutually exclusive options:
  -d Drops the table, then recreates it and populates
-- Mais --
```



# raster2pgsql

```
Prompt de Comando

    it with current raster data.
    -a Appends raster into current table, must be
        exactly the same table schema.
    -c Creates a new table and populates it, this is the
        default if you do not specify any options.
    -p Prepare mode, only creates the table.
    -f <column> Specify the name of the raster column
    -F Add a column with the filename of the raster.
    -n <column> Specify the name of the filename column. Implies -F.
    -l <overview factor> Create overview of the raster. For more than
        one factor, separate with comma(,). Overview table name follows
        the pattern o_<overview factor>_<table>. Created overview is
        stored in the database and is not affected by -R.
    -q Wrap PostgreSQL identifiers in quotes.
    -I Create a GIST spatial index on the raster column. The ANALYZE
        command will automatically be issued for the created index.
    -M Run VACUUM ANALYZE on the table of the raster column. Most
        useful when appending raster to existing table with -a.
    -C Set the standard set of constraints on the raster
        column after the rasters are loaded. Some constraints may fail
        if one or more rasters violate the constraint.
    -x Disable setting the max extent constraint. Only applied if
        -C flag is also used.
-- Mais --
```

# raster2pgsql

```
Prompt de Comando

-x Disable setting the max extent constraint. Only applied if
  -C flag is also used.
-r Set the constraints (spatially unique and coverage tile) for
  regular blocking. Only applied if -C flag is also used.
-T <tablespace> Specify the tablespace for the new table.
  Note that indices (including the primary key) will still use
  the default tablespace unless the -X flag is also used.
-X <tablespace> Specify the tablespace for the table's new index.
  This applies to the primary key and the spatial index if
  the -I flag is used.
-N <nodata> NODATA value to use on bands without a NODATA value.
-k Skip NODATA value checks for each raster band.
-E <endian> Control endianness of generated binary output of
  raster. Use 0 for XDR and 1 for NDR (default). Only NDR
  is supported at this time.
-V <version> Specify version of output WKB format. Default
  is 0. Only 0 is supported at this time.
-e Execute each statement individually, do not use a transaction.
-Y Use COPY statements instead of INSERT statements.
-G Print the supported GDAL raster formats.
-? Display this help screen.

C:\>
```

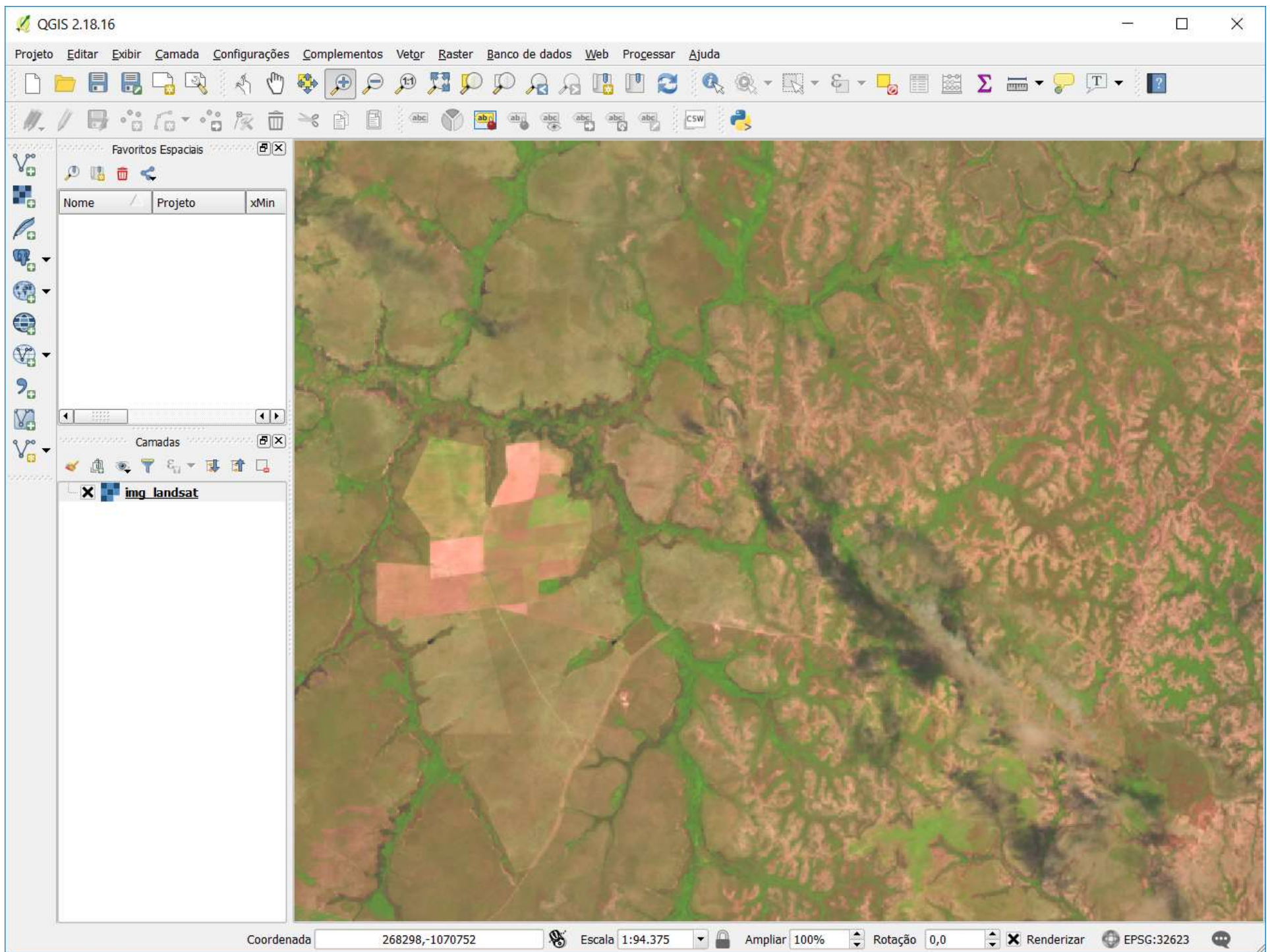
# raster2pgsql + psql

```
raster2pgsql -c -f rast -s 32623 \  
            -I -t 128x128 -P \  
            -l 4,8,16,32,64 -M -C \  
            Img_landsat.tif \  
            img_landsat > img_landsat.sql
```

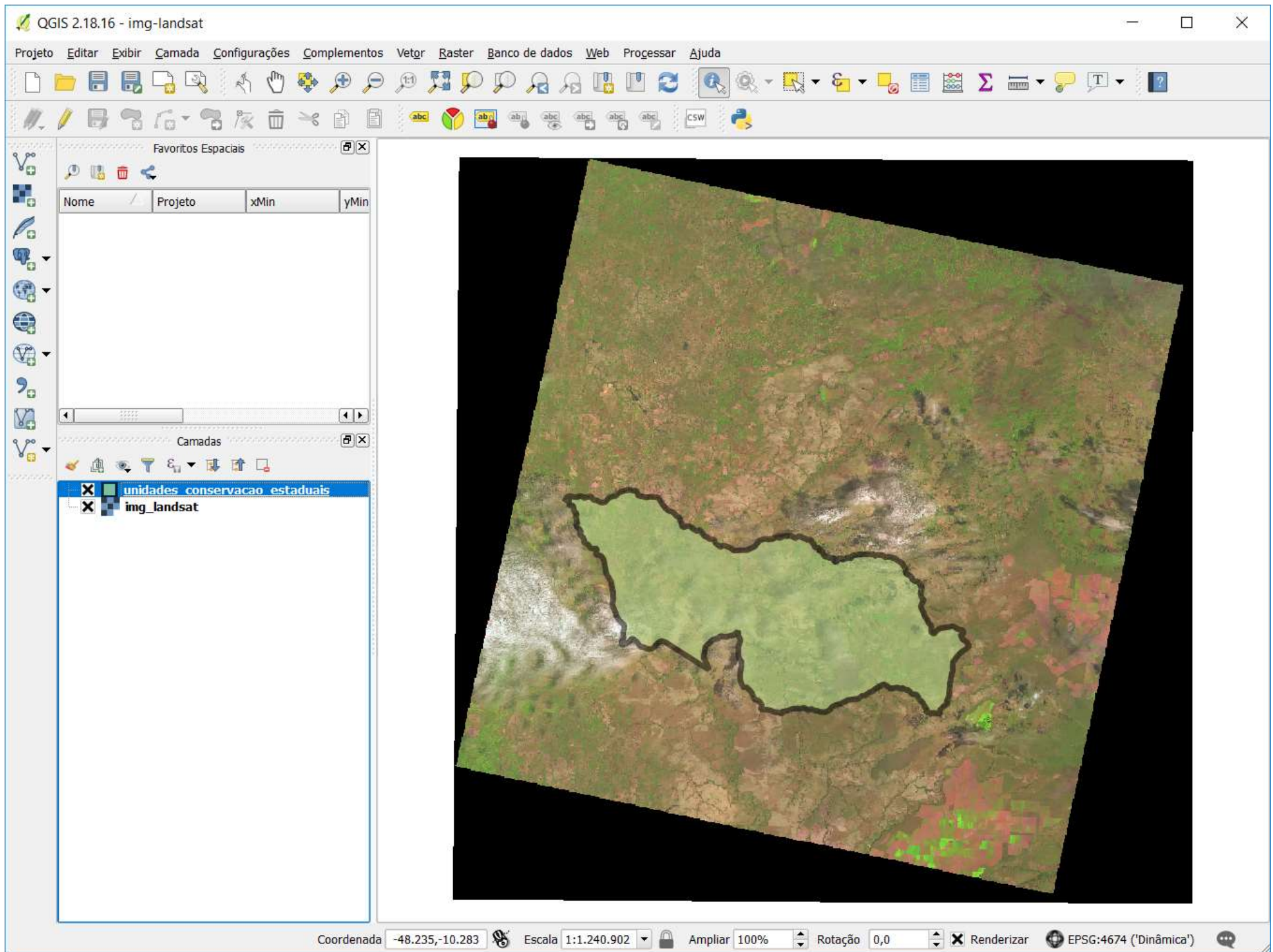
```
psql -U postgres -h localhost -p 5432 \  
      -d bdgeo -f img_landsat.sql
```

QGIS

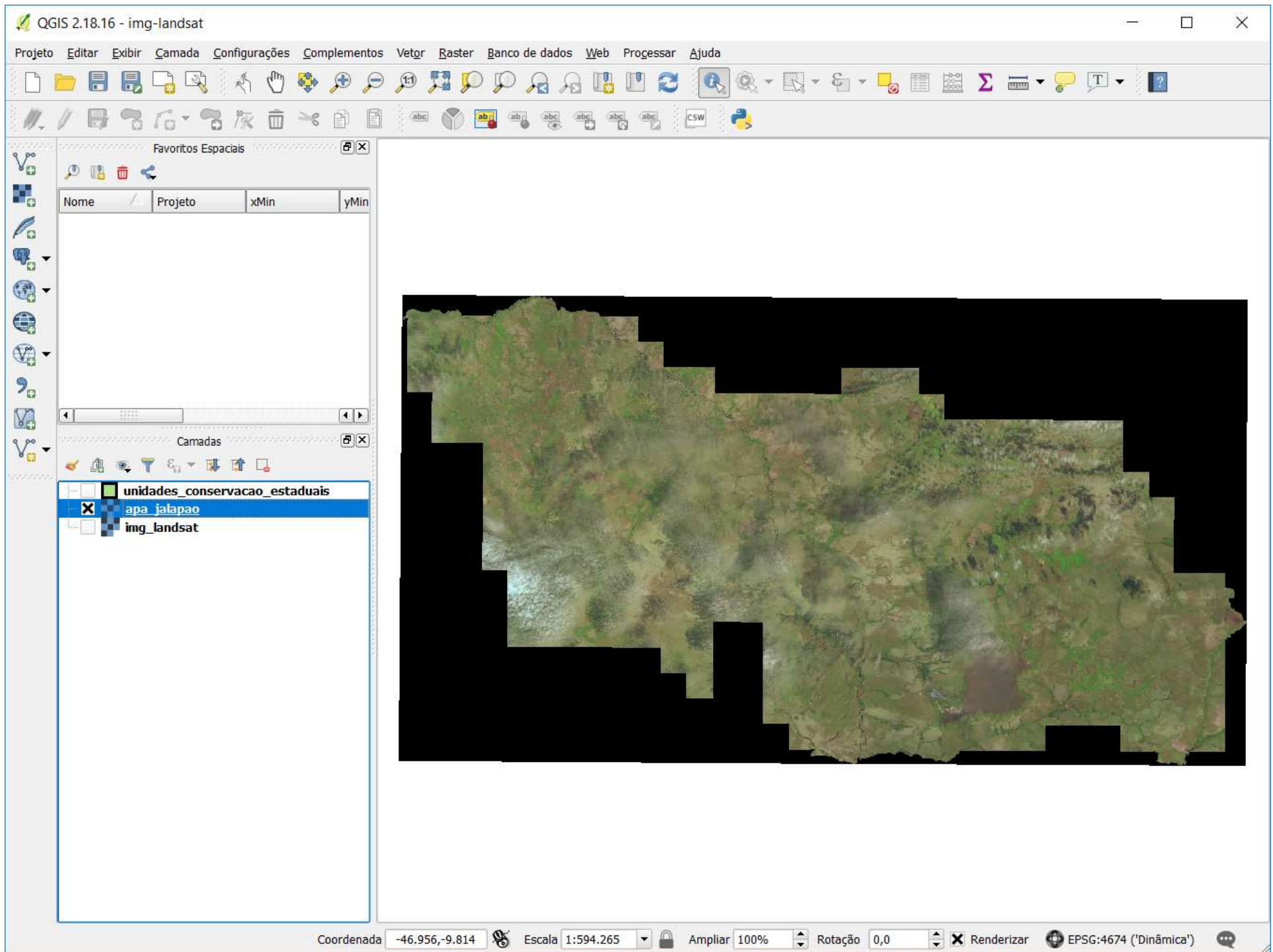




# Consultas Espaciais







# Clipping

Faça um recorte da imagem landsat utilizando como máscara a geometria da unidade de conservação da “APA JALAPÃO”:

```
CREATE TABLE apa_jalapao AS
  SELECT img.rid,
         ST_Clip( img.rast,
                  ST_Transform(ucs.geom, 32623) ) AS rast
  FROM img_landsat AS img,
       unidades_conservacao_estaduais AS ucs
 WHERE ST_Intersects( img.rast,
                     ST_Transform(ucs.geom, 32623) )
        AND ucs.gid = 18;
```

# Estatísticas do Raster

```
SELECT ST_SummaryStats('img_landsat', 'rast', 1)
```

```
SELECT ST_Histogram('img_landsat', 'rast', 1)
```

# Considerações Finais

# Referências Bibliográficas

# Exercícios