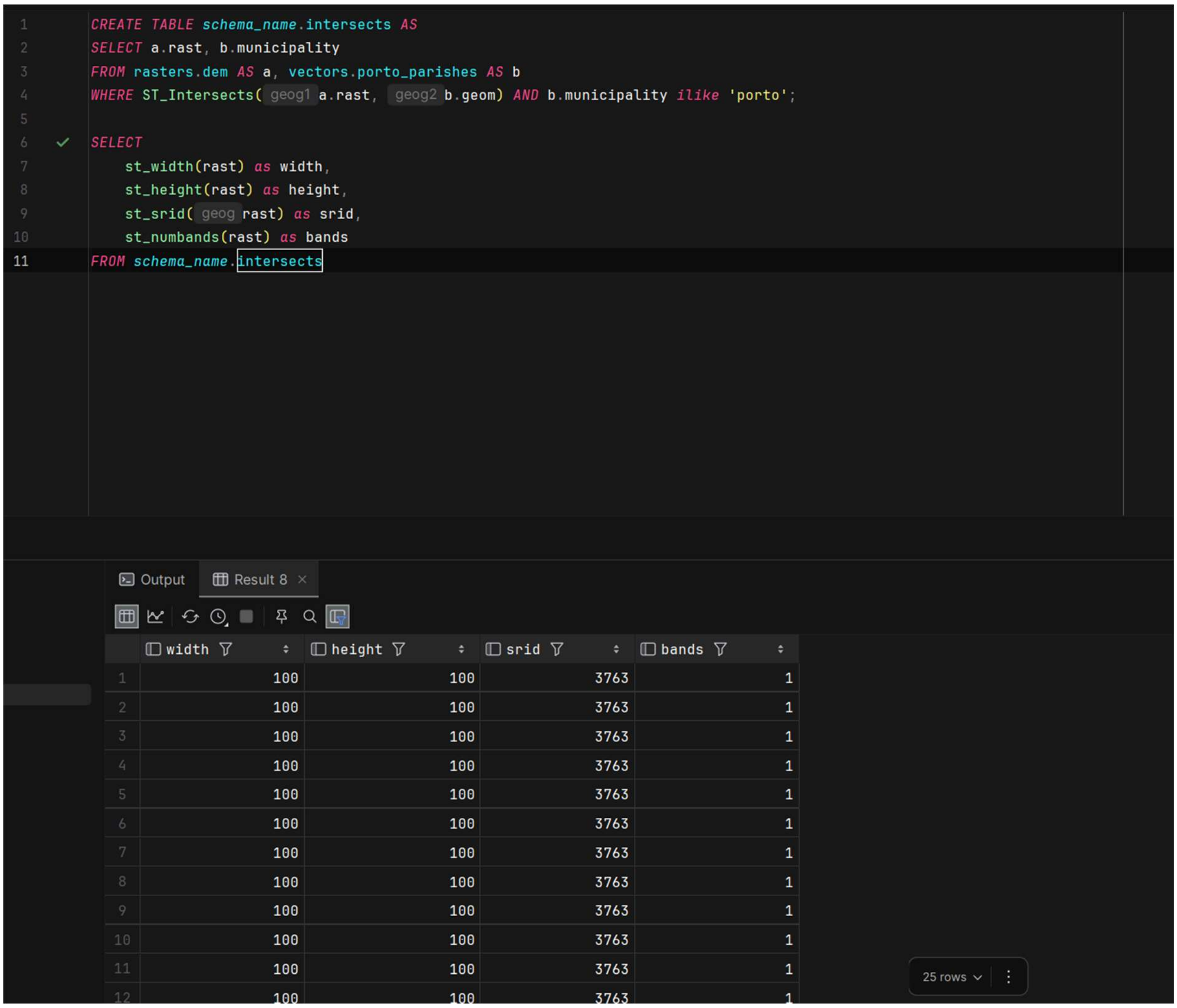
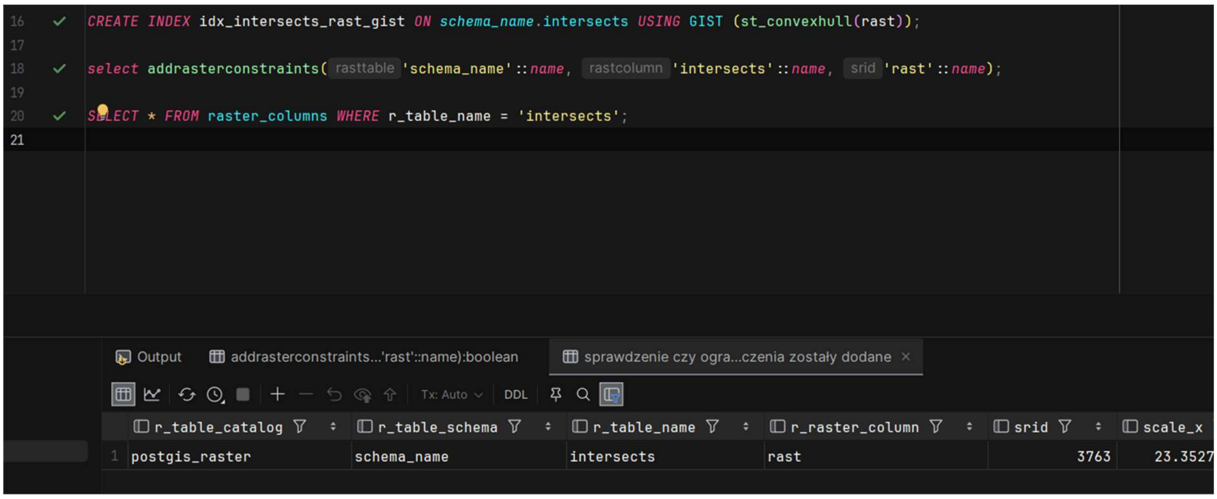
ST_intersects



```sql
CREATE TABLE schema_name.intersects AS
SELECT a.rast, b.municipality
FROM rasters.dem AS a, vectors.porto_parishes AS b
WHERE ST_Intersects( geog1 a.rast,  geog2 b.geom) AND b.municipality ilike 'porto';

SELECT
    st_width(rast) as width,
    st_height(rast) as height,
    st_srid( geog rast) as srid,
    st_numbands(rast) as bands
FROM schema_name.intersects
```

	width	height	srid	bands
1	100	100	3763	1
2	100	100	3763	1
3	100	100	3763	1
4	100	100	3763	1
5	100	100	3763	1
6	100	100	3763	1
7	100	100	3763	1
8	100	100	3763	1
9	100	100	3763	1
10	100	100	3763	1
11	100	100	3763	1
12	100	100	3763	1

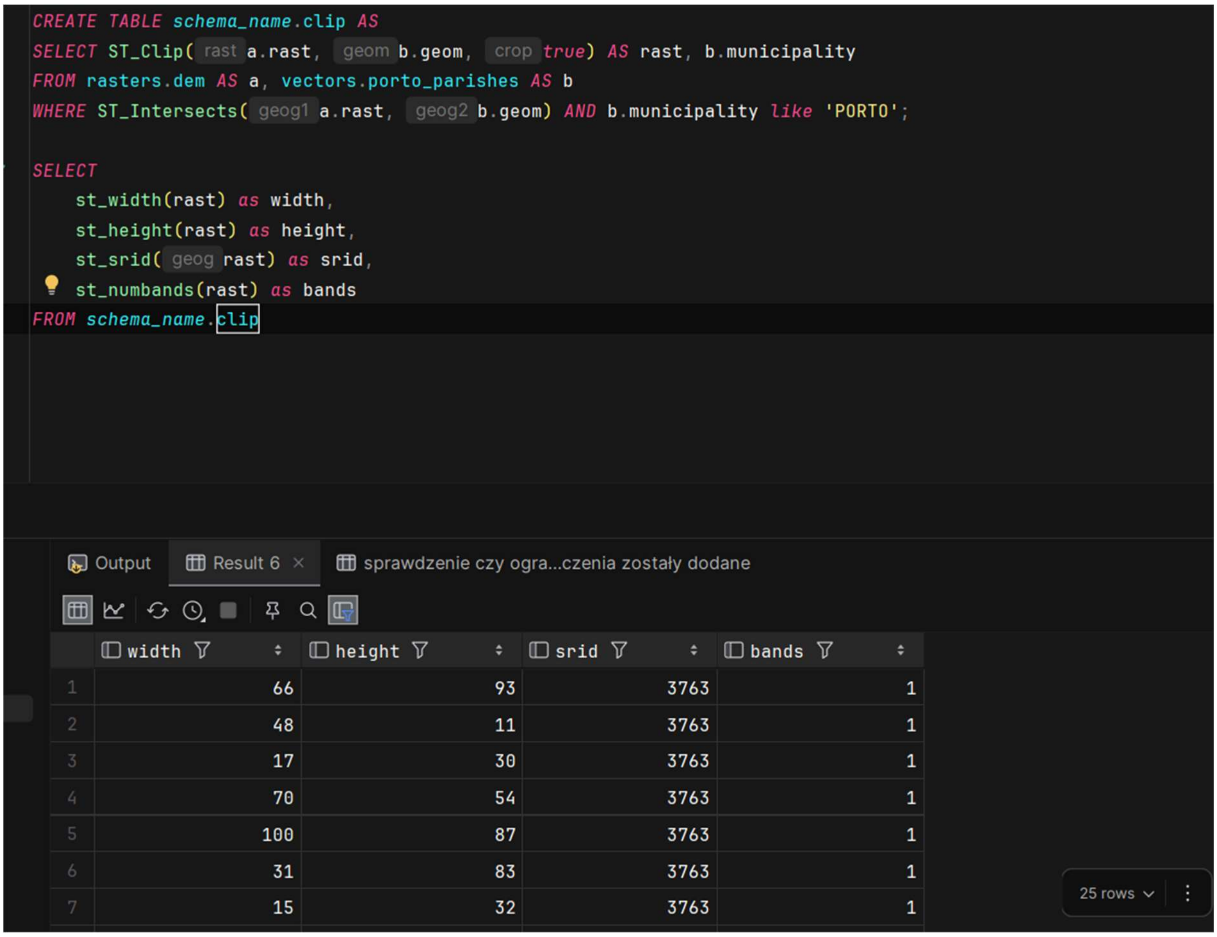


```sql
CREATE INDEX idx_intersects_rast_gist ON schema_name.intersects USING GIST (st_convexhull(rast));

select addrasterconstraints( rasttable 'schema_name'::name,  rastcolumn 'intersects'::name,  srid 'rast'::name);

SELECT * FROM raster_columns WHERE r_table_name = 'intersects';
```

Output
addrasterconstraints...'rast'::name):boolean
sprawdzenie czy ogra...czenia zostały dodane
Tx: Auto
DDL

	r_table_catalog	r_table_schema	r_table_name	r_raster_column	srid	scale_x
1	postgis_raster	schema_name	intersects	rast	3763	23.3527

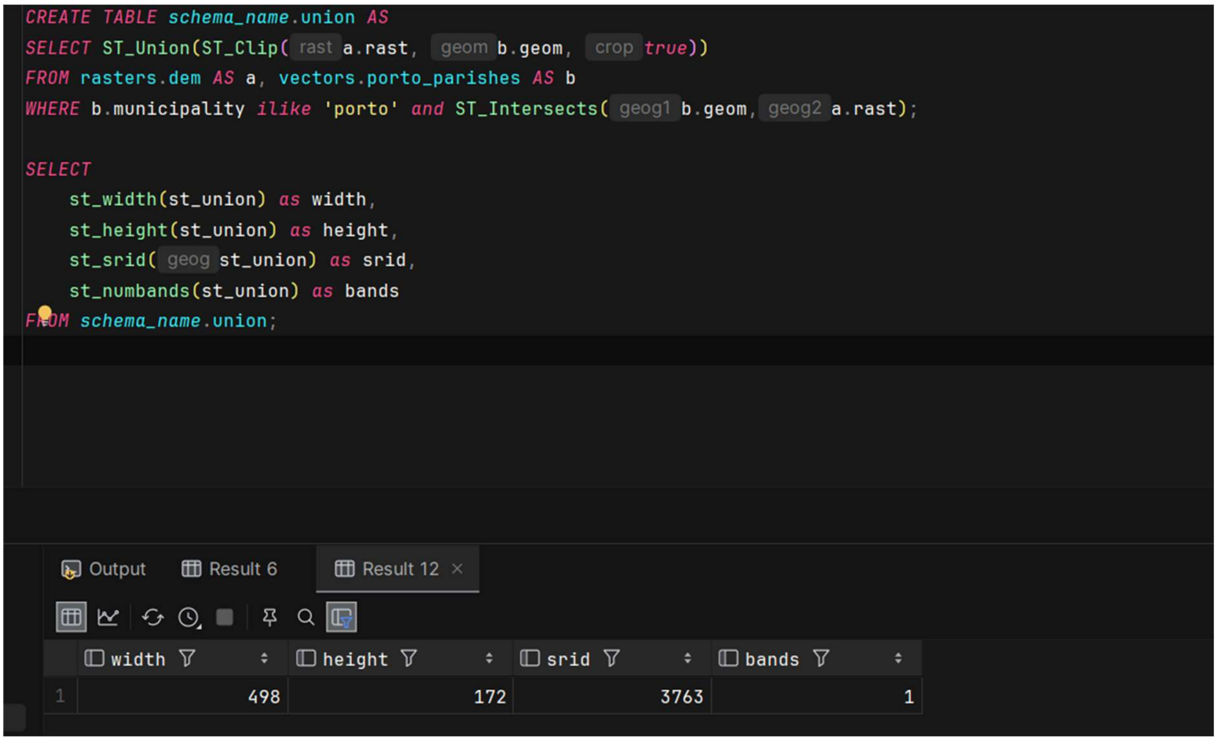
ST_clip



```sql
CREATE TABLE schema_name.clip AS
SELECT ST_Clip(a.rast, b.geom, true) AS rast, b.municipality
FROM rasters.dem AS a, vectors.porto_parishes AS b
WHERE ST_Intersects(a.rast, b.geom) AND b.municipality like 'PORTO';

SELECT
    st_width(rast) as width,
    st_height(rast) as height,
    st_srid(rast) as srid,
    st_numbands(rast) as bands
FROM schema_name.clip
```

	width	height	srid	bands
1	66	93	3763	1
2	48	11	3763	1
3	17	30	3763	1
4	70	54	3763	1
5	100	87	3763	1
6	31	83	3763	1
7	15	32	3763	1

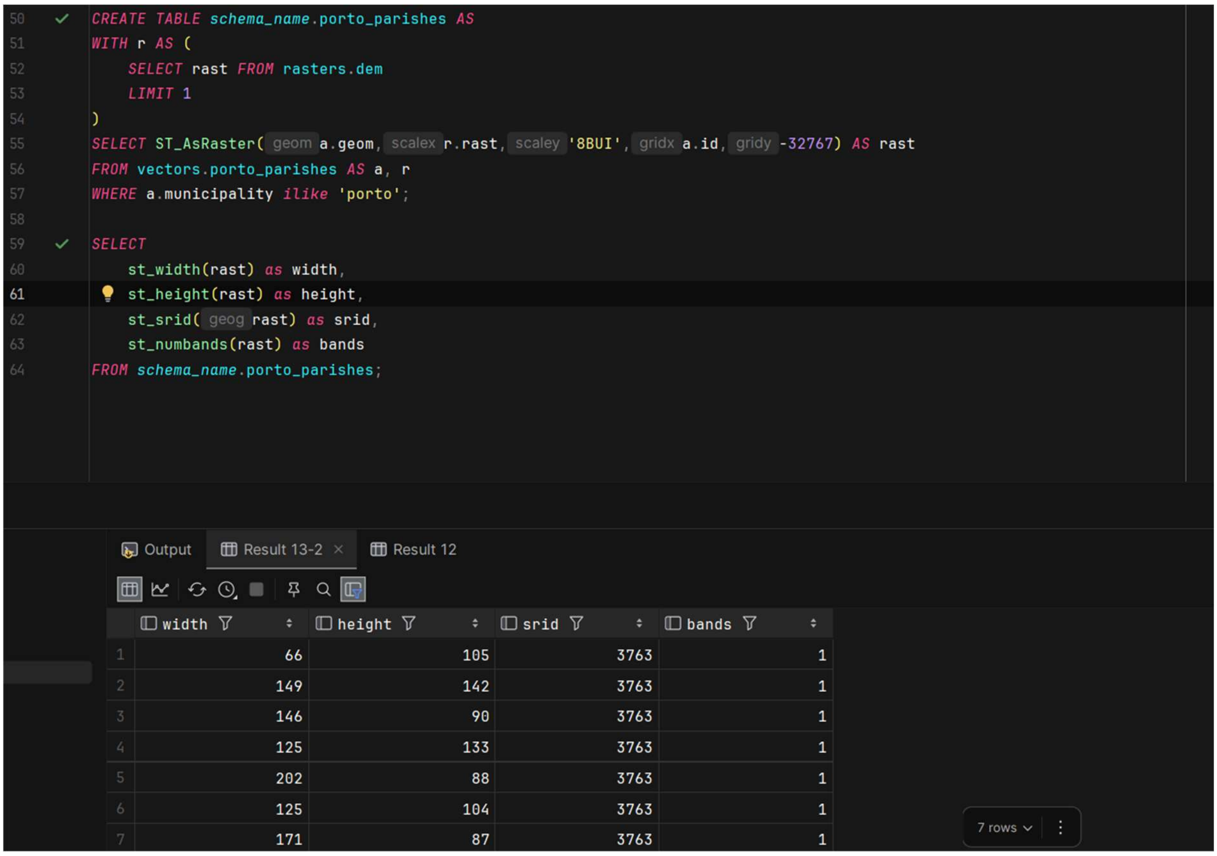
ST_union



```sql
CREATE TABLE schema_name.union AS
SELECT ST_Union(ST_Clip(a.rast, b.geom, true))
FROM rasters.dem AS a, vectors.porto_parishes AS b
WHERE b.municipality ilike 'porto' and ST_Intersects(b.geom, a.rast);

SELECT
    st_width(st_union) as width,
    st_height(st_union) as height,
    st_srid(st_union) as srid,
    st_numbands(st_union) as bands
FROM schema_name.union;
```

	width	height	srid	bands
1	498	172	3763	1

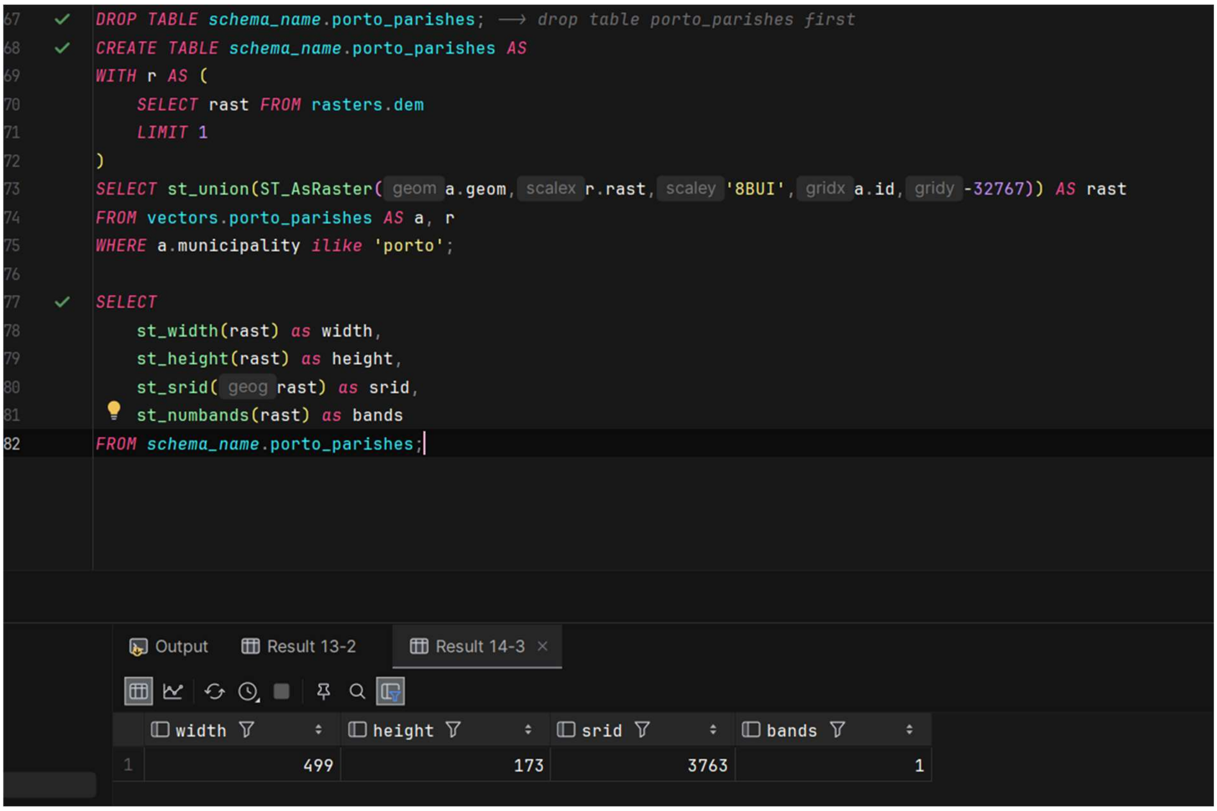
ST_asraster



```sql
CREATE TABLE schema_name.porto_parishes AS
WITH r AS (
    SELECT rast FROM rasters.dem
    LIMIT 1
)
SELECT ST_AsRaster(a.geom, r.rast, '8BUI', a.id, -32767) AS rast
FROM vectors.porto_parishes AS a, r
WHERE a.municipality ilike 'porto';

SELECT
    st_width(rast) as width,
    st_height(rast) as height,
    st_srid(rast) as srid,
    st_numbands(rast) as bands
FROM schema_name.porto_parishes;
```

	width	height	srid	bands
1	66	105	3763	1
2	149	142	3763	1
3	146	90	3763	1
4	125	133	3763	1
5	202	88	3763	1
6	125	104	3763	1
7	171	87	3763	1

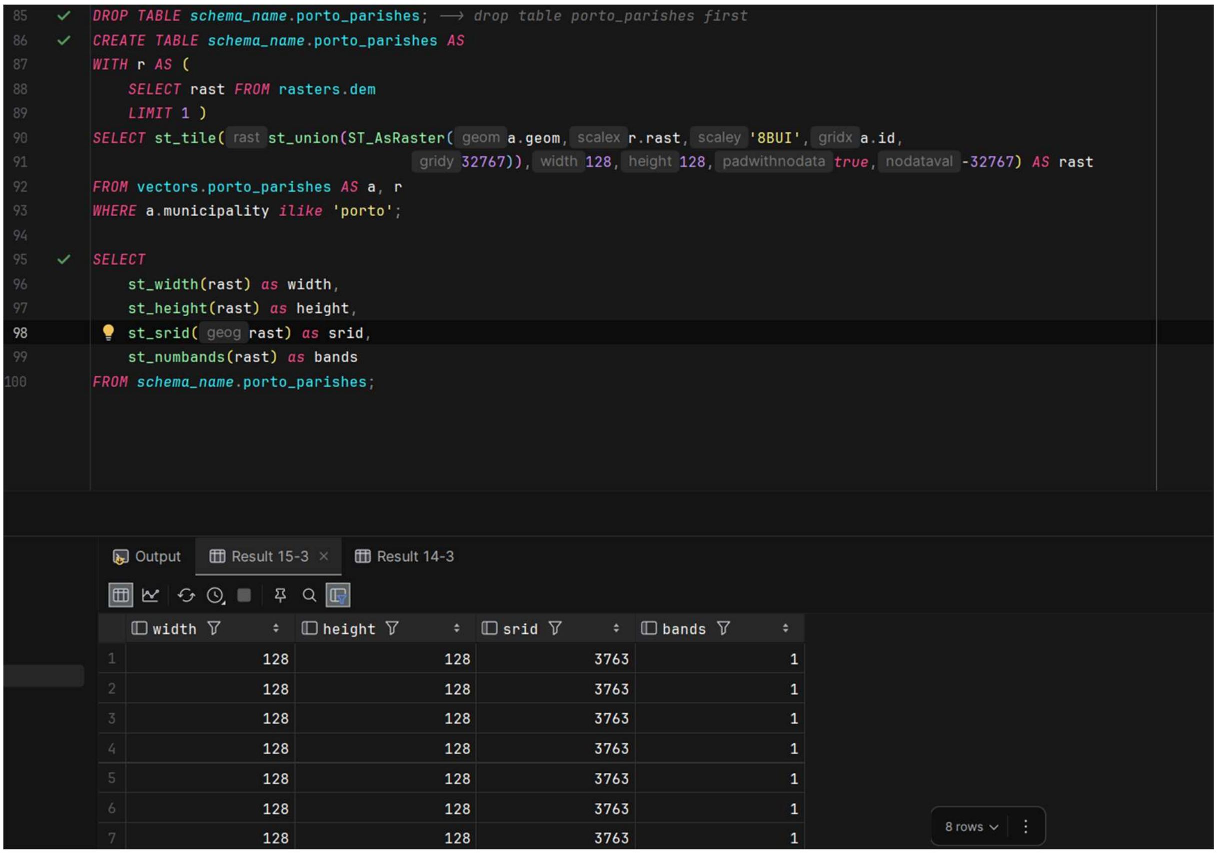
ST_union



```sql
DROP TABLE schema_name.porto_parishes; --> drop table porto_parishes first
CREATE TABLE schema_name.porto_parishes AS
WITH r AS (
    SELECT rast FROM rasters.dem
    LIMIT 1
)
SELECT st_union(ST_AsRaster(a.geom, r.rast, '8BUI', a.id, -32767)) AS rast
FROM vectors.porto_parishes AS a, r
WHERE a.municipality ilike 'porto';

SELECT
    st_width(rast) as width,
    st_height(rast) as height,
    st_srid(rast) as srid,
    st_numbands(rast) as bands
FROM schema_name.porto_parishes;
```

	width	height	srid	bands
1	499	173	3763	1

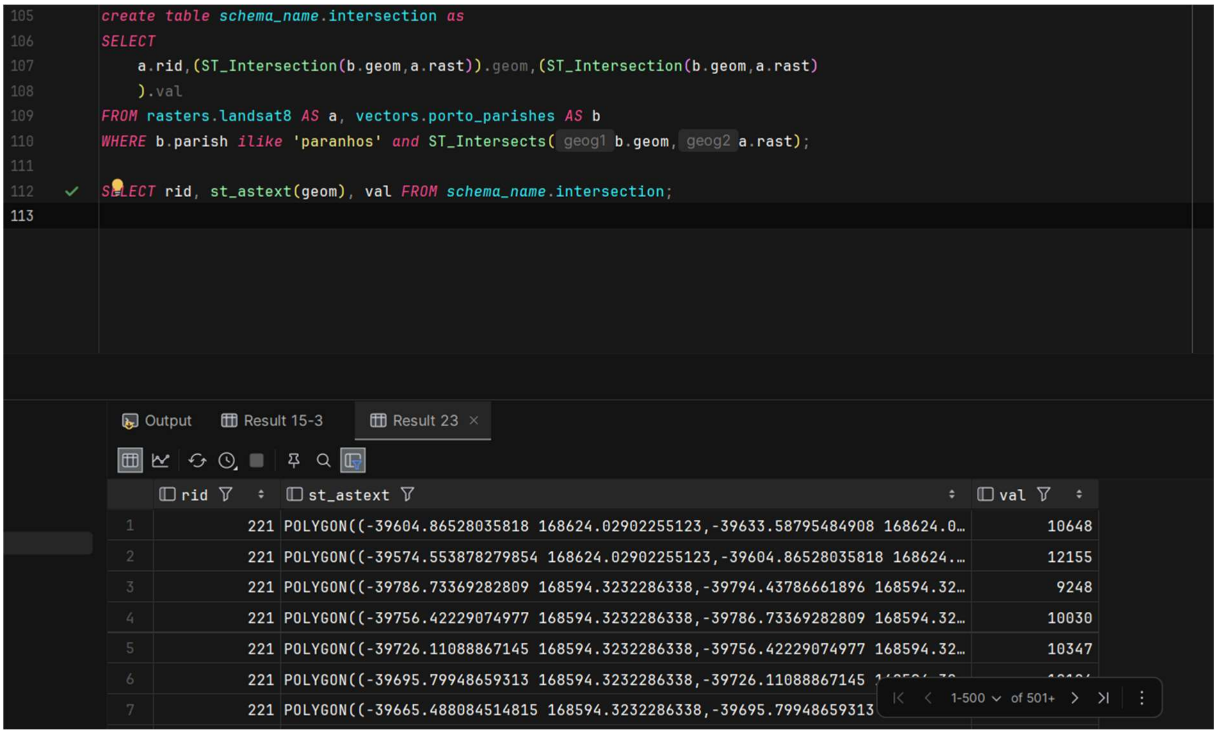
ST_tile



```sql
DROP TABLE schema_name.porto_parishes; --> drop table porto_parishes first
CREATE TABLE schema_name.porto_parishes AS
WITH r AS (
    SELECT rast FROM rasters.dem
    LIMIT 1 )
SELECT st_tile(st_union(ST_AsRaster(a.geom, r.rast, '8BUI', a.id,
                                     32767)), 128, 128, true, -32767) AS rast
FROM vectors.porto_parishes AS a, r
WHERE a.municipality ilike 'porto';

SELECT
    st_width(rast) as width,
    st_height(rast) as height,
    st_srid(rast) as srid,
    st_numbands(rast) as bands
FROM schema_name.porto_parishes;
```

	width	height	srid	bands
1	128	128	3763	1
2	128	128	3763	1
3	128	128	3763	1
4	128	128	3763	1
5	128	128	3763	1
6	128	128	3763	1
7	128	128	3763	1

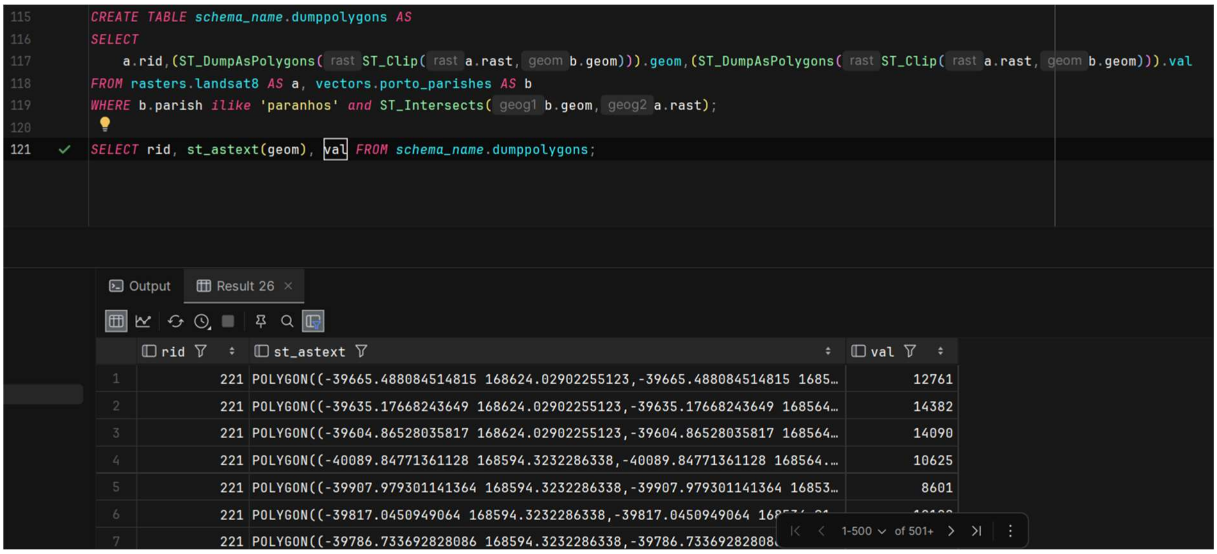
ST_intersection



```sql
create table schema_name.intersection as
SELECT
    a.rid,(ST_Intersection(b.geom,a.rast)).geom,(ST_Intersection(b.geom,a.rast)
    ).val
FROM rasters.landsat8 AS a, vectors.porto_parishes AS b
WHERE b.parish ilike 'paranhos' and ST_Intersects(b.geom,a.rast);

SELECT rid, st_astext(geom), val FROM schema_name.intersection;
```

```
   rid  st_astext                                                                          val
1  221  POLYGON((-39604.86528035818 168624.02902255123,-39633.58795484908 168624.0…      10648
2  221  POLYGON((-39574.553878279854 168624.02902255123,-39604.86528035818 168624.…      12155
3  221  POLYGON((-39786.73369282809 168594.3232286338,-39794.43786661896 168594.32…       9248
4  221  POLYGON((-39756.42229074977 168594.3232286338,-39786.73369282809 168594.32…      10030
5  221  POLYGON((-39726.11088867145 168594.3232286338,-39756.42229074977 168594.32…      10347
6  221  POLYGON((-39695.79948659313 168594.3232286338,-39726.11088867145
7  221  POLYGON((-39665.488084514815 168594.3232286338,-39695.79948659313
```

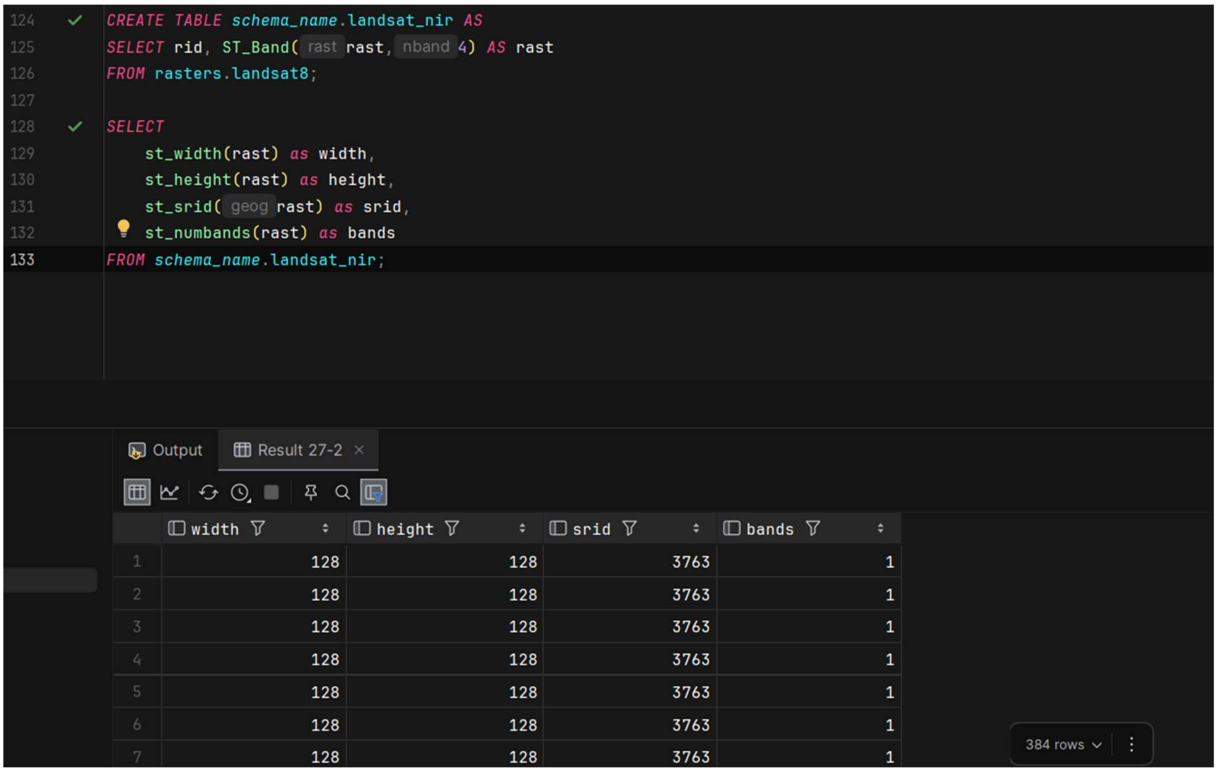
ST_dumpaspolygons



```sql
CREATE TABLE schema_name.dumppolygons AS
SELECT
    a.rid,(ST_DumpAsPolygons(ST_Clip(a.rast,b.geom))).geom,(ST_DumpAsPolygons(ST_Clip(a.rast,b.geom))).val
FROM rasters.landsat8 AS a, vectors.porto_parishes AS b
WHERE b.parish ilike 'paranhos' and ST_Intersects(b.geom,a.rast);

SELECT rid, st_astext(geom), val FROM schema_name.dumppolygons;
```

```
   rid  st_astext                                                                          val
1  221  POLYGON((-39665.488084514815 168624.02902255123,-39665.488084514815 1685…      12761
2  221  POLYGON((-39635.17668243649 168624.02902255123,-39635.17668243649 168564…      14382
3  221  POLYGON((-39604.86528035817 168624.02902255123,-39604.86528035817 168564…      14090
4  221  POLYGON((-40089.84771361128 168594.3232286338,-40089.84771361128 168564.…      10625
5  221  POLYGON((-39907.979301141364 168594.3232286338,-39907.979301141364 16853…       8601
6  221  POLYGON((-39817.0450949064 168594.3232286338,-39817.0450949064 16
7  221  POLYGON((-39786.733692828086 168594.3232286338,-39786.73369282808
```

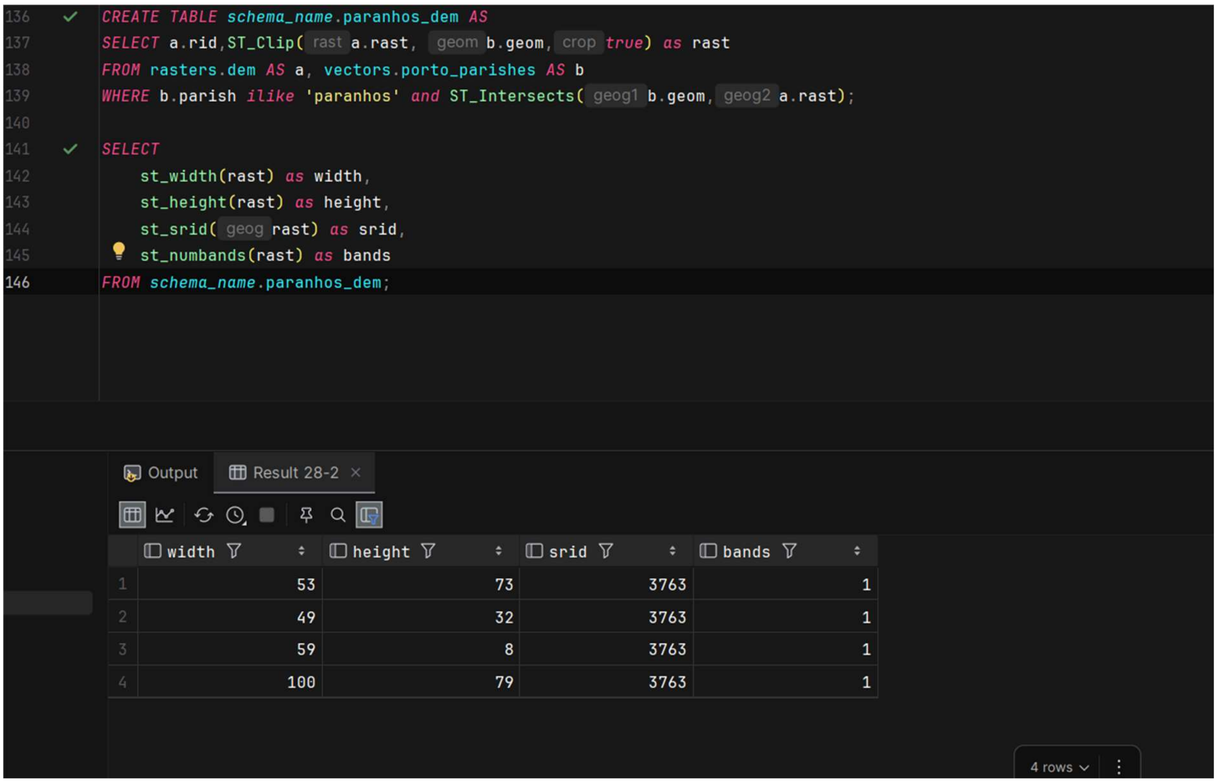
ST_band



```sql
CREATE TABLE schema_name.landsat_nir AS
SELECT rid, ST_Band(rast, 4) AS rast
FROM rasters.landsat8;

SELECT
    st_width(rast) as width,
    st_height(rast) as height,
    st_srid(rast) as srid,
    st_numbands(rast) as bands
FROM schema_name.landsat_nir;
```

	width	height	srid	bands
1	128	128	3763	1
2	128	128	3763	1
3	128	128	3763	1
4	128	128	3763	1
5	128	128	3763	1
6	128	128	3763	1
7	128	128	3763	1

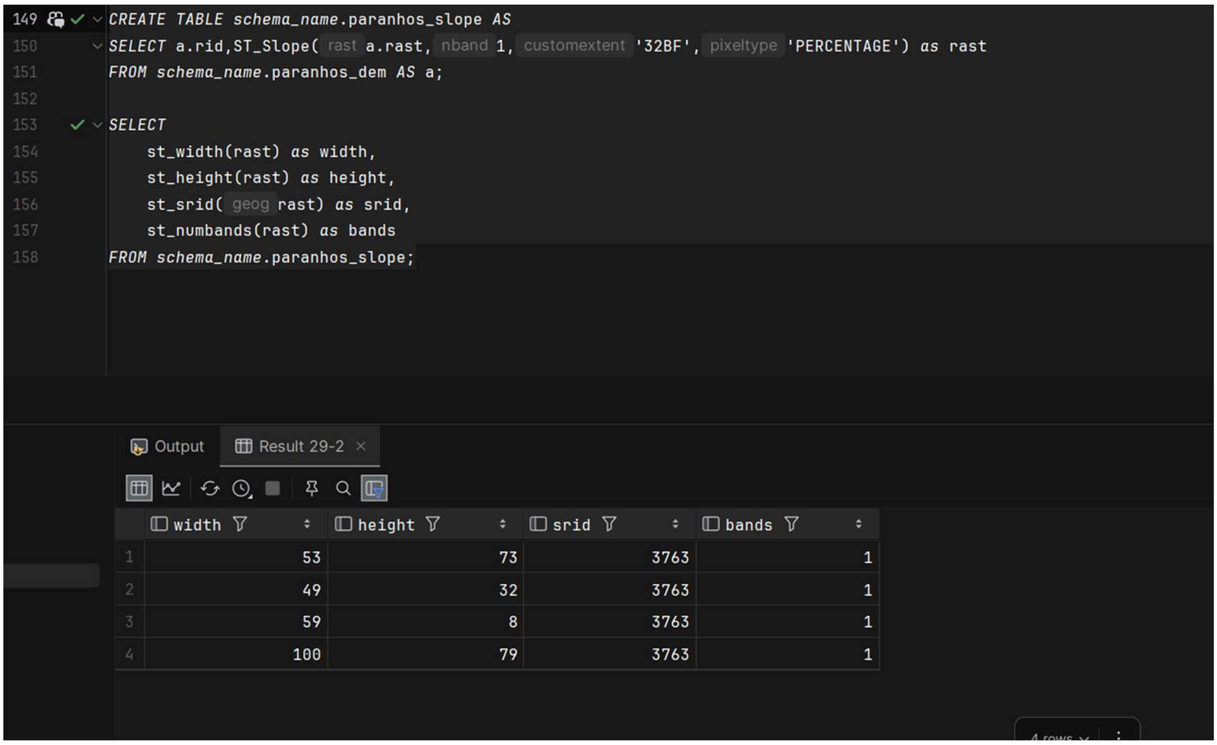
ST_clip



```sql
CREATE TABLE schema_name.paranhos_dem AS
SELECT a.rid,ST_Clip(a.rast, b.geom, true) as rast
FROM rasters.dem AS a, vectors.porto_parishes AS b
WHERE b.parish ilike 'paranhos' and ST_Intersects(b.geom, a.rast);

SELECT
    st_width(rast) as width,
    st_height(rast) as height,
    st_srid(rast) as srid,
    st_numbands(rast) as bands
FROM schema_name.paranhos_dem;
```

	width	height	srid	bands
1	53	73	3763	1
2	49	32	3763	1
3	59	8	3763	1
4	100	79	3763	1

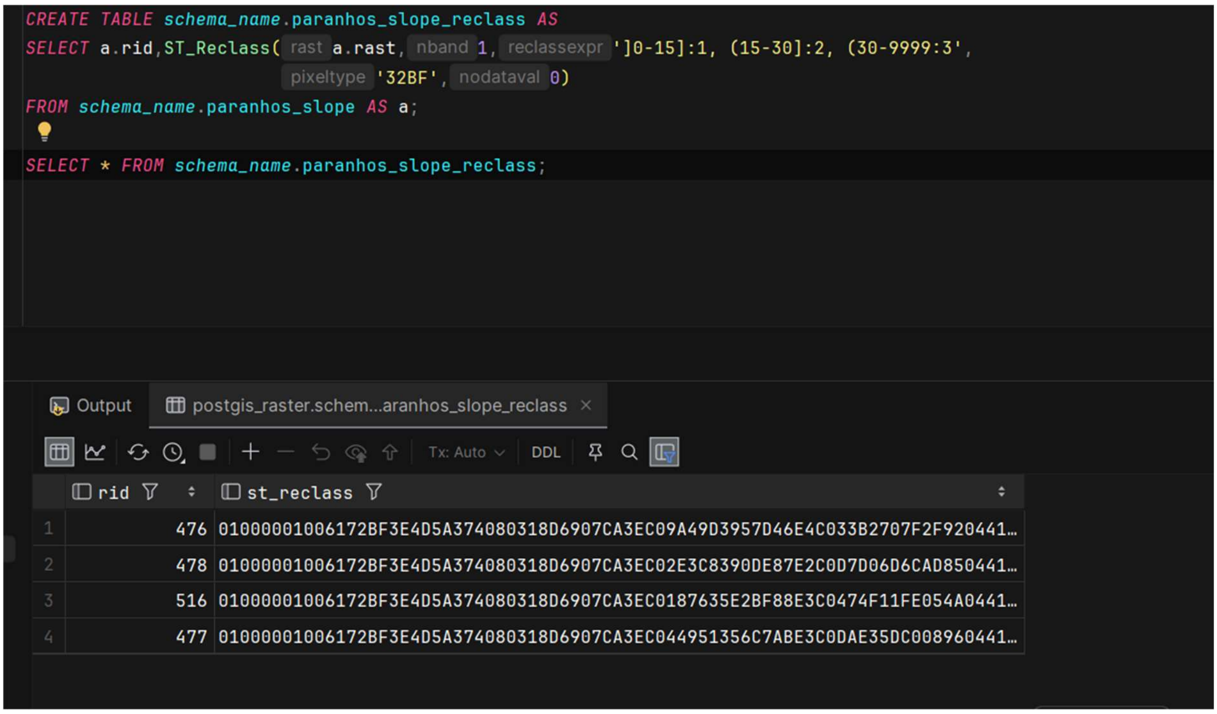
ST_slope



```sql
CREATE TABLE schema_name.paranhos_slope AS
SELECT a.rid,ST_Slope( rast a.rast, nband 1, customextent '32BF', pixeltype 'PERCENTAGE') as rast
FROM schema_name.paranhos_dem AS a;

SELECT
    st_width(rast) as width,
    st_height(rast) as height,
    st_srid( geog rast) as srid,
    st_numbands(rast) as bands
FROM schema_name.paranhos_slope;
```

	width	height	srid	bands
1	53	73	3763	1
2	49	32	3763	1
3	59	8	3763	1
4	100	79	3763	1

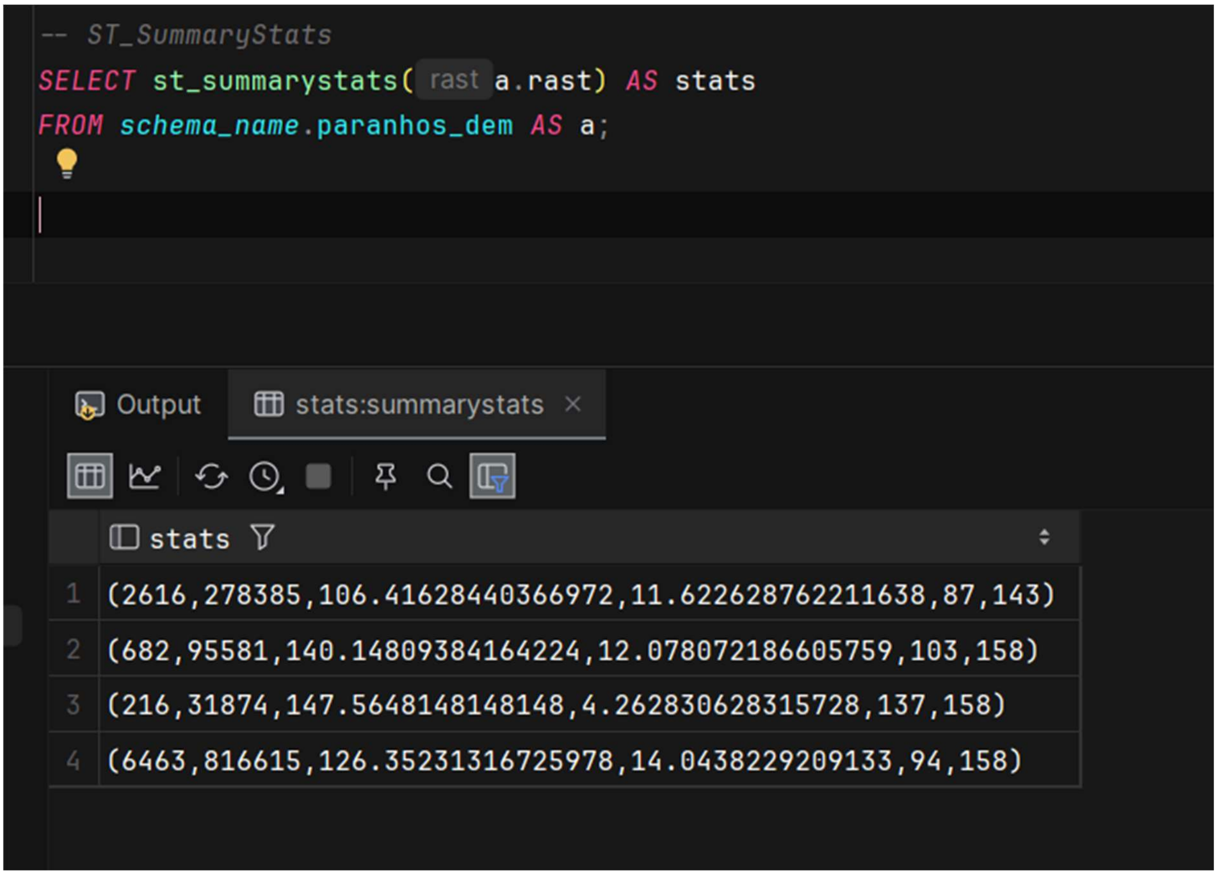
ST_reclass



```sql
CREATE TABLE schema_name.paranhos_slope_reclass AS
SELECT a.rid,ST_Reclass( rast a.rast, nband 1, reclassexpr ']0-15]:1, (15-30]:2, (30-9999:3',
                         pixeltype '32BF', nodataval 0)
FROM schema_name.paranhos_slope AS a;

SELECT * FROM schema_name.paranhos_slope_reclass;
```

	rid	st_reclass
1	476	01000001006172BF3E4D5A374080318D6907CA3EC09A49D3957D46E4C033B2707F2F920441…
2	478	01000001006172BF3E4D5A374080318D6907CA3EC02E3C8390DE87E2C0D7D06D6CAD850441…
3	516	01000001006172BF3E4D5A374080318D6907CA3EC0187635E2BF88E3C0474F11FE054A0441…
4	477	01000001006172BF3E4D5A374080318D6907CA3EC044951356C7ABE3C0DAE35DC008960441…

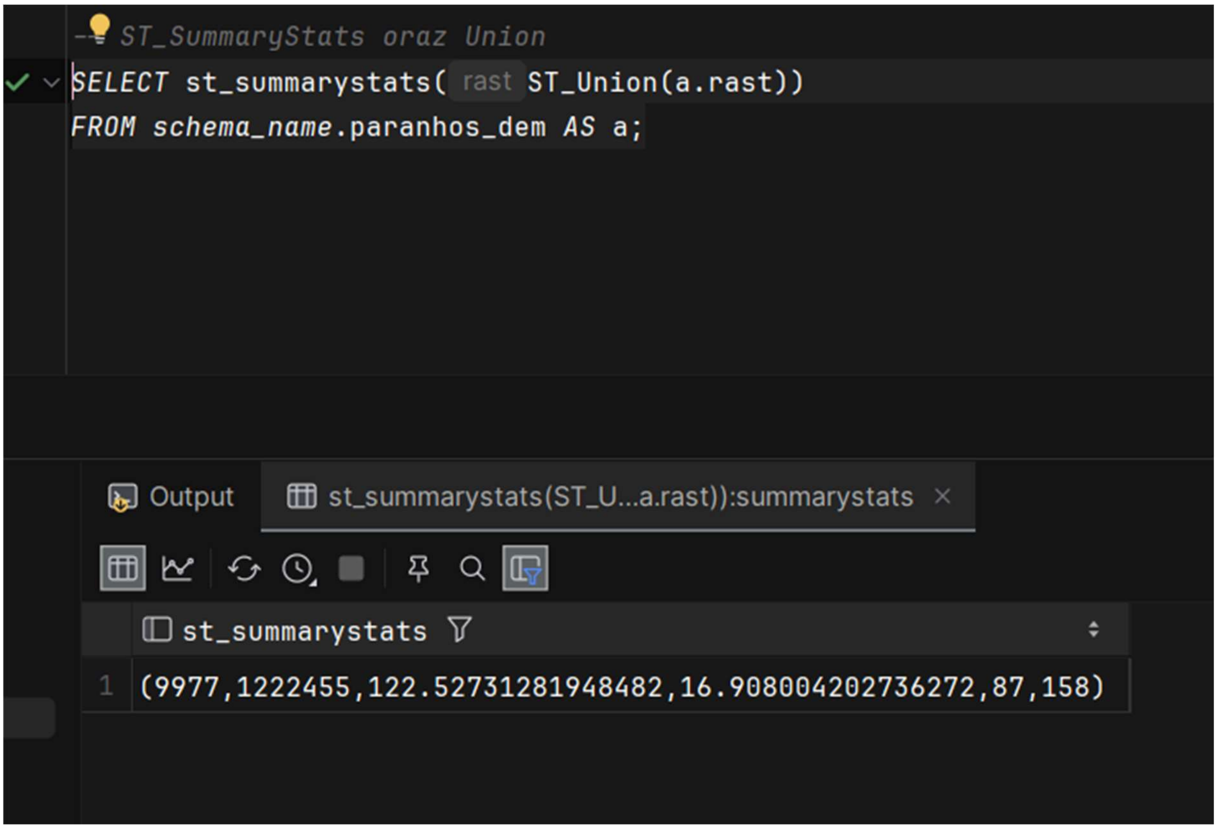
ST_summarystats



```sql
-- ST_SummaryStats
SELECT st_summarystats(a.rast) AS stats
FROM schema_name.paranhos_dem AS a;
```

	stats
1	(2616,278385,106.41628440366972,11.622628762211638,87,143)
2	(682,95581,140.14809384164224,12.078072186605759,103,158)
3	(216,31874,147.5648148148148,4.262830628315728,137,158)
4	(6463,816615,126.35231316725978,14.0438229209133,94,158)

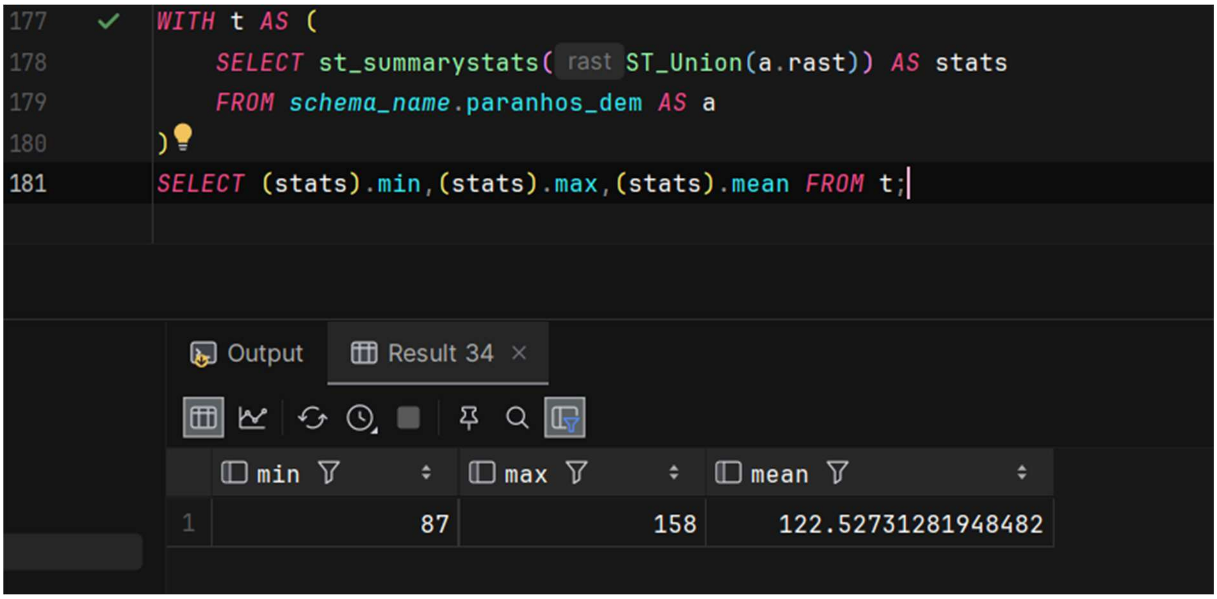
ST_summarystats oraz union



```sql
-- ST_SummaryStats oraz Union
SELECT st_summarystats( ST_Union(a.rast))
FROM schema_name.paranhos_dem AS a;
```

```
  st_summarystats
1 (9977,1222455,122.52731281948482,16.908004202736272,87,158)
```

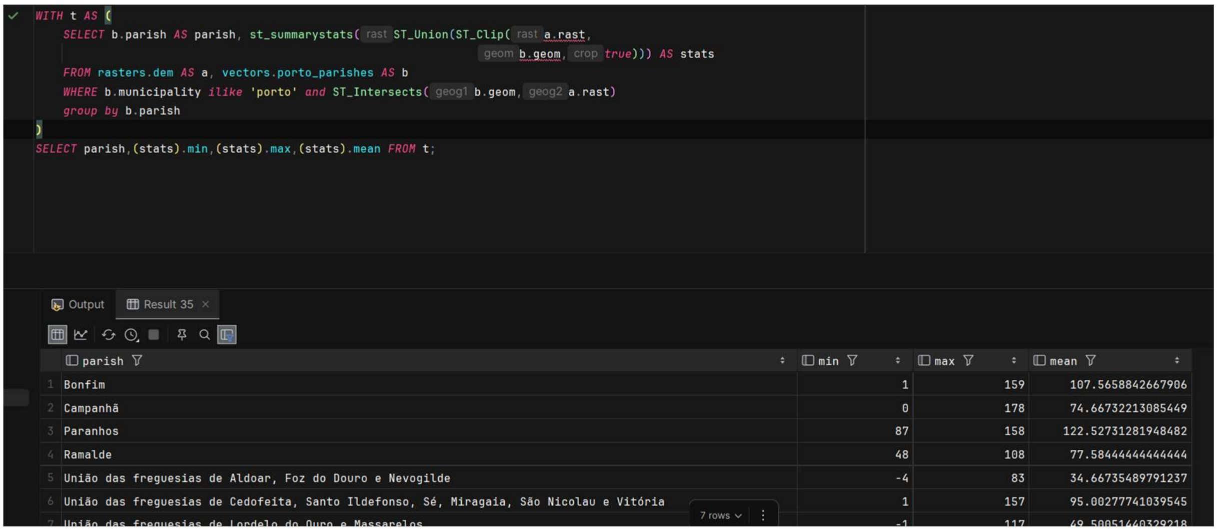
ST_SummaryStats z lepszą kontrolą złożonego typu danych



```sql
WITH t AS (
    SELECT st_summarystats( ST_Union(a.rast)) AS stats
    FROM schema_name.paranhos_dem AS a
)
SELECT (stats).min,(stats).max,(stats).mean FROM t;
```

```
  min   max   mean
1  87   158   122.52731281948482
```

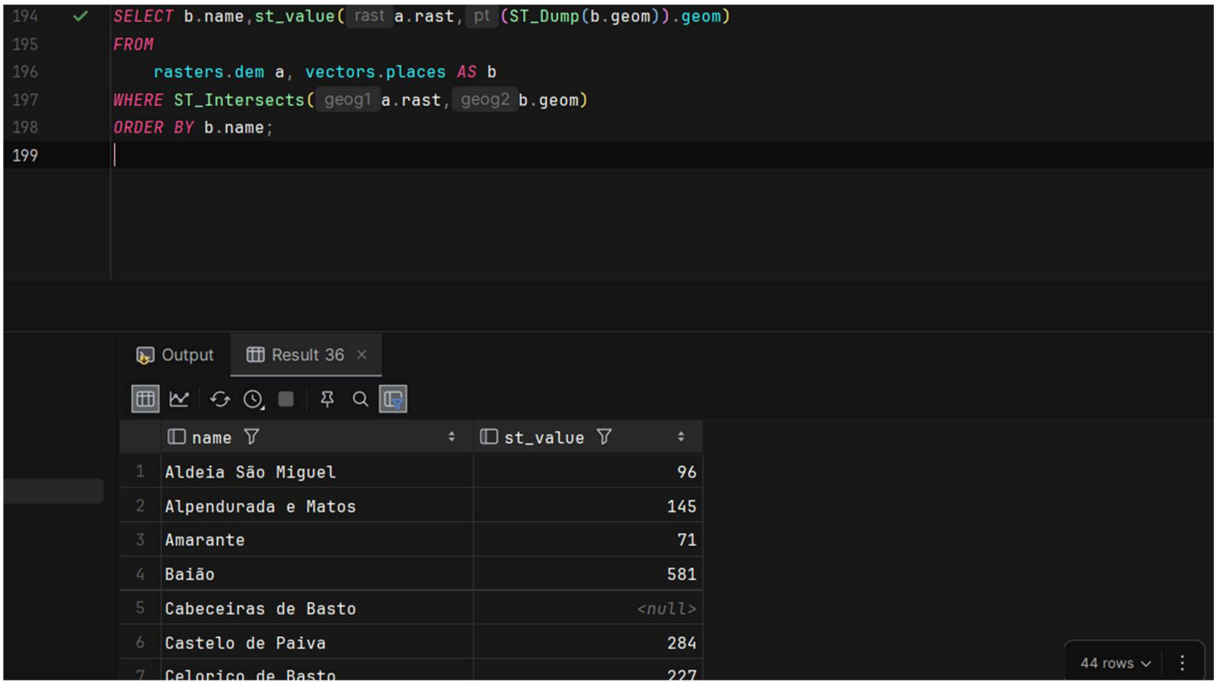
ST_SummaryStats w połączeniu z GROUP BY



```sql
WITH t AS (
    SELECT b.parish AS parish, st_summarystats(ST_Union(ST_Clip(a.rast,
                                                              b.geom, true))) AS stats
    FROM rasters.dem AS a, vectors.porto_parishes AS b
    WHERE b.municipality ilike 'porto' and ST_Intersects(b.geom, a.rast)
    group by b.parish
)
SELECT parish,(stats).min,(stats).max,(stats).mean FROM t;
```

	parish	min	max	mean
1	Bonfim	1	159	107.5658842667906
2	Campanhã	0	178	74.66732213085449
3	Paranhos	87	158	122.52731281948482
4	Ramalde	48	108	77.58444444444444
5	União das freguesias de Aldoar, Foz do Douro e Nevogilde	-4	83	34.66735489791237
6	União das freguesias de Cedofeita, Santo Ildefonso, Sé, Miragaia, São Nicolau e Vitória	1	157	95.00277741039545
7	União das freguesias de Lordelo do Ouro e Massarelos	-1	117	49.50051440329218

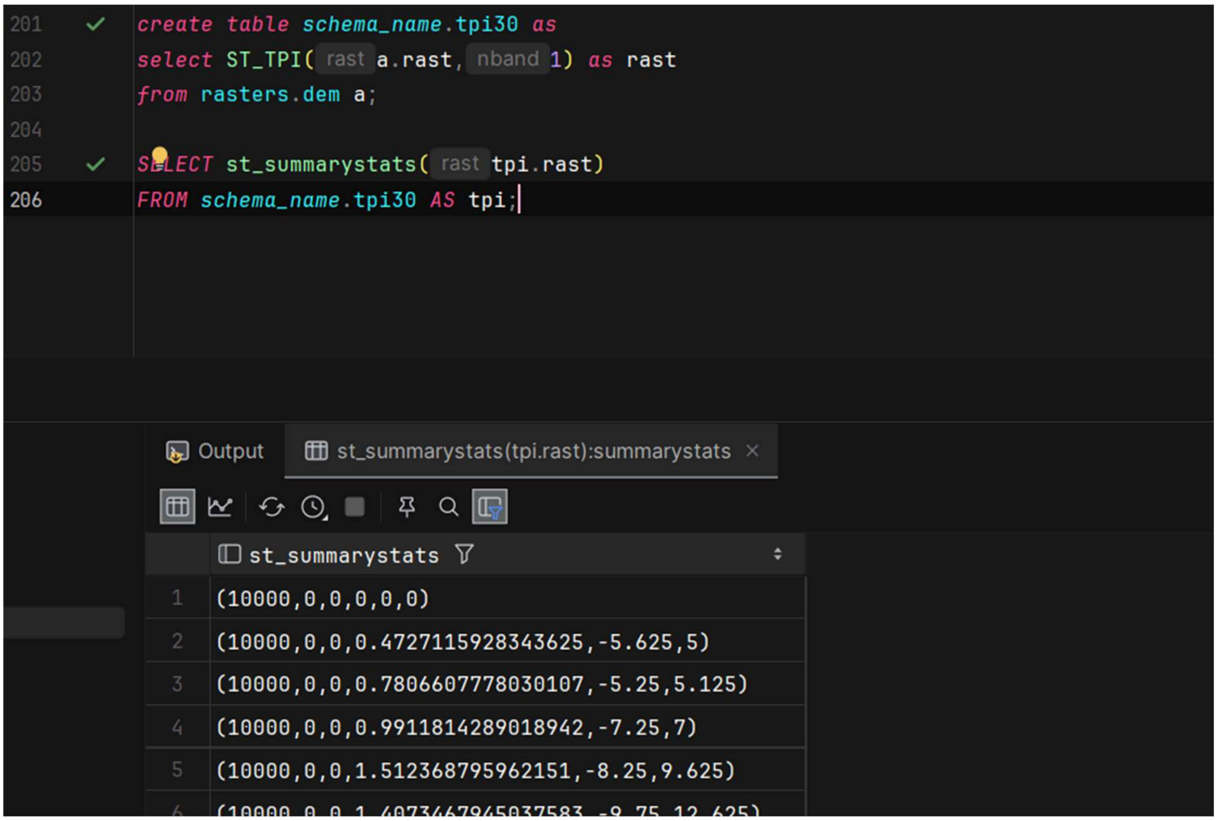
ST_Value



```sql
SELECT b.name,st_value(a.rast, (ST_Dump(b.geom)).geom)
FROM
    rasters.dem a, vectors.places AS b
WHERE ST_Intersects(a.rast, b.geom)
ORDER BY b.name;
```

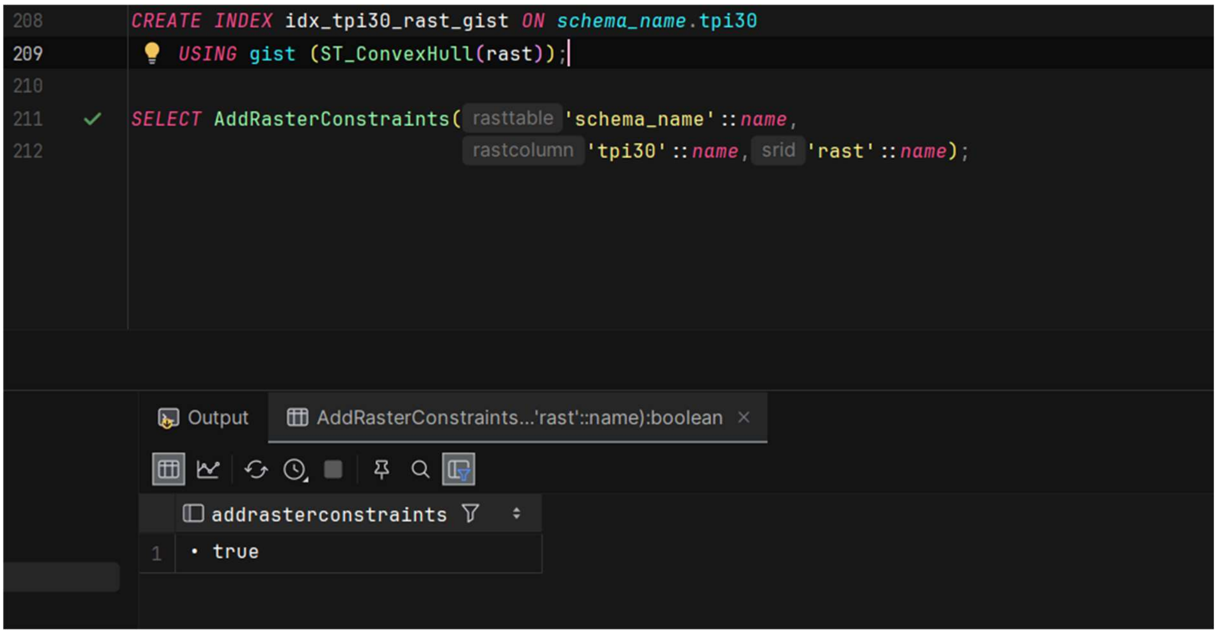
	name	st_value
1	Aldeia São Miguel	96
2	Alpendurada e Matos	145
3	Amarante	71
4	Baião	581
5	Cabeceiras de Basto	<null>
6	Castelo de Paiva	284
7	Celorico de Basto	227

ST_TPI



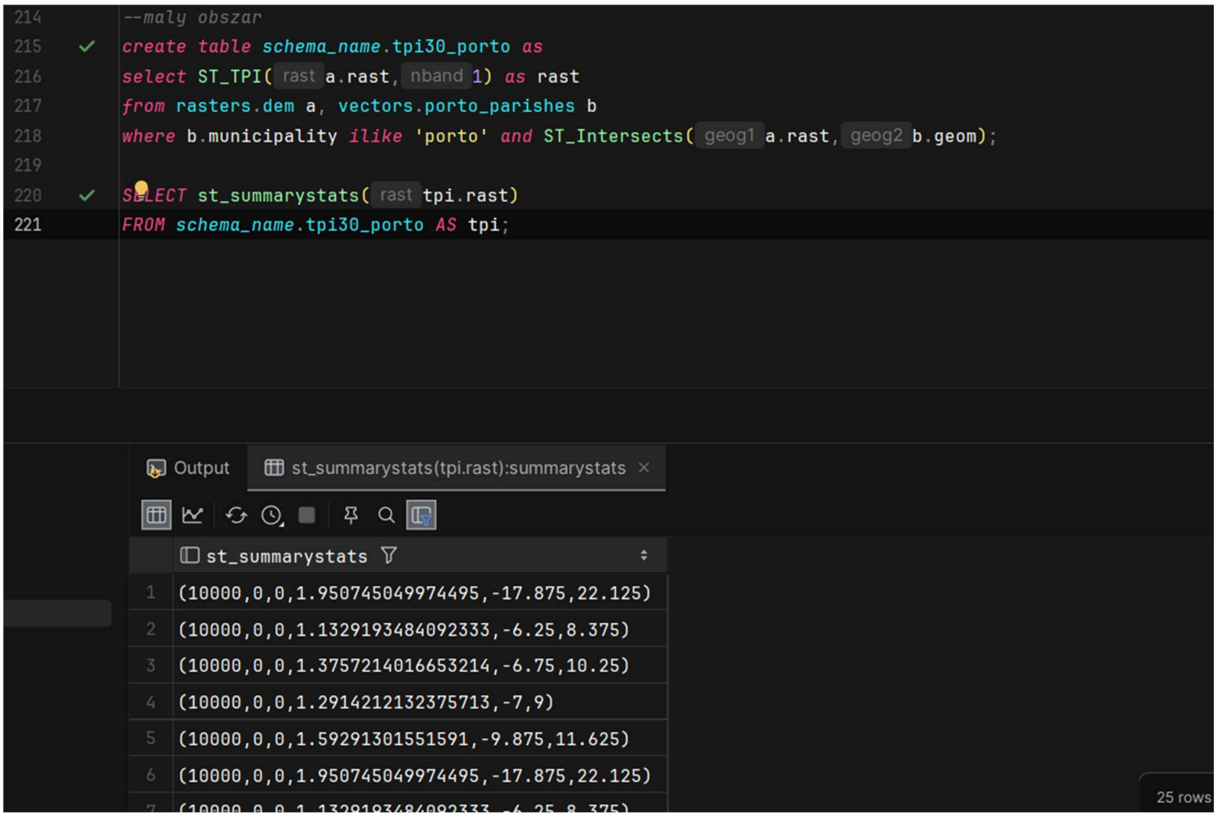
```sql
create table schema_name.tpi30 as
select ST_TPI(a.rast, 1) as rast
from rasters.dem a;

SELECT st_summarystats(tpi.rast)
FROM schema_name.tpi30 AS tpi;
```

```
   st_summarystats
1  (10000,0,0,0,0,0)
2  (10000,0,0,0.4727115928343625,-5.625,5)
3  (10000,0,0,0.7806607778030107,-5.25,5.125)
4  (10000,0,0,0.9911814289018942,-7.25,7)
5  (10000,0,0,1.512368795962151,-8.25,9.625)
6  (10000,0,0,1.4073467945037583,-9.75,12.625)
```



```sql
CREATE INDEX idx_tpi30_rast_gist ON schema_name.tpi30
 USING gist (ST_ConvexHull(rast));

SELECT AddRasterConstraints('schema_name'::name,
                            'tpi30'::name, 'rast'::name);
```

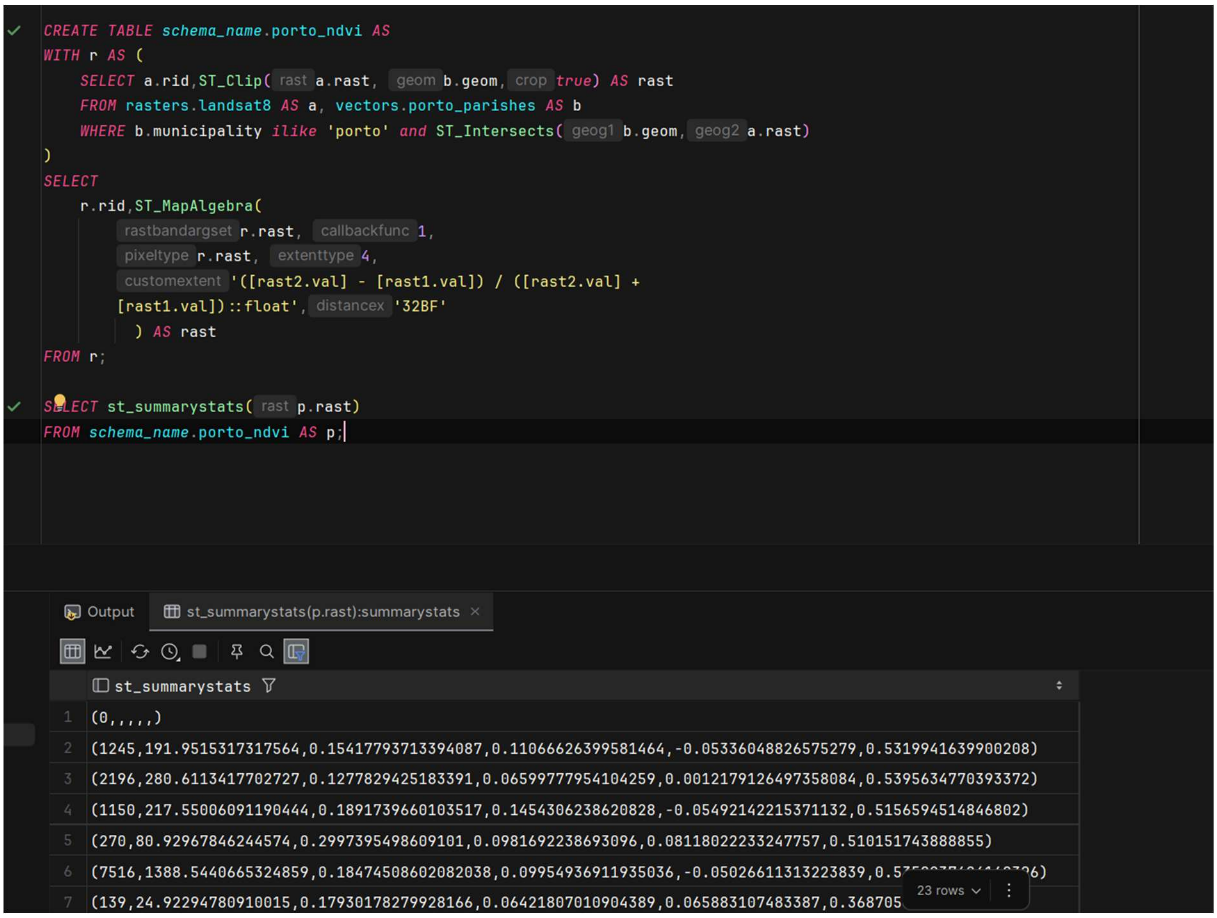
```
   addrasterconstraints
1  • true
```



```sql
--maly obszar
create table schema_name.tpi30_porto as
select ST_TPI(a.rast,1) as rast
from rasters.dem a, vectors.porto_parishes b
where b.municipality ilike 'porto' and ST_Intersects(a.rast,b.geom);

SELECT st_summarystats(tpi.rast)
FROM schema_name.tpi30_porto AS tpi;
```

```
   st_summarystats
1  (10000,0,0,1.950745049974495,-17.875,22.125)
2  (10000,0,0,1.1329193484092333,-6.25,8.375)
3  (10000,0,0,1.3757214016653214,-6.75,10.25)
4  (10000,0,0,1.2914212132375713,-7,9)
5  (10000,0,0,1.59291301551591,-9.875,11.625)
6  (10000,0,0,1.950745049974495,-17.875,22.125)
7  (10000,0,0,1.1329193484092333,-6.25,8.375)
```

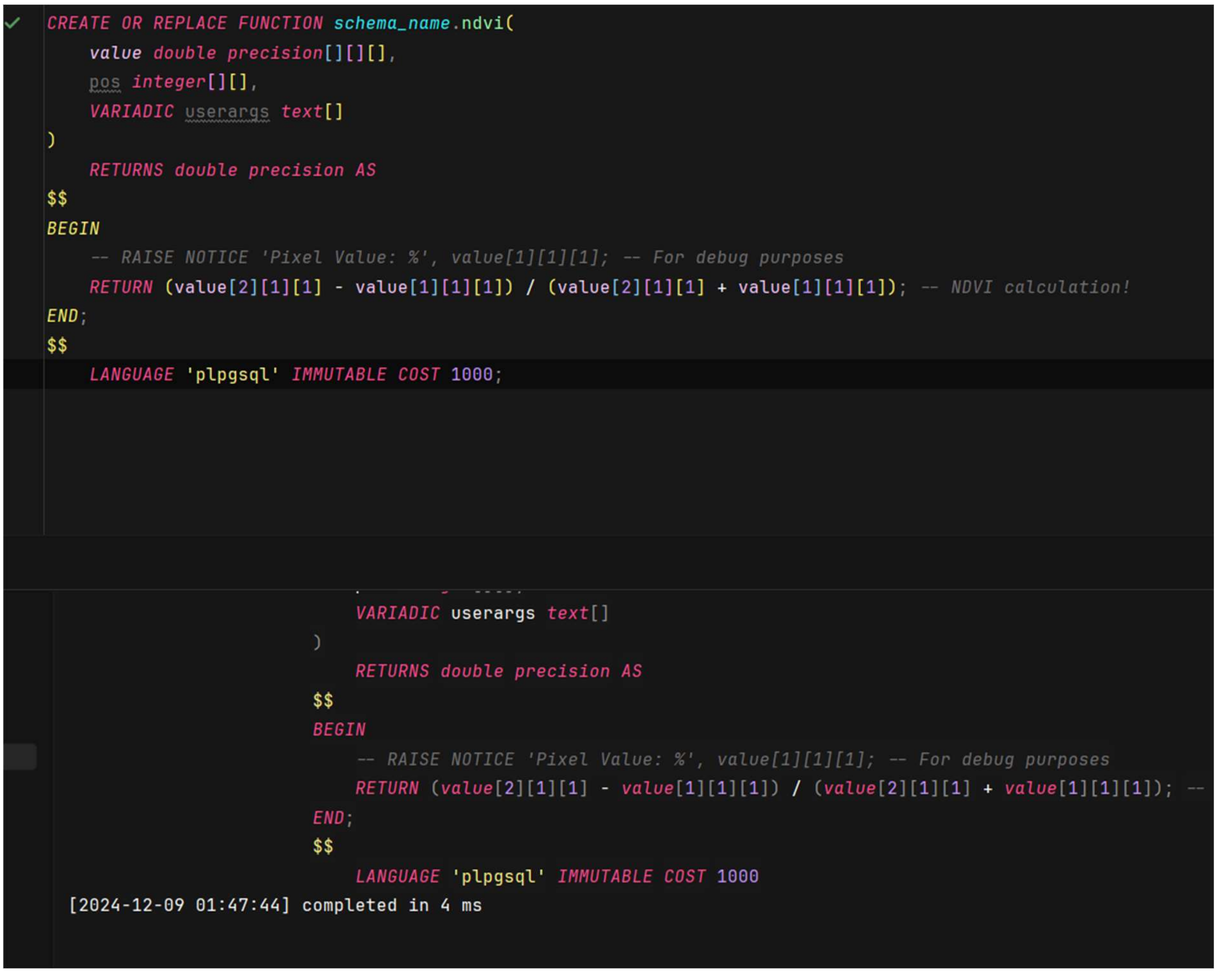
Wyrażenie Algebry Map



```sql
CREATE TABLE schema_name.porto_ndvi AS
WITH r AS (
    SELECT a.rid,ST_Clip(a.rast, b.geom, true) AS rast
    FROM rasters.landsat8 AS a, vectors.porto_parishes AS b
    WHERE b.municipality ilike 'porto' and ST_Intersects(b.geom, a.rast)
)
SELECT
    r.rid,ST_MapAlgebra(
        r.rast, 1,
        r.rast, 4,
        '([rast2.val] - [rast1.val]) / ([rast2.val] +
        [rast1.val])::float', '32BF'
          ) AS rast
FROM r;

SELECT st_summarystats(p.rast)
FROM schema_name.porto_ndvi AS p;
```

```
  st_summarystats
1 (0,,,,,)
2 (1245,191.9515317317564,0.15417793713394087,0.11066626399581464,-0.05336048826575279,0.5319941639900208)
3 (2196,280.6113417702727,0.1277829425183391,0.06599777954104259,0.0012179126497358084,0.5395634770393372)
4 (1150,217.55006091190444,0.1891739660103517,0.1454306238620828,-0.05492142215371132,0.5156594514846802)
5 (270,80.92967846244574,0.2997395498609101,0.0981692238693096,0.08118022233247757,0.510151743888855)
6 (7516,1388.5440665324859,0.18474508602082038,0.09954936911935036,-0.05026611313223839,0.5[illegible]6)
7 (139,24.92294780910015,0.17930178279928166,0.06421807010904389,0.065883107483387,0.368705
```

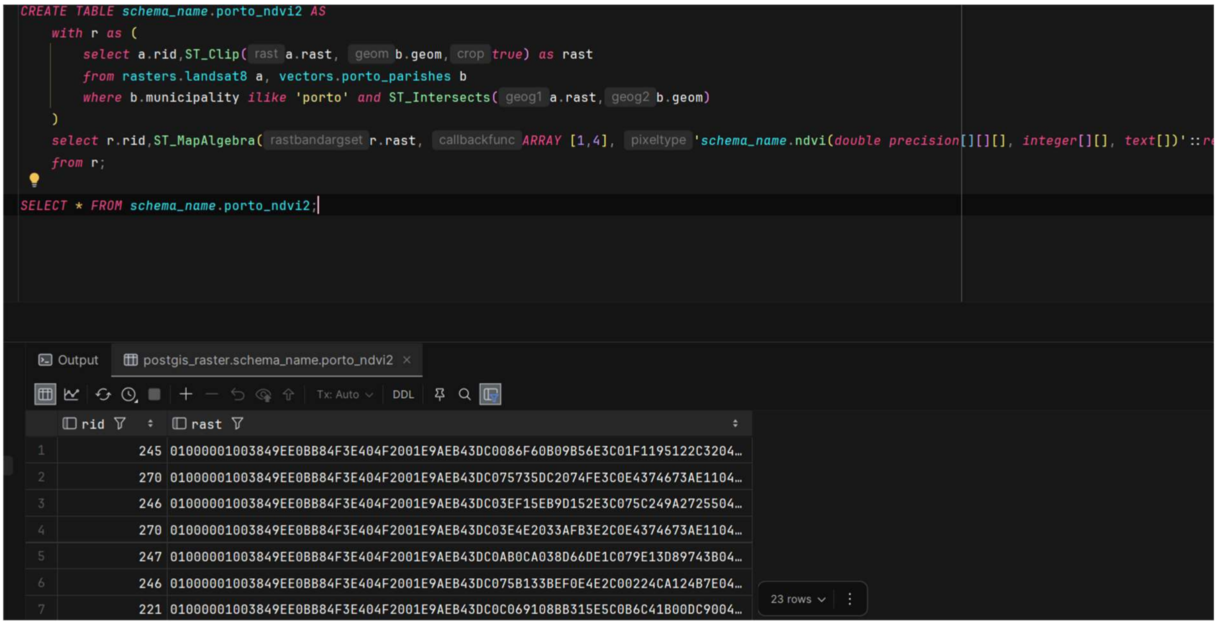
Funkcja zwrotna



```sql
CREATE OR REPLACE FUNCTION schema_name.ndvi(
    value double precision[][][],
    pos integer[][],
    VARIADIC userargs text[]
)
    RETURNS double precision AS
$$
BEGIN
    -- RAISE NOTICE 'Pixel Value: %', value[1][1][1]; -- For debug purposes
    RETURN (value[2][1][1] - value[1][1][1]) / (value[2][1][1] + value[1][1][1]); -- NDVI calculation!
END;
$$
    LANGUAGE 'plpgsql' IMMUTABLE COST 1000;
```

```
                    VARIADIC userargs text[]
                )
                    RETURNS double precision AS
                $$
                BEGIN
                    -- RAISE NOTICE 'Pixel Value: %', value[1][1][1]; -- For debug purposes
                    RETURN (value[2][1][1] - value[1][1][1]) / (value[2][1][1] + value[1][1][1]); --
                END;
                $$
                    LANGUAGE 'plpgsql' IMMUTABLE COST 1000
[2024-12-09 01:47:44] completed in 4 ms
```

Funkcje TPI



```sql
CREATE TABLE schema_name.porto_ndvi2 AS
    with r as (
        select a.rid,ST_Clip(a.rast, b.geom, true) as rast
        from rasters.landsat8 a, vectors.porto_parishes b
        where b.municipality ilike 'porto' and ST_Intersects(a.rast, b.geom)
    )
    select r.rid,ST_MapAlgebra(r.rast, ARRAY [1,4], 'schema_name.ndvi(double precision[][][], integer[][], text[])'::re
    from r;

SELECT * FROM schema_name.porto_ndvi2;
```

	rid	rast
1	245	01000001003849EE0BB84F3E404F2001E9AEB43DC0086F60B09B56E3C01F1195122C3204…
2	270	01000001003849EE0BB84F3E404F2001E9AEB43DC075735DC2074FE3C0E4374673AE1104…
3	246	01000001003849EE0BB84F3E404F2001E9AEB43DC03EF15EB9D152E3C075C249A2725504…
4	270	01000001003849EE0BB84F3E404F2001E9AEB43DC03E4E2033AFB3E2C0E4374673AE1104…
5	247	01000001003849EE0BB84F3E404F2001E9AEB43DC0AB0CA038D66DE1C079E13D89743B04…
6	246	01000001003849EE0BB84F3E404F2001E9AEB43DC075B133BEF0E4E2C00224CA124B7E04…
7	221	01000001003849EE0BB84F3E404F2001E9AEB43DC0C069108BB315E5C0B6C41B00DC9004…