

# PostGIS – raster (BDP)

## Wiktoria Kania

## Wynik przygotowań

Pierwsza operacja w PGAdminie, w celu skontrolowania, czy dane otwierane poprzez Terminal mają odpowiednią strukturę i zawartość:

Schemas (4)

- kania
- public
- rasters
  - Aggregates
  - Collations
  - Domains
  - FTS Configuration
  - FTS Dictionaries
  - FTS Parsers
  - FTS Templates
  - Foreign Tables
  - Functions
  - Materialized View
  - Operators
  - Procedures
  - Sequences
  - Tables (3)
    - dem
    - landsat8

Query
Query History

```

1
2
3 SELECT * FROM public.raster_columns WHERE r_table_name = 'dem' or r_table_name = 'landsat8';
4

```

Data Output
Messages
Notifications

	r_table_catalog	r_table_schema	r_table_name	r_raster_column_name	srid	scale_x	scale_y	blocksize_x	blocksize_y
	name	name	name	name	integer	double precision	double precision	integer	integer
1	db67	rasters	dem	rast	3763	23.3527411668	-30.7891756029	100	100
2	db67	rasters	landsat8	rast	3763	30.3114020783	-29.7057939174	128	128

## Tworzenie rastrów z istniejących rastrów i interakcja z wektorami

## ST\_Intersects

[illegible]

## ST\_Clip

[illegible]

## ST\_Union

[illegible]

## Tworzenie rastrów z wektorów (rastrowanie)

## ST\_AsRaster

The screenshot shows the PostgreSQL pgAdmin interface. On the left, the 'Tables (4)' folder is expanded, showing 'clip', 'intersects', 'porto\_parishes', and 'union'. The 'porto\_parishes' table is selected. The main pane displays a SQL query: `select * from kania.porto_parishes limit 50`. Below the query, the 'Data Output' tab shows the results of the query. The results are displayed in a table with 7 rows. The first row is labeled 'rast raster'. The second row contains a long string of zeros. The third row contains a long string of zeros. The fourth row contains a long string of zeros. The fifth row contains a long string of zeros. The sixth row contains a long string of zeros. The seventh row contains a long string of zeros.

The screenshot shows the PostgreSQL GUI interface. On the left, the 'Tables (4)' folder is expanded, showing 'clip', 'intersects', 'porto\_parishes', and 'union'. The 'Query Editor' tab is active, displaying the SQL query: `select * from kania.porto_parishes limit 50`. The 'Data Output' tab is selected, showing the results of the query. The results are displayed in a table with two columns: 'rast' and 'raster'. The first row shows a long hexadecimal string for 'rast' and a corresponding 'raster' value.

[illegible]

## ST\_Intersection

- Operators
- Procedures
- Sequences
- Tables (6)
- clip
- dumptopology
- Intersection
- Intersects
- porto\_parishes
- union
- Trigger Functions
- Types
- Views
- public
- rasters
- Aggregates
- Collations
- Domains
- FTS Configuration

```

81 select * from kania.intersection
82 limit 50
--

```

Data Output		Messages	Notifications
	<div> <div>rid</div> <div>integer</div> </div>		
	<div> <div>geom</div> <div>geometry</div> </div>		
1	221	0103000020B30E000010000005000000086F60B9B563C0E32C703B809504410A080B00325AE3C0E32C703B809504417958A835959E3C017B7D1009405441086F60B09B563C0B08B5943A8950	
2	221	0103000020B30E00001000000500000003EF15EB9D152E3C0E32C703B80950441086F60B09B563C0E32C703B80950441086F60B09B563C0B08B5943A89504413EF15EB9D152E3C01EAC6512C2950	
3	221	0103000020B30E0000100000040000000B61697A576DE3C0DAE4F895929404410EDB000346E63C0DAE4F89592940441BF61697A576DE3C01B7DD4649B940441BF61697A576DE3C0DAE4F89592940	
4	221	0103000020B30E0000100000060000000F5E36783BD693C0DAE4F89592940441BF61697A576DE3C0DAE4F89592940441BF61697A576DE3C01B7DD4649B940441401361C35658E3C0045602AD940	
5	221	0103000020B30E00001000000500000002C6666CC365E3C0DAE4F89592940441F5E36783BD693C0DAE4F89592940441F5E36783BD693C03B05C3B48C9404412C66668CC365E3C0D605C213DB940	
6	221	0103000020B30E000010000005000000063E86495F961E3C0DAE4F895929404412C66668CC365E3C0DAE4F895929404412C66668CC365E3C0D605C213B0B94044163E86495F961E3C01736B8F2F9940	
7	221	0103000020B30E00001000000500000009A6A39E2F5EE3C0DAE4F8959294044163E86495F961E3C0DAE4F8959294044163E86495F961E3C01736B8F2F99404419A6A639E2F5EE3C00C67A11B9504	
8	221	0103000020B30E00001000000600000001EC6147655AE3C0D19C81F0A49304419A6A639E2F5EE3C0D19C81F0A49304419A6A639E2F5EE3C00C67A11B950444116328E5E3C01C76C13221950	
9	221	0103000020B30E000010000006000000086F60B9B563C0E32C703B80950441086F60B09B563C0D19C81F0A49304411EC6147655AE3C0D19C81F0A49304411EC6147655AE3C0C37E7CADA79950	
10	221	0103000020B30E00001000000500000003EF15EB9D152E3C0E32C703B809504413EF15EB9D152E3C0D19C81F0A4930441086F60B09B563C0D19C81F0A4930441086F60B09B563C0E32C703B80950	

Total rows: 50 of 50
Query complete 00:00:00.059

Materialized View

Operators

Procedures

Sequences

Tables (6)

clip

dumppolylgons

Intersection

Intersects

porto\_parishes

union

Trigger Functions

Types

Views

public

rasters

Aggregates

Collations

Domains

FTS Configuration

```

89 select * from kania.dumppolylgons
90 limit 50
91
92
93 -- Analyze results

```

Data Output Messages Notifications

	rid	integer	geom	geometry
1	221	0103000020B30E000010000005000000A6A639E2F5EE3C0E32C703B809504419A6A639E2F5EE3C0D19C81F0A4930441D0EC61A7655AE3C0D19C81F0A4930441D0EC61A7655AE3C0E32C703B809504		
2	221	0103000020B30E000010000005000000D0EC61A7655AE3C0E32C703B80950441D0EC61A7655AE3C0D19C81F0A4930441076F60B09B56E3C0D19C81F0A4930441076F60B09B56E3C0E32C703B809504		
3	221	0103000020B30E000010000005000000076F60B09B56E3C0E32C703B80950441076F60B09B56E3C0D19C81F0A49304413EF15EB9D152E3C0D19C81F0A49304413EF15EB9D152E3C0E32C703B809504		
4	221	0103000020B30E0000100000050000000A4B7820389E3C0DAE4F895929404119A4B7820389E3C0D19C81F0A4930441D0C07629718FE3C0D19C81F0A4930441D0C07629718FE3C0DAE4F89592940		
5	221	0103000020B30E000010000007000000C3586F567F7CE3C0DAE4F89592940411E3586F567F7CE3C0C8540A4B79204411ADB6D5F875B783C0C8540A4B79204411ADB6D5F875B783C0D19C81F0A4930		
6	221	0103000020B30E000010000005000000087D6FA612171E3C0DAE4F8959294041187D6FA612171E3C0C8540A4B7920441BE61697A576D63C0C8540A4B7920441BE61697A576D63C0DAE4F89592940		
7	221	0103000020B30E0000100000050000000BE61697A576D63C0DAE4F89592940411BE61697A576D63C0C8540A4B7920441F5E36783BD69E3C0C8540A4B7920441F5E36783BD69E3C0DAE4F89592940		
8	221	0103000020B30E00001000000500000005E36783BD69E3C0DAE4F89592940411F5E36783BD69E3C0C8540A4B79204412C66668CC36E3C0C8540A4B79204412C66668CC36E3C0DAE4F89592940		
9	221	0103000020B30E000010000005000000002C66668CC36E3C0DAE4F895929404112C66668CC36E3C0C8540A4B792044163E849F9F961E3C0C8540A4B792044163E849F9F961E3C0DAE4F89592940		
10	221	0103000020B30E000010000005000000063E849F9F961E3C0DAE4F8959294041163E849F9F961E3C0C8540A4B79204419A6A639E2F5EE3C0C8540A4B79204419A6A639E2F5EE3C0DAE4F89592940		

Total rows: 50 of 50      Query complete 00:00:00.051

Ln 90, Col

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[illegible][illegible]

The screenshot shows the QGIS interface with the SQL console and the Data Output panel. The SQL console displays a query to calculate statistics for the 'paranhos\_dem' layer. The Data Output panel shows the results of the query, including the number of rows and the completion time.

**SQL Console:**

```
-- Publiczenie statystyk rastra dla kafelka
129 SELECT st_summarystats(a.rast) AS stats
130 FROM kania.paranhos_dem AS a;
131
```

**Data Output Panel:**

	stats
	summarystats
1	(2616,278385,106.41628440366972,11.622628762211638,87,14...
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)

**Summary:** Total rows: 4 of 4. Query complete 00:00:00.041



## ST\_SummaryStats oraz Union

The screenshot shows a SQL IDE interface. On the left, a sidebar lists database objects: Functions, Materialized View, Operators, Procedures, 1.3 Sequences, Tables (10), and Trigger Functions. The 'Tables (10)' folder is expanded, showing a list of tables including clip, dumppolygons, intersection, intersects, landsat\_nir, paranhos\_dem, paranhos\_slope, paranhos\_slope, porto\_parishes, union, and Trigger Functions. The main editor displays a SQL query:

```
132 -- obliczenie jednej statystyki wybranego rastra.  
133 SELECT st_summarystats(ST_Union(a.rast))  
134 FROM kania.paranhos_dem AS a;  
135
```

Below the query editor, there are tabs for 'Data Output', 'Messages', and 'Notifications'. The 'Data Output' tab is active, showing a table with the results of the query:

	st_summarystats summarystats
1	(9977,1222455,122.52731281948482,16.908004202736272,87,15...

At the bottom, a status bar indicates 'Total rows: 1 of 1' and 'Query complete 00:00:00.038'.

## ST\_SummaryStats z lepszą kontrolą złożonego typu danych

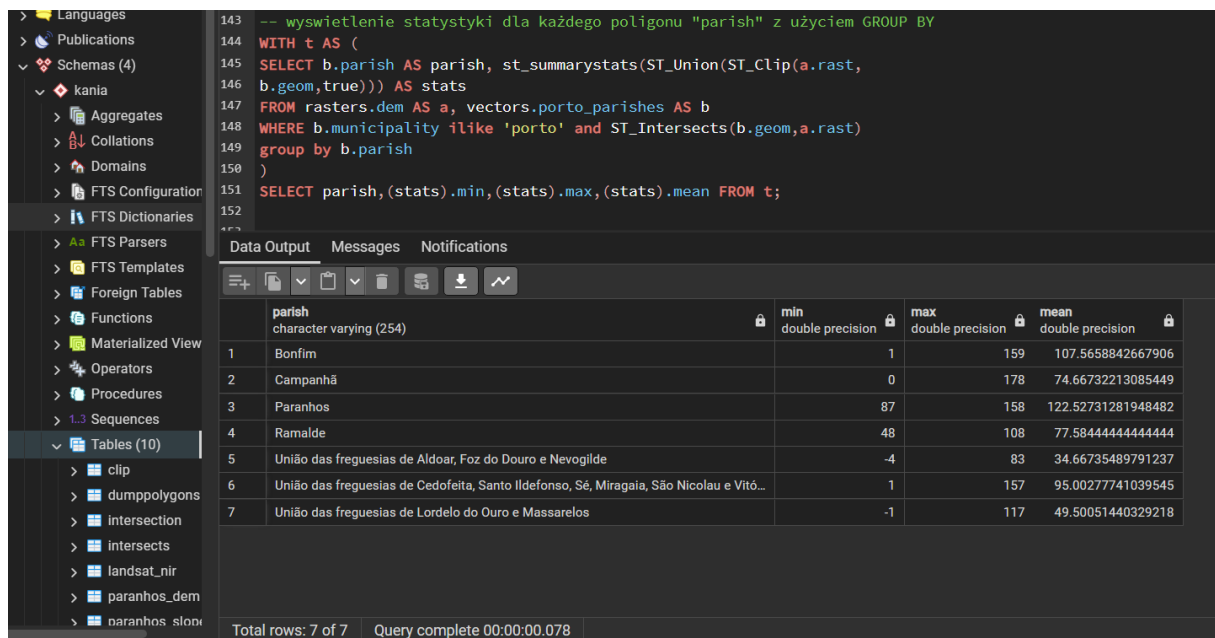
The screenshot shows a SQL IDE interface. On the left, a sidebar lists database objects: Foreign Tables, Functions, Materialized View, Operators, Procedures, 1.3 Sequences, Tables (10), and Trigger Functions. The 'Tables (10)' folder is expanded, showing a list of tables including clip, dumppolygons, intersection, intersects, landsat\_nir, paranhos\_dem, paranhos\_slope, paranhos\_slope, porto\_parishes, union, and Trigger Functions. The main editor displays a SQL query:

```
136 -- lepsza kontrola złożonego typu danych  
137 WITH t AS (  
138 SELECT st_summarystats(ST_Union(a.rast)) AS stats  
139 FROM kania.paranhos_dem AS a  
140 )  
141 SELECT (stats).min,(stats).max,(stats).mean FROM t;  
142
```

Below the query editor, there are tabs for 'Data Output', 'Messages', and 'Notifications'. The 'Data Output' tab is active, showing a table with the results of the query:

	min double precision	max double precision	mean double precision
1	87	158	122.52731281948482

## ST\_SummaryStats w połączeniu z GROUP BY

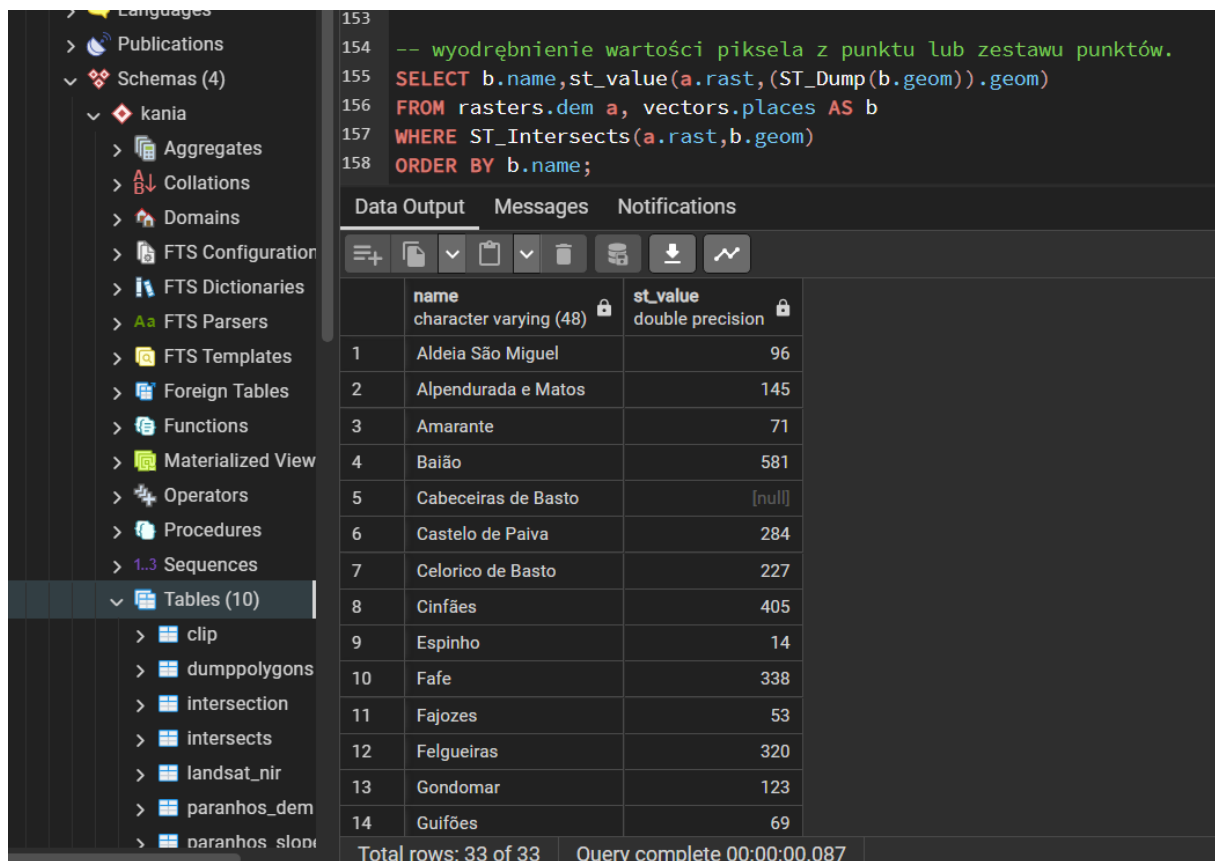


```
143 -- wyświetlenie statystyki dla każdego poligonu "parish" z użyciem GROUP BY
144 WITH t AS (
145 SELECT b.parish AS parish, st_summarystats(ST_Union(ST_Clip(a.rast,
146 b.geom,true))) AS stats
147 FROM rasters.dem AS a, vectors.porto_parishes AS b
148 WHERE b.municipality ilike 'porto' and ST_Intersects(b.geom,a.rast)
149 group by b.parish
150 )
151 SELECT parish,(stats).min,(stats).max,(stats).mean FROM t;
```

	parish character varying (254)	min double precision	max double precision	mean double precision
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 Vitó...	1	157	95.00277741039545
7	União das freguesias de Lordelo do Ouro e Massarelos	-1	117	49.50051440329218

Total rows: 7 of 7    Query complete 00:00:00.078

## ST\_Value



```
153
154 -- wyodrębnienie wartości piksela z punktu lub zestawu punktów.
155 SELECT b.name,st_value(a.rast,(ST_Dump(b.geom)).geom)
156 FROM rasters.dem a, vectors.places AS b
157 WHERE ST_Intersects(a.rast,b.geom)
158 ORDER BY b.name;
```

	name character varying (48)	st_value double precision
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
8	Cinfães	405
9	Espinho	14
10	Fafe	338
11	Fajozes	53
12	Felgueiras	320
13	Gondomar	123
14	Guifões	69

Total rows: 33 of 33    Query complete 00:00:00.087

## ST\_TPI

The screenshot shows a PostgreSQL IDE with a sidebar on the left listing various database objects. The main window displays SQL code for creating a table and index. The code is as follows:

```
162 -- obliczanie TPI
163 CREATE TABLE kania.tpi30 AS
164 SELECT ST_TPI(a.rast,1) AS rast
165 FROM rasters.dem a;
166
167 -- Poniższa kwerenda utworzy indeks przestrzenny:
168 CREATE INDEX idx_tpi30_rast_gist ON kania.tpi30
169 USING gist (ST_ConvexHull(rast));
170 -- Dodanie constraintów:
171 SELECT AddRasterConstraints('kania'::name,
172 'tpi30'::name,'rast'::name);
173
```

Below the code, there is a 'Data Output' tab showing a single row of data:

	addrasterconstraints
1	true

The status bar at the bottom indicates 'Total rows: 1 of 1' and 'Query complete 00:00:29.348'.

The screenshot shows a PostgreSQL IDE with a sidebar on the left listing various database objects. The main window displays SQL code for creating a table and index. The code is as follows:

```
173 -- ZADANIE Tworzenie tabeli tpi30 dla obszaru gminy Porto - ograniczenie czasu wykonywania
174 CREATE TABLE kania.tpi30_porto AS
175 SELECT ST_TPI(a.rast, 1) AS rast
176 FROM rasters.dem AS a, vectors.porto_parishes AS p
177 WHERE ST_Intersects(a.rast, p.geom) AND p.municipality ILIKE 'porto';
178
179 -- Poniższa kwerenda utworzy indeks przestrzenny:
180 CREATE INDEX idx_tpi30_rast_gist ON kania.tpi30_porto
181 USING gist (ST_ConvexHull(rast));
182 -- Dodanie constraintów:
183 SELECT AddRasterConstraints('kania'::name,
184 'tpi30_porto'::name,'rast'::name);
185
```

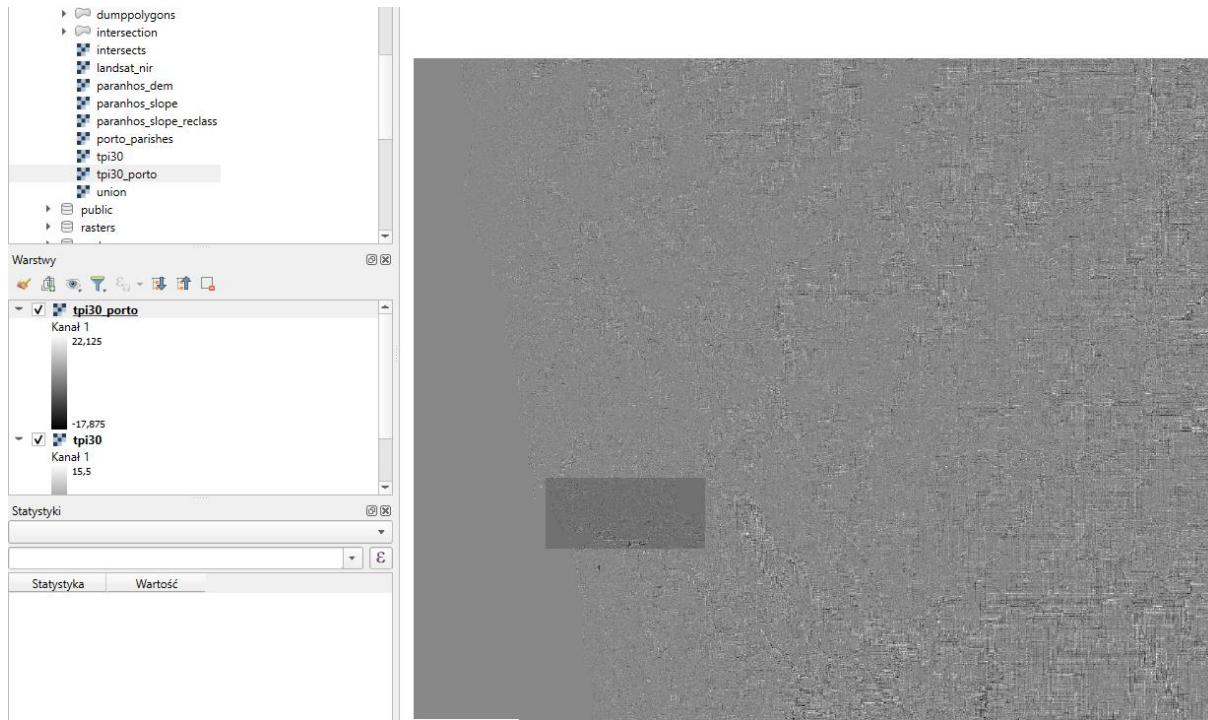
Below the code, there is a 'Data Output' tab showing a single row of data:

	addrasterconstraints
1	true

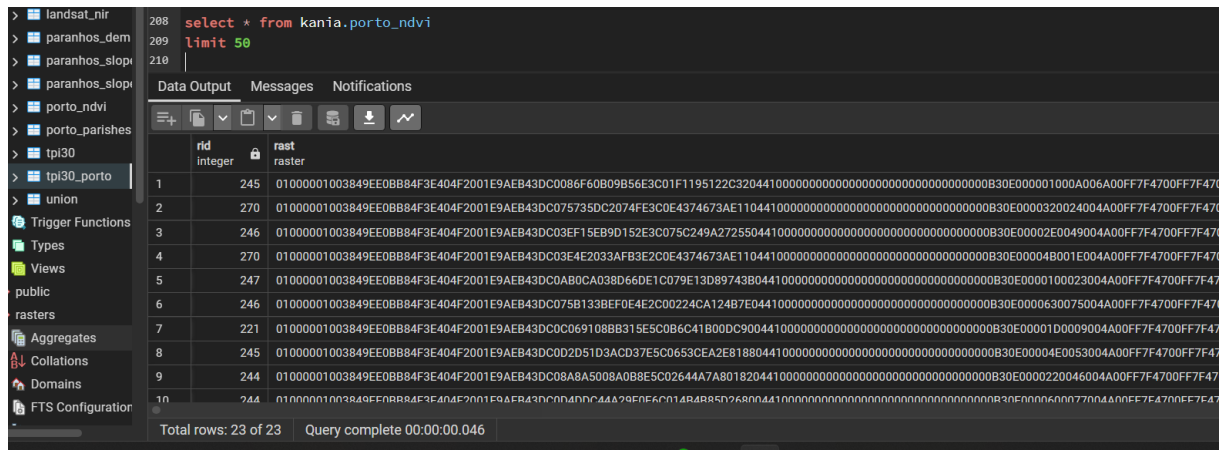
The status bar at the bottom indicates 'Total rows: 1 of 1' and 'Query complete 00:00:01.242'.

**DLA OGRANICZONEGO OBSZARU, CZAS WYKONANIA ZAPYTANIA WYNOŚI 1.242 S, A NIE 29.348, JAK W PRZYPADKU POCZĄTKOWYM.**





## Wyrażenie Algebry Map



## Funkcja zwrotna

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