

# Sistem Informasi Geografis



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# Data Spatial

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# Geographical Information System



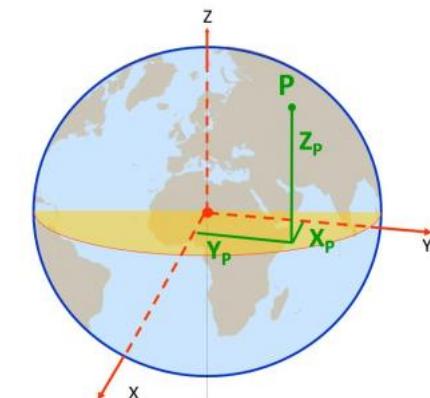
# Definisi Data Spatial

**Data spasial** adalah data yang terkait dengan objek, fenomena, serta hubungan di antaranya terhadap suatu posisi dalam ruang bumi.

Data spasial mengandung informasi mengenai bumi, termasuk di permukaan bumi, bawah permukaan bumi, perairan, dan bawah atmosfer. (Rajabifard dan Williamson, 2000)

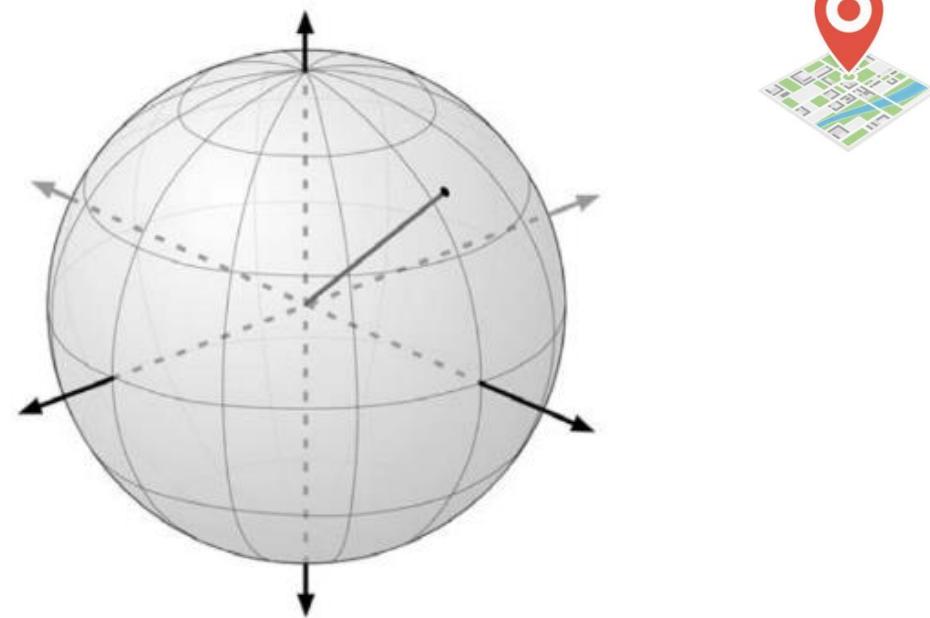
Spatial Data: Informasi tentang objek dengan sistem geografis (GPS)

- *locations*
- *Shapes*



- Location: a point on earth is specified by its *latitude* and *longitude*

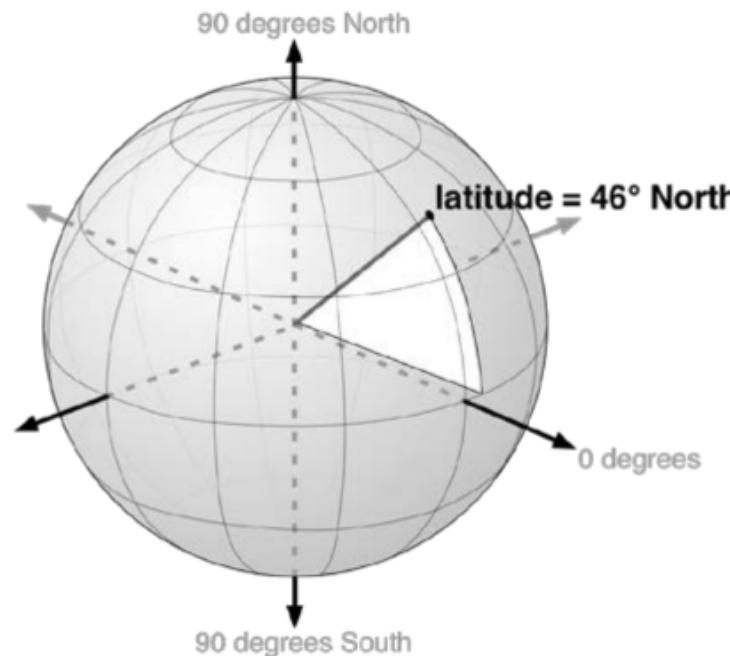
Imagine a line segment between the center of the Earth and a location



# Geospatial Data

- Location: a point on earth is specified by its *latitude* and *longitude*

**Latitude** is the angle in the north-south direction

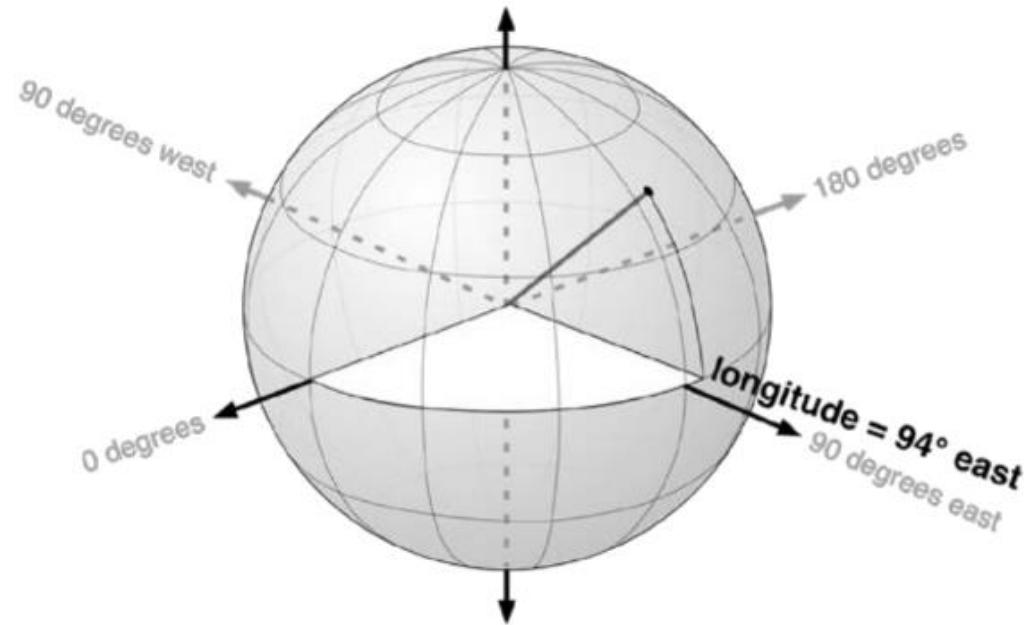


Depok City / Coordinates

6.4025° S, 106.7942° E

- Location: a point on earth is specified by its *latitude* and *longitude*

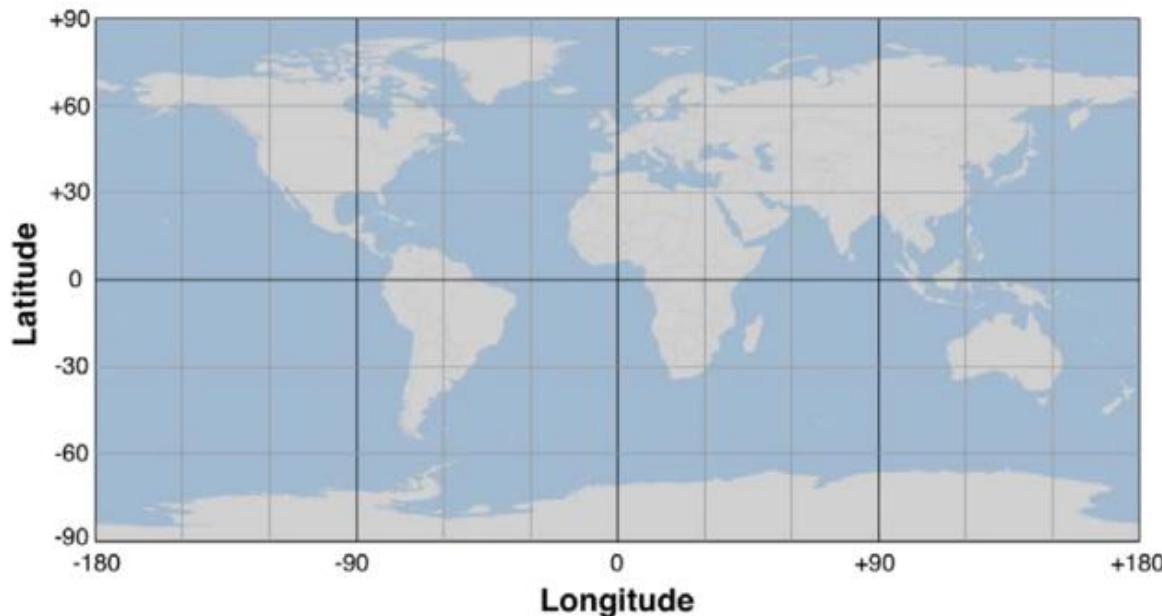
**Longitude** is the angle in the east-west direction



Depok City / Coordinates  
 $6.4025^{\circ}$  S,  $106.7942^{\circ}$  E

# Geospatial Data

- Location: a point on earth is specified by its *latitude* and *longitude*



- degrees, minutes, seconds  
 $176^{\circ}14'4''$
- degrees and decimal minutes  
 $176^{\circ}14.066'$
- decimal degrees  
 $176.234436^{\circ}$

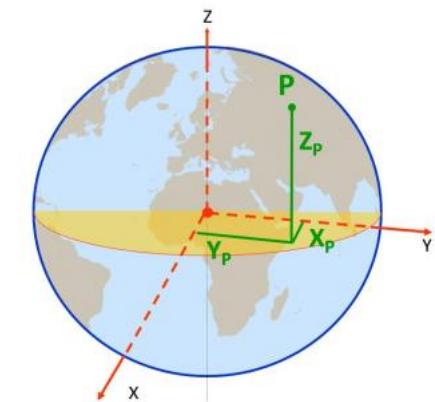


Depok City / Coordinates

$6.4025^{\circ}$  S,  $106.7942^{\circ}$  E

## Pentingnya informasi mengenai posisi lokasi

- Memberikan pengetahuan tentang fenomena yang terjadi di suatu tempat yang memungkinkan diketahui hubungannya dengan fenomena lain yang terjadi, baik di tempat yang sama maupun tempat yang berbeda
- Memungkinkan diperhitungkannya jarak, dikembangkan sebagai peta, serta dianalisis untuk memberikan arahan dan pengambilan keputusan yang bersifat kompleks



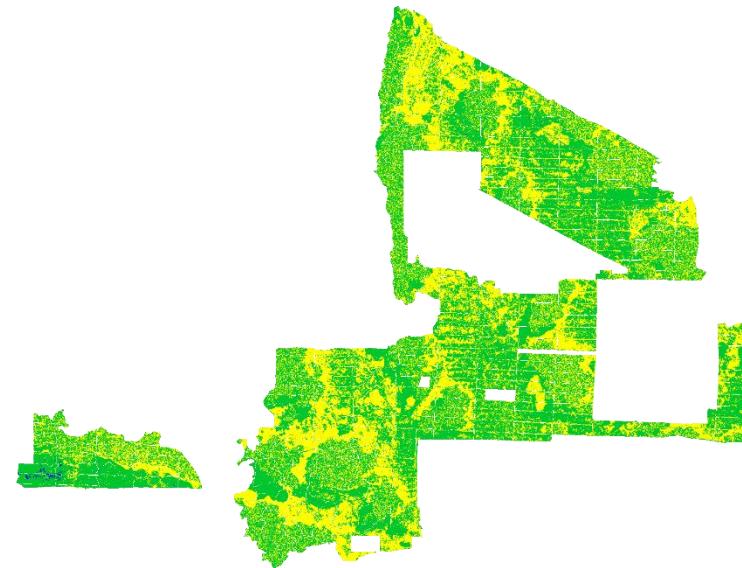
- **Temporal** (dimensi waktu)
  - Contoh: informasi tanggal terjadinya erupsi gunung merapi
- **Tematik** (dimensi topik)
  - Contoh: topik curah hujan pada suatu peta curah hujan
- **Spasial** (dimensi ruang)
  - Contoh: relief hutan tropis pada suatu peta hutan tropis

# Dimensi Data Spatial :: Waktu

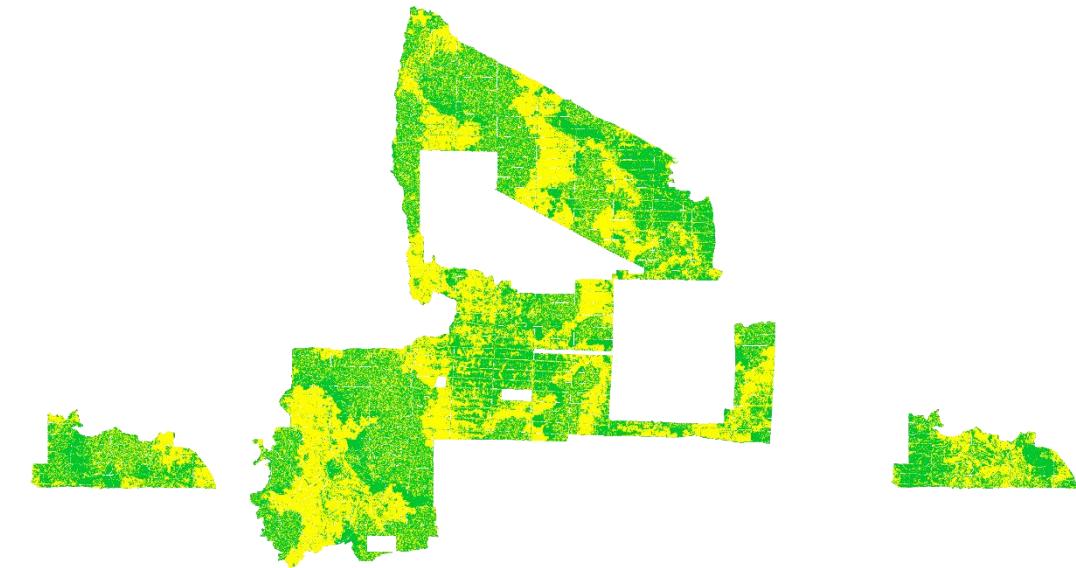
Juni 2023



Juli 2023



Agustus 2023



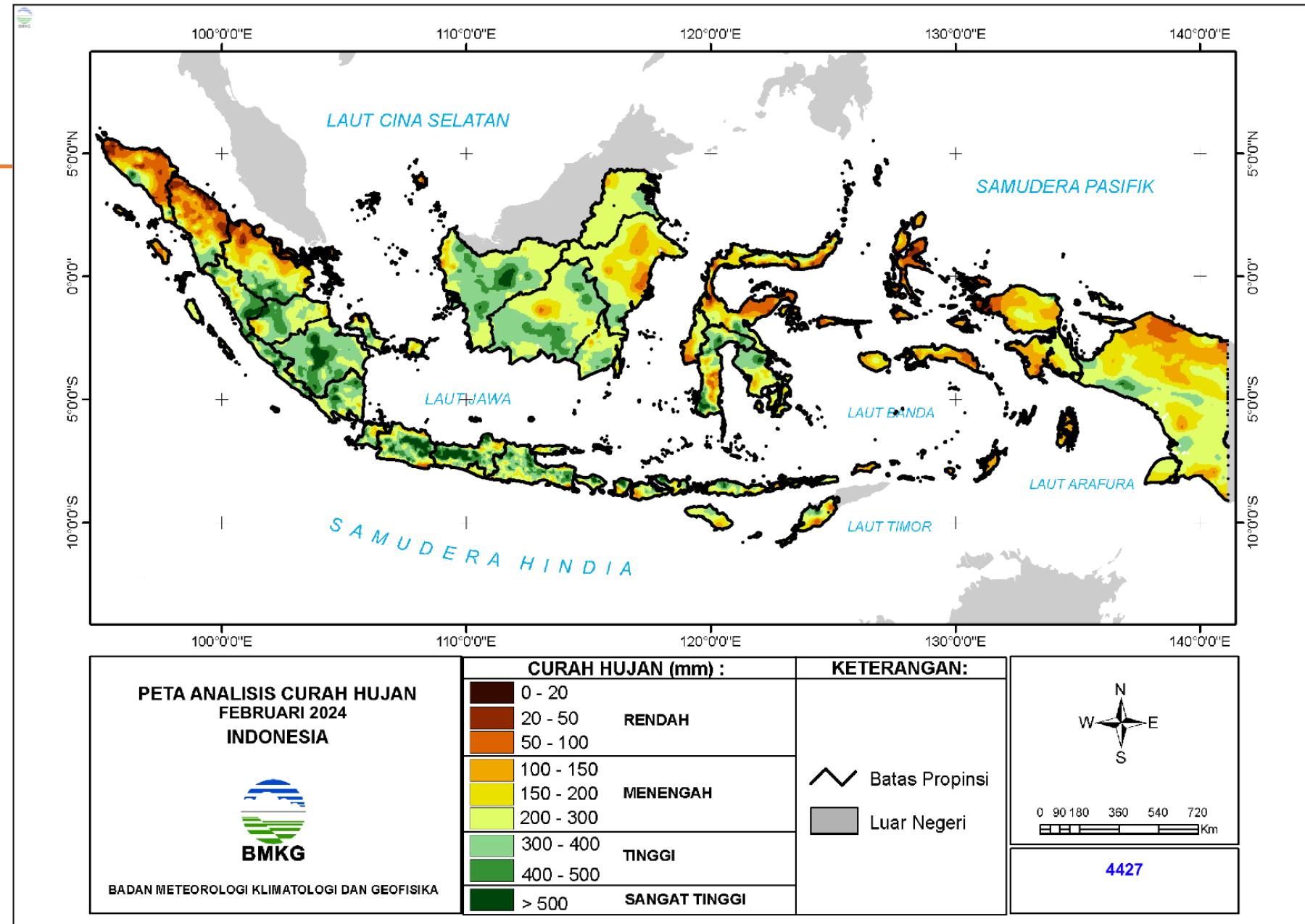
Legenda

 <= 2.1%
 > 2.1% - 2.3%
 > 2.3% - 2.5%

 > 2.5% - 2.7%
 > 2.7% - 2.9%
 > 2.9%

Peta Sebaran Nitrogen di Perkebunan Sawit, PT  
Kalianusa, Kalimantan Timur

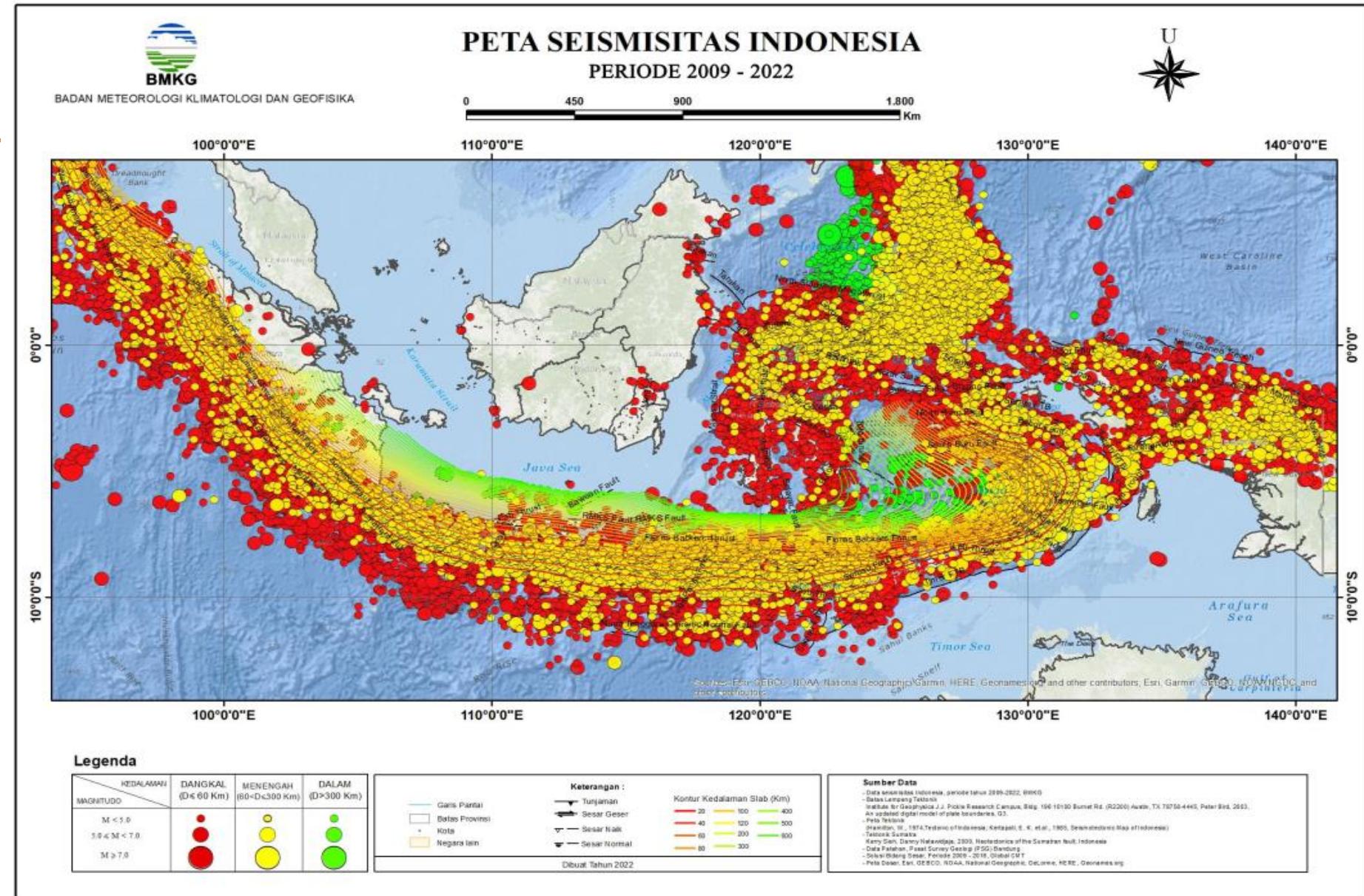
# Dimensi Data Spatial :: Topik



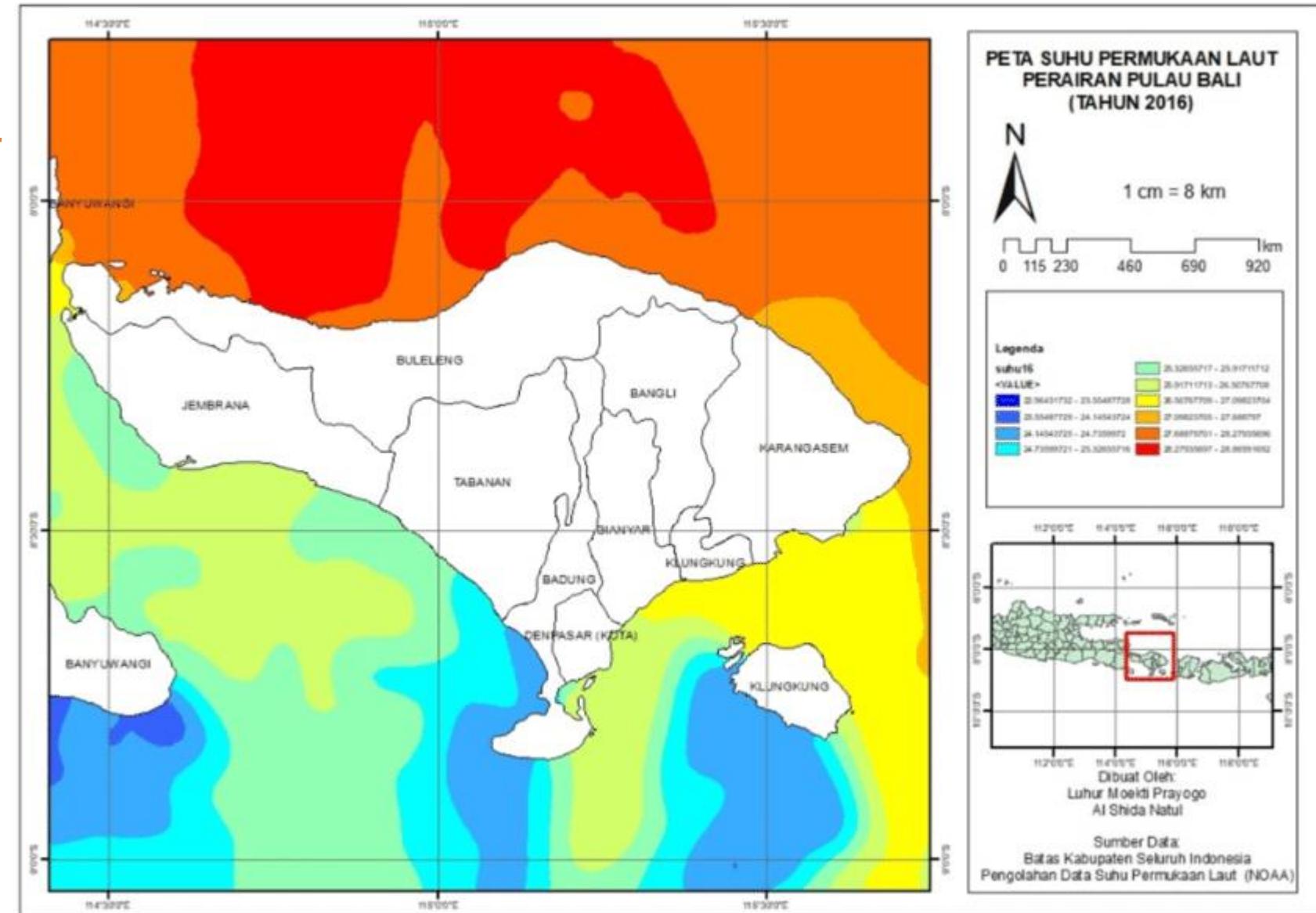
## Dimensi Data Spatial :: Ruang



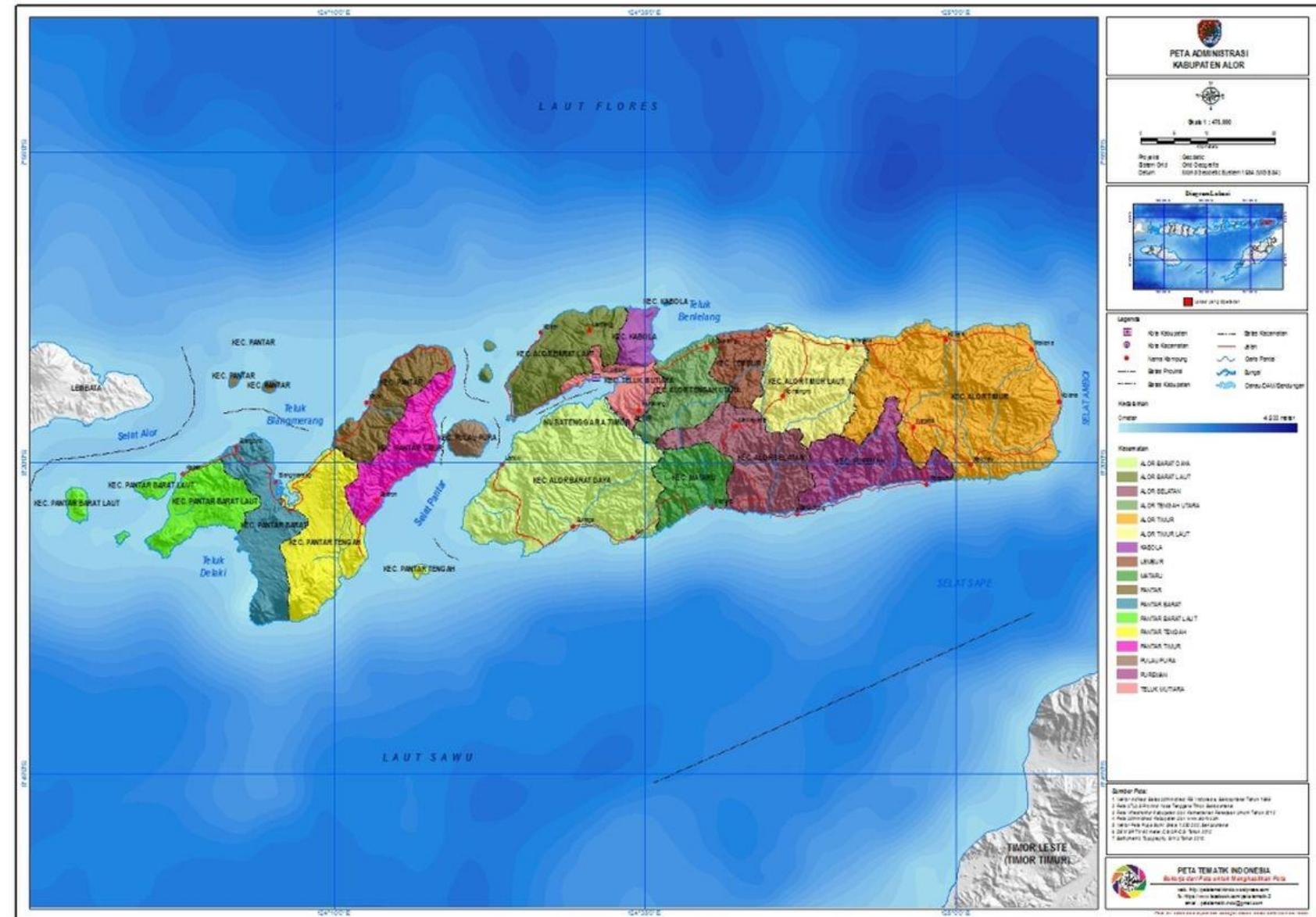
# Dimensi Data Spatial :: ?



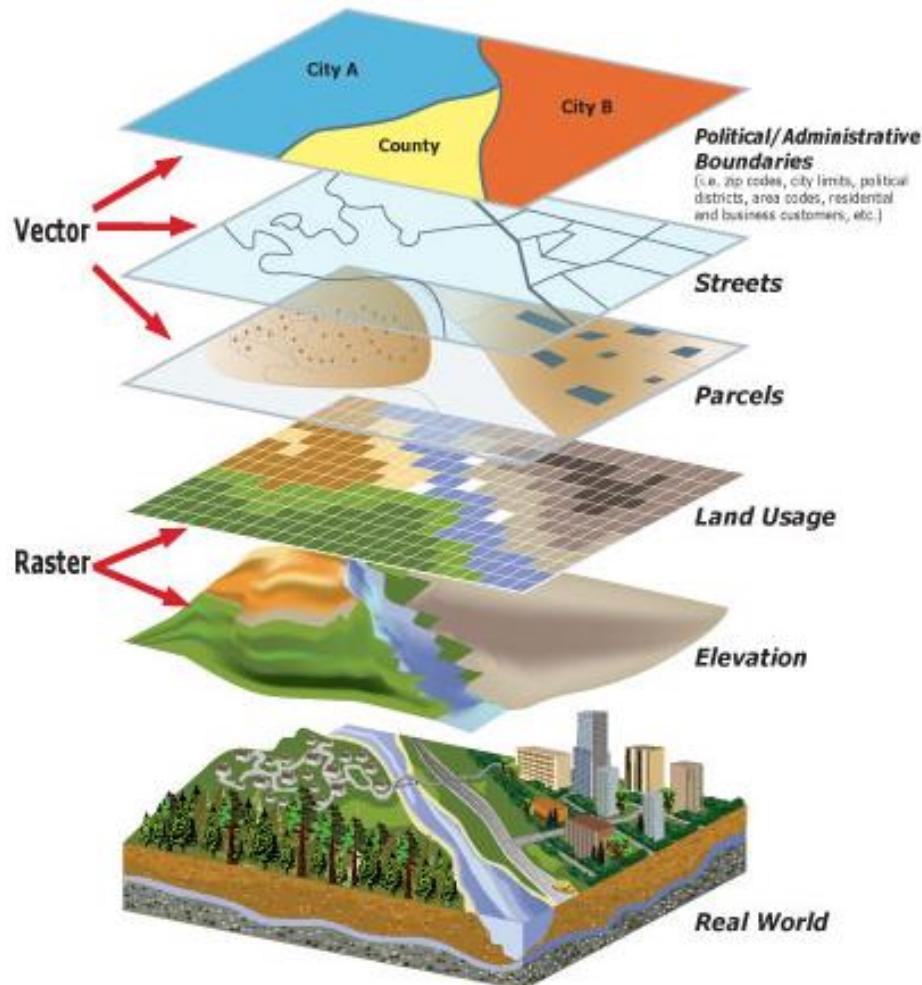
# Dimensi Data Spatial :: ?



# Dimensi Data Spatial :: ?



# Sumber data GIS :: Spatial Data



## • Data Vector:

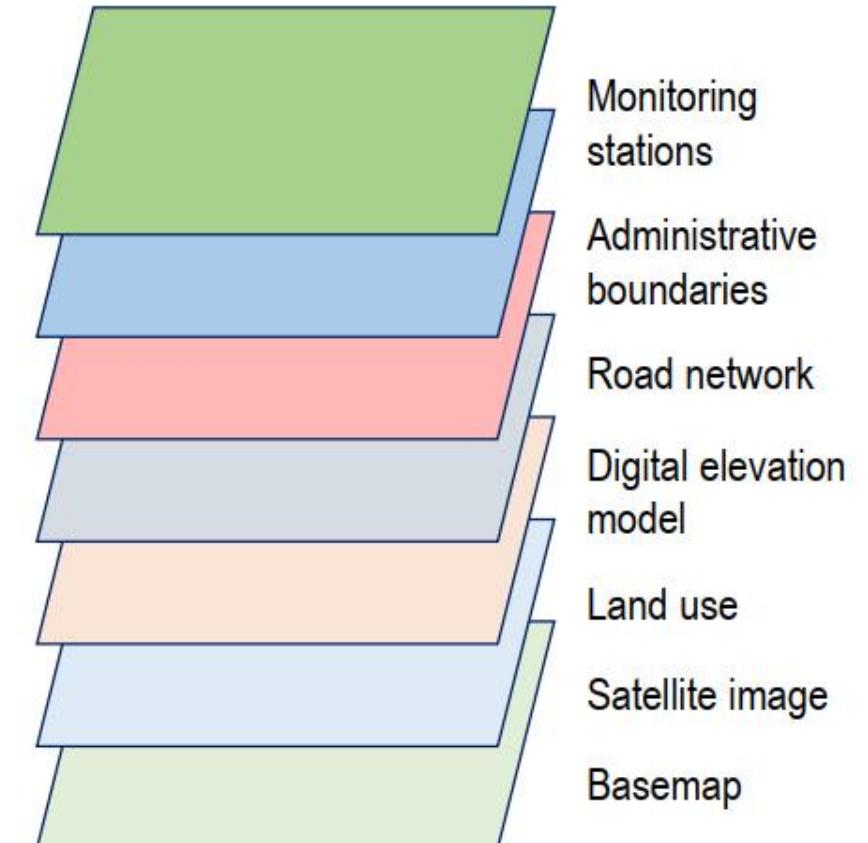
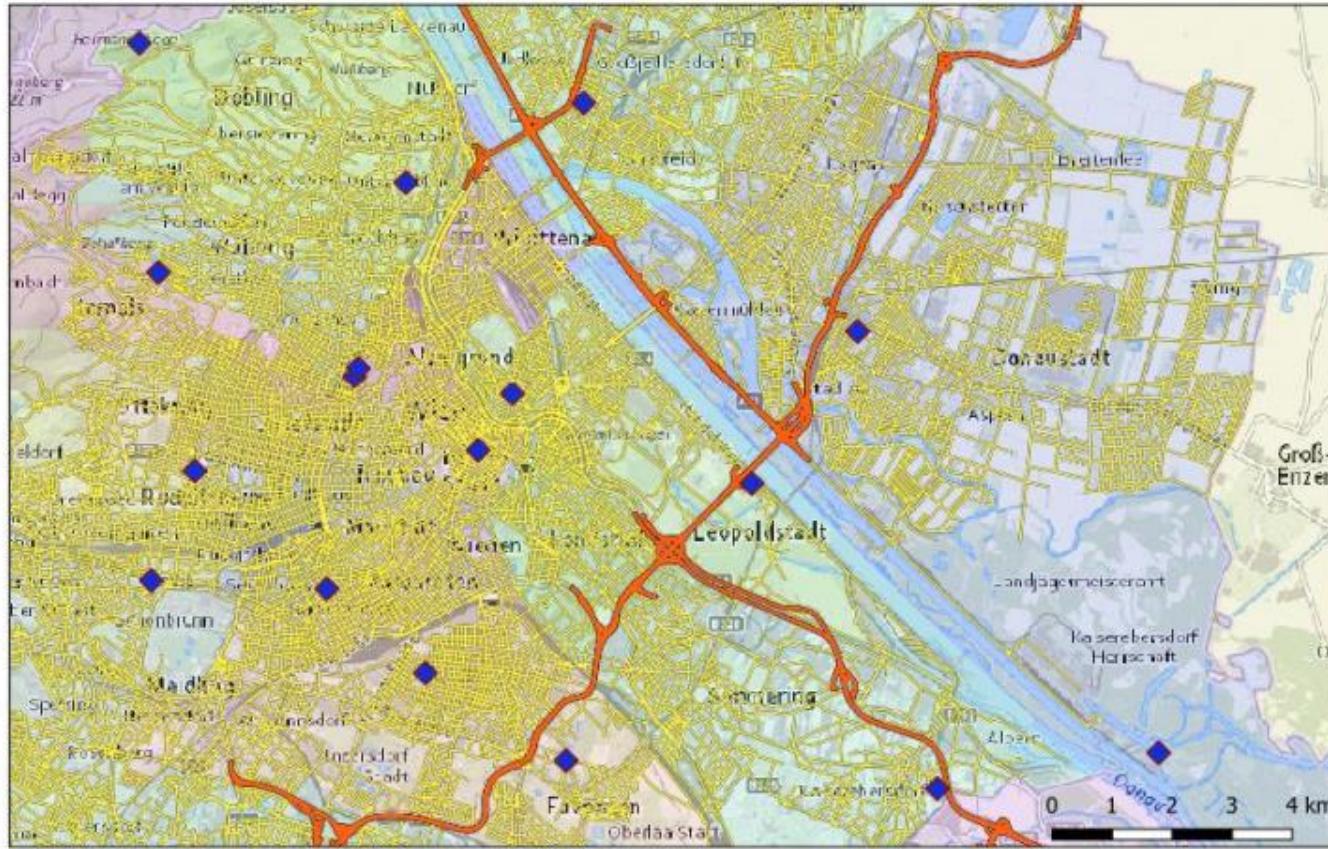
- Jenis data paling umum dalam GIS
- Dibentuk dari Kumpulan koordinat X, Y berupa Point, Line, Polygon
- Data Diskrit
- Peta Analog

## • Data Raster

- Data tersusun dari bentuk matriks atau pixel dan membentuk grid
- Setiap pixel menunjukan satu nilai
- Data Kontinu
- Data bersumber dari rekaman sensor satelit, airbone (pesawat terbang), UAV (Drone)

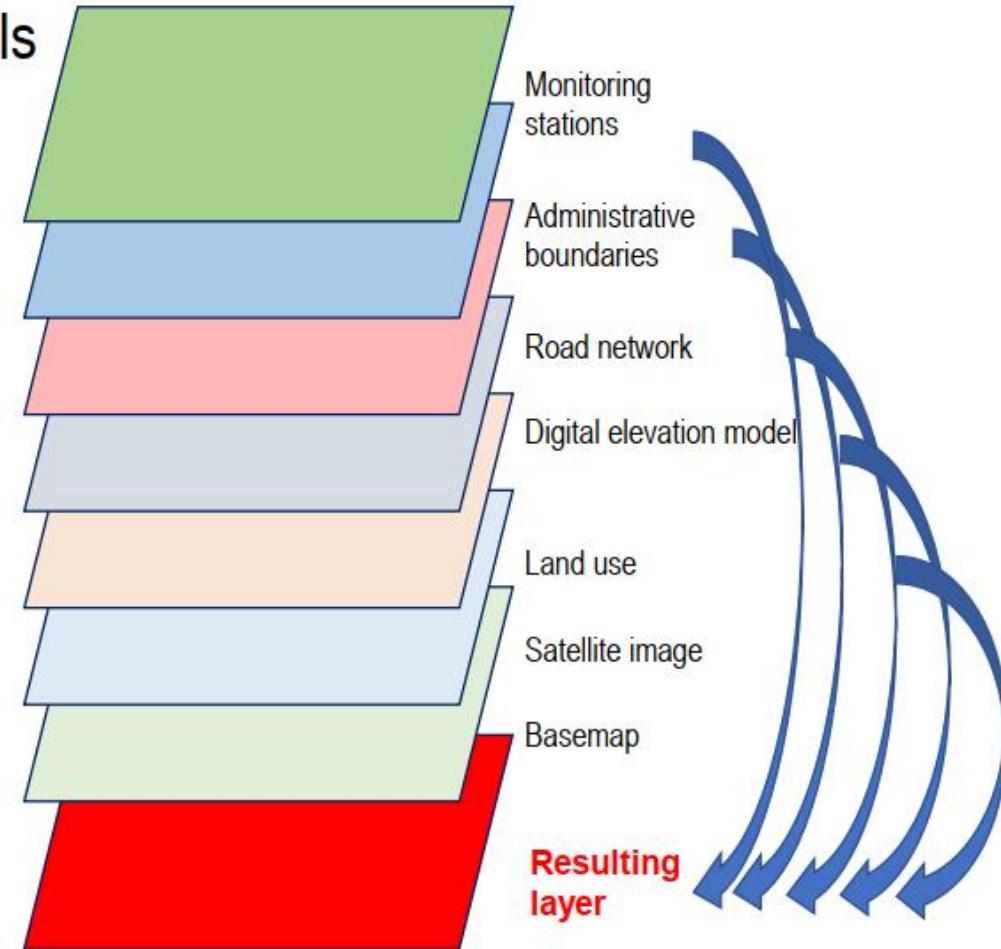
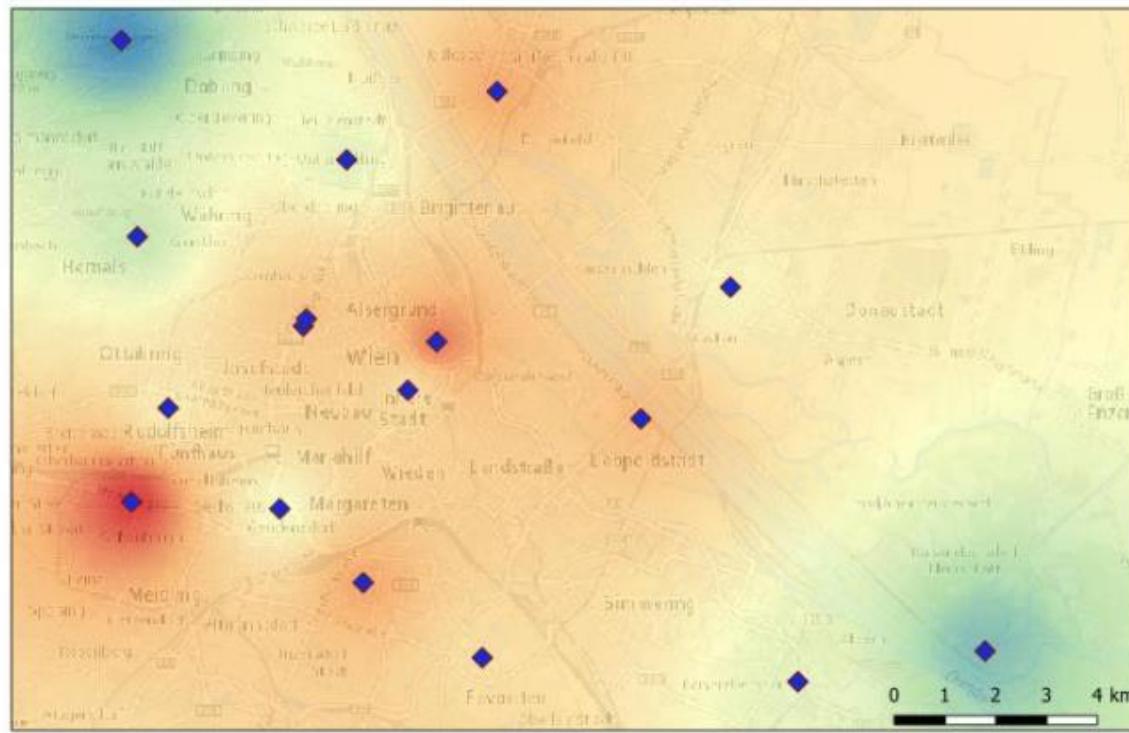
# Sumber data GIS :: Spatial Data - Layer

- GIS: integration of different kind of geodata



# Sumber data GIS :: Spatial Data - Layer

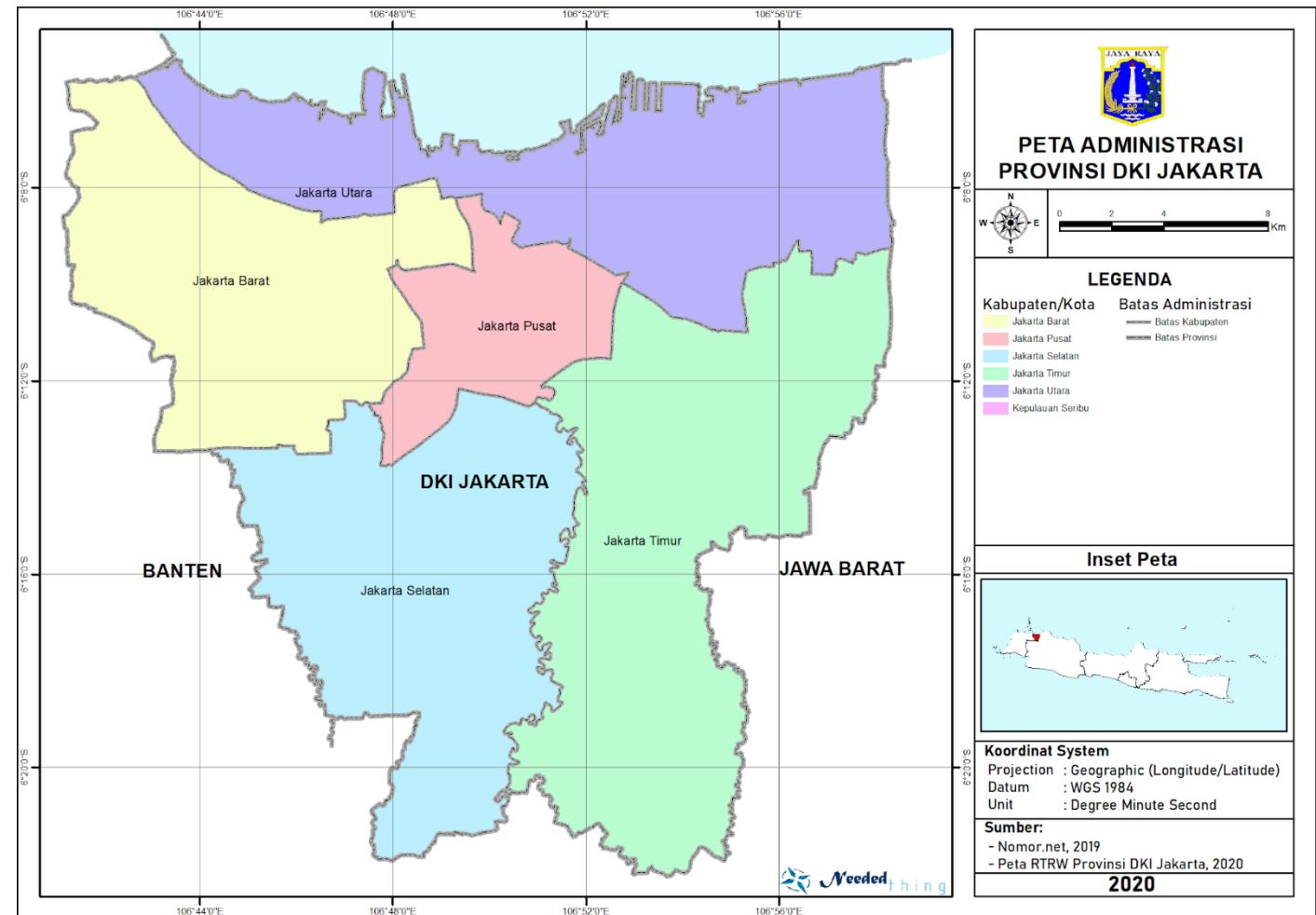
- Overlay operators, interpolation algorithms, tools for modelling and simulation, ...



## 1

### Peta Analog:

peta cetakan dengan teknik kartografi didalamnya terdapat referensi spatial: koordinat, skala, arah mata angin, format peta analog biasanya bentuk data vector



# Sumber data GIS :: data spatial

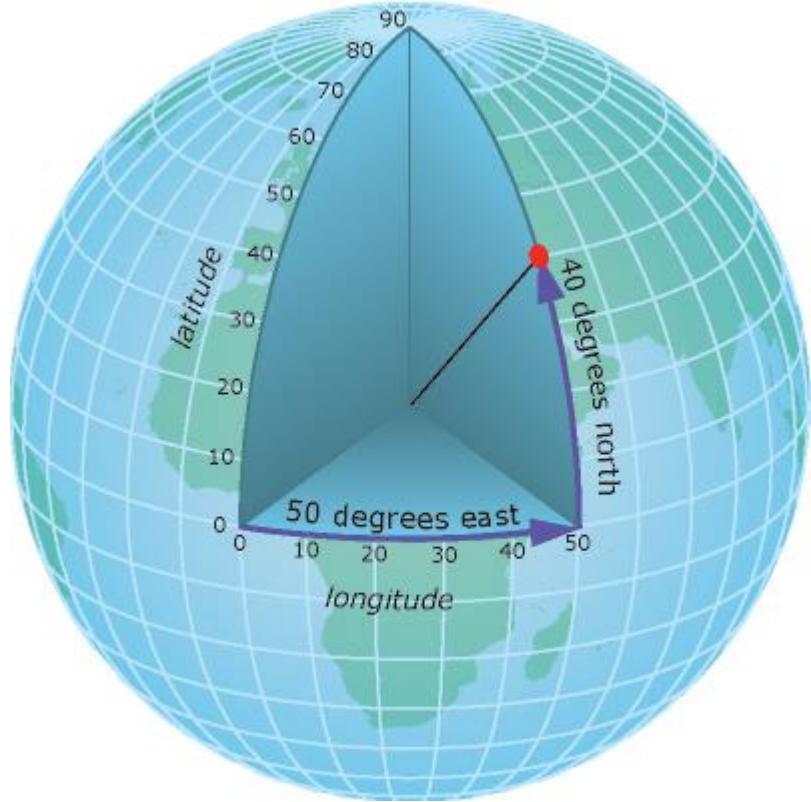
2

**Sistem Penginderaan Jarak Jauh:** sumber data yang penting yang didapat secara berkala bersumber dari satelit, airbone, drone (UAV), data di represantikan dalam bentuk raster



# Sumber data GIS :: data spatial

3 Data GPS (Global Positioning System): data koordinat X,Y diperlukan bumi yang disajikan dalam bentuk vector



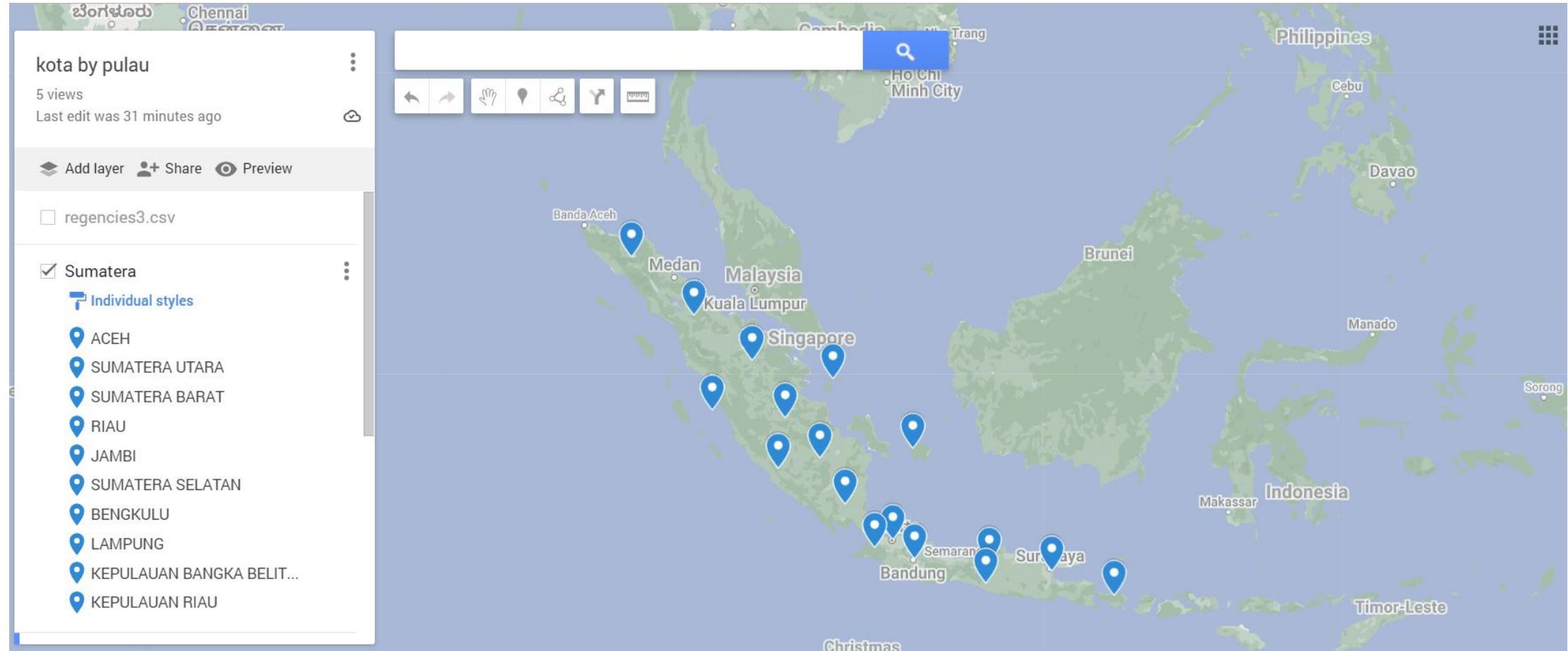
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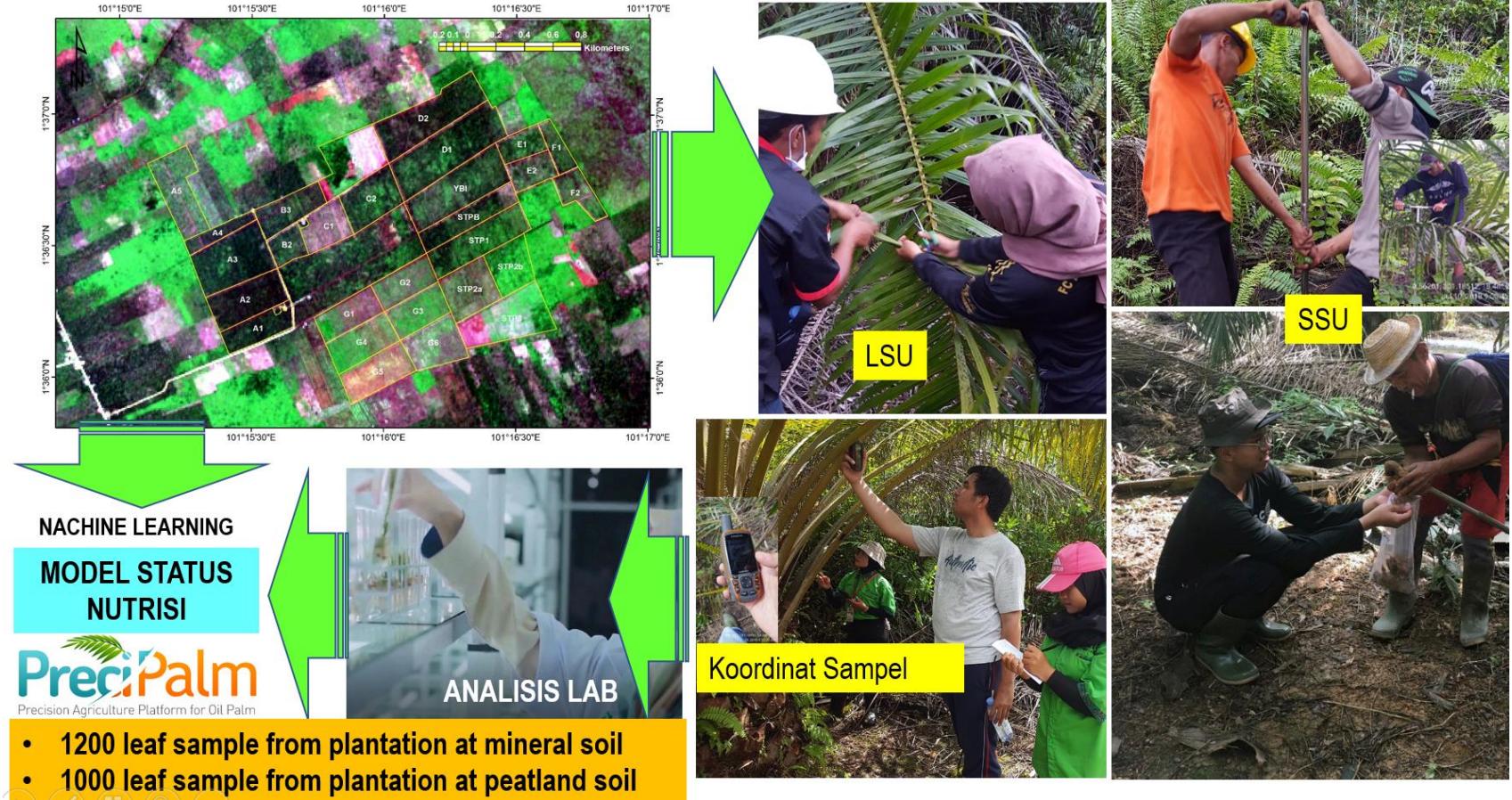
3

## Contoh Data GPS tagging data aplikasi Google Map



1

**Data hasil pengukuran lapangan:** data batas administrasi, batas kepemilikan lahan, batas hak pengusahaan hutan, hasil analisis lab nutrisi sampel tanah (SSU) dan daun tanaman (LSU)

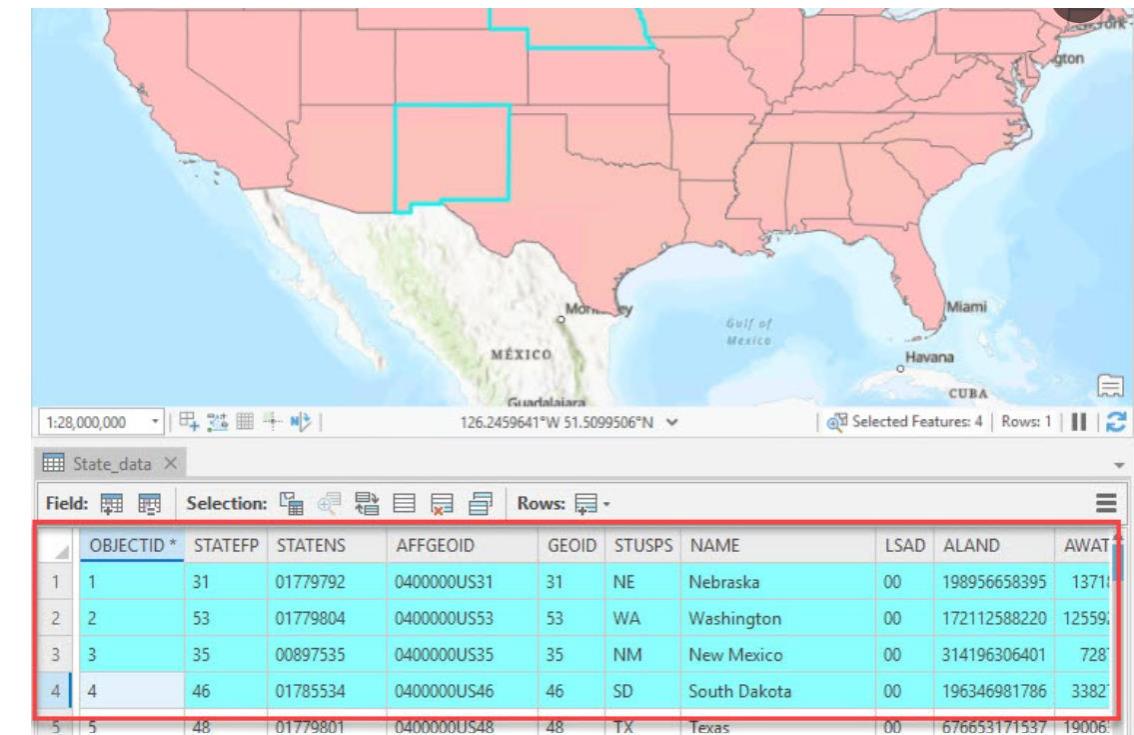


# Sumber data GIS :: data non spatial

2

Data disajikan dalam bentuk atribut referensi berbentuk tabel (data non grafis)

No.	Kecamatan	Jumlah Penduduk	LUas Wilayah	Kepadatan



2

Data disajikan dalam bentuk atribut referensi berbentuk tabel (data non grafis)

Car ID	Departure			Arrival		
	Date-Time	Latitude	Longitude	Date-Time	Latitude	Longitude
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...



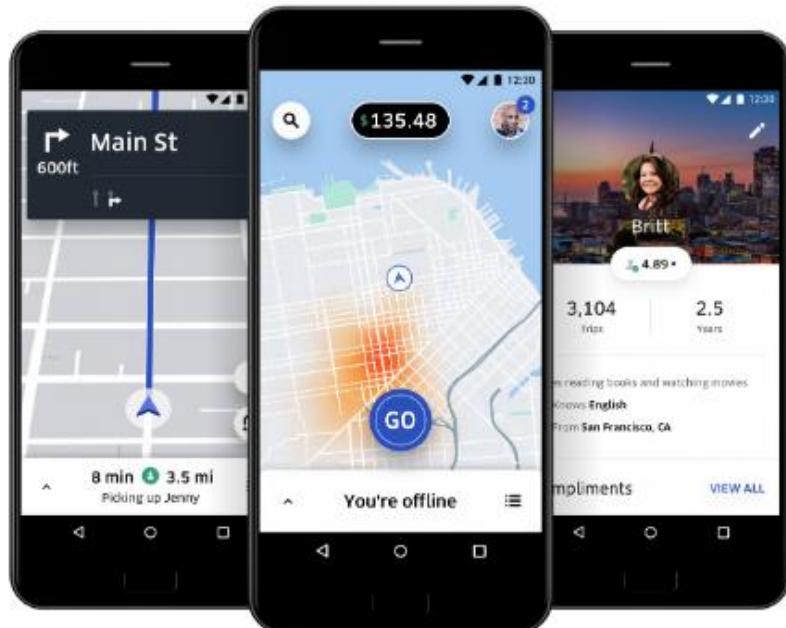
- **Spatial data:** Information about *locations* and *shapes* of objects in a geographic coordinate system



## Data analysis for traffic management

- Data collection from mobile devices
- Understanding mobility patterns
- Predicting traffic flow
- Optimizing traffic signal control (traffic lights)

- **Spatial data:** Information about *locations* and *shapes* of objects in a geographic coordinate system



## Predicting passenger demand

- Data is collected after each trip
- Recommendations to drivers
- Pricing based on predicted demand
- Similar types of analysis are possible for public transit

- **Spatial data:** Information about *locations* and *shapes* of objects in a geographic coordinate system



## Urban planning

- Different types of data with geographical attributes (census data, traffic data, etc.)
- Long-term predictions
- Zoning (clustering)



# Praktikum

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- ✓ Membuat data spatial vector dengan data Layer menggunakan Aplikasi Google Map