

The background of the slide is a light gray, stylized map of a city grid, showing a dense network of streets and blocks. The map is centered and covers the entire area of the slide.

# **CAPACITACIÓN EN SISTEMAS DE INFORMACIÓN GEOGRÁFICA ORIENTADA AL ANÁLISIS ESPACIAL**

**WESTERN UNION  
AGOSTO-SEPTIEMBRE  
2022**

Martín Fernando Ortiz

The background of the slide is a light gray, stylized map of a city grid, showing a dense network of streets and blocks. A thin vertical black line is positioned to the right of the 'Isocronas 01' text.

**Isocronas 01**

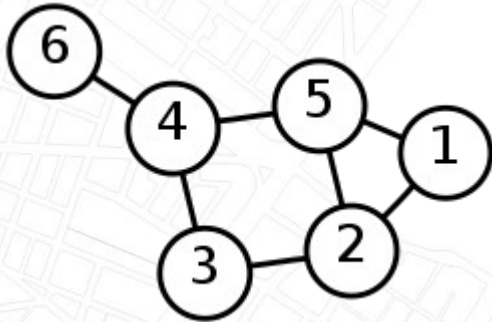
**CAPACITACIÓN EN SISTEMAS DE INFORMACIÓN  
GEOGRÁFICA ORIENTADA AL ANÁLISIS  
ESPACIAL**

**Clase 6**

# Isocronas

Son áreas las cuales determinan el costo máximo que se puede cubrir desde un punto en común.

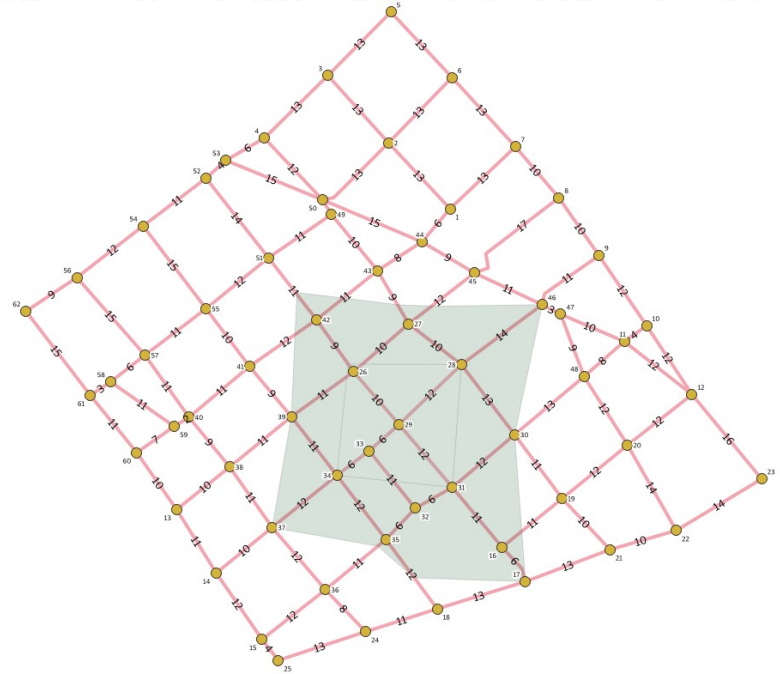
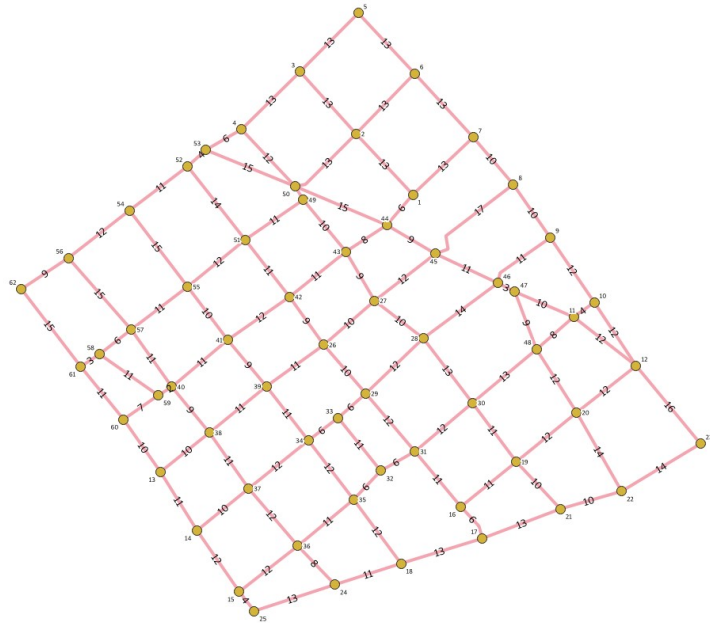
Dichas áreas se enmarcan en un grafo, entendiendo a éste cómo un conjunto de nodos conectados entre sí mediante aristas.



Cuando hablamos de costo nos referimos a diferentes variables que le podemos asignar a cada una de las aristas. Ésto puede ser, tiempo, distancia, etc.

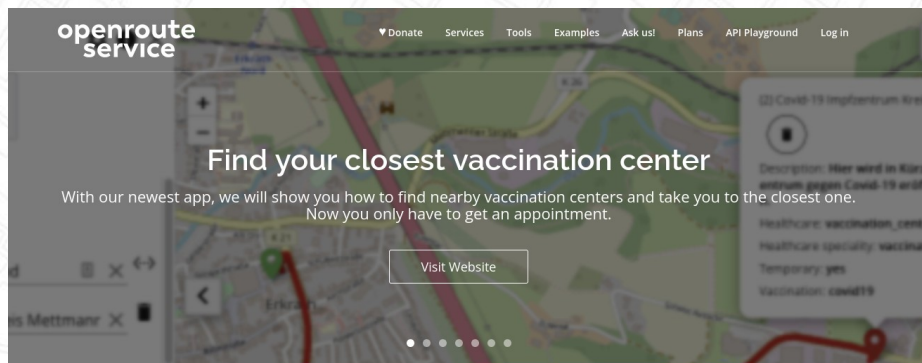
A su vez, cada arista puede tener restricciones, cómo por ejemplo el sentido de circulación en el modelado de una red vial.

Si modelamos el grafo como una red de calles, cada una de éstas tendrá un costo, para calcular una isocrona de 1000 metros, debemos calcular cuantas aristas podemos cubrir desde un vértice hasta a llegar a 1000.



Dada la complejidad de tener una red actualizada, con las diferentes restricciones según los modos de transporte, la forma más fácil de generar isocronas es con aplicaciones de terceros.

En nuestro caso, usaremos **OpenRouteService Tools (ORS Tools)**



#### Crowd sourced

We trust the wisdom of the crowd.  
The openrouteservice API consumes user-generated and collaboratively collected free geographic data, directly from **OpenStreetMap**.



#### Opensource

We believe in the benefit of open development, and so all code for openrouteservice is **opensource** and freely available for all to download and contribute to on GitHub.



#### Humanitarian

We want to make life better and easier. Therefore, we constantly develop our services to **meet current needs** of people and search for new ways to engage in disaster prevention and relief.

La API ofrece herramientas de ruteo, matrices de distancia, isocronas entre otros algoritmos. Para utilizarla hay que generar una API key. Es importante consultar las restricciones en el consumo del servicio.


<https://openrouteservice.org/restrictions/>



# Registro en ORS Tools

- Dar de alta un usuario en <https://openrouteservice.org/dev/#/signup>
- Con el registro realizado ir a la pestaña Dashboard (<https://openrouteservice.org/dev/#/home> )
- En la parte inferior de la pantalla clicar en “Create Token”

CREATE AN ACCOUNT


 SIGN UP WITH GITHUB

or

Username 0 / 20


Email\* 0 / 20


First name\* 0 / 20 Last name\* 0 / 20

 Sector 0 / 20

Website 0 / 20

Define your password

New password\* 0 / 25 

Confirm new password\* 0 / 25 

☐ Subscribe to newsletter

☐ I accept [the terms of service](#) and was informed about [the privacy policy](#)

SUBMIT >

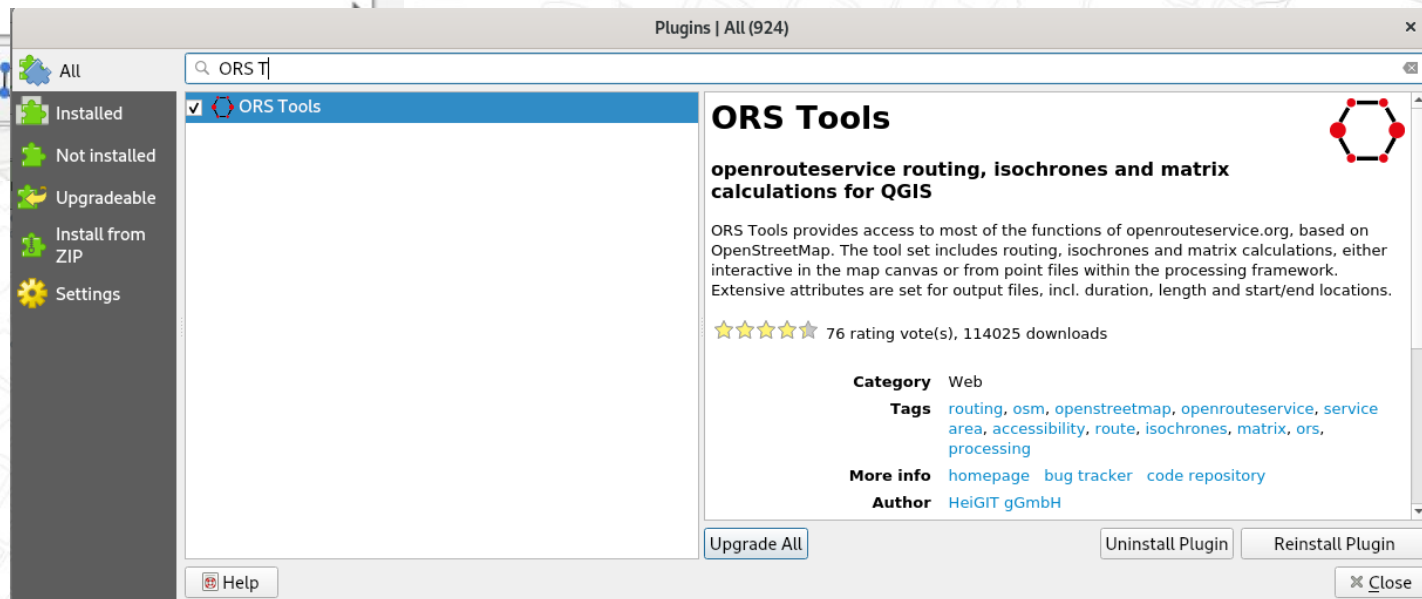
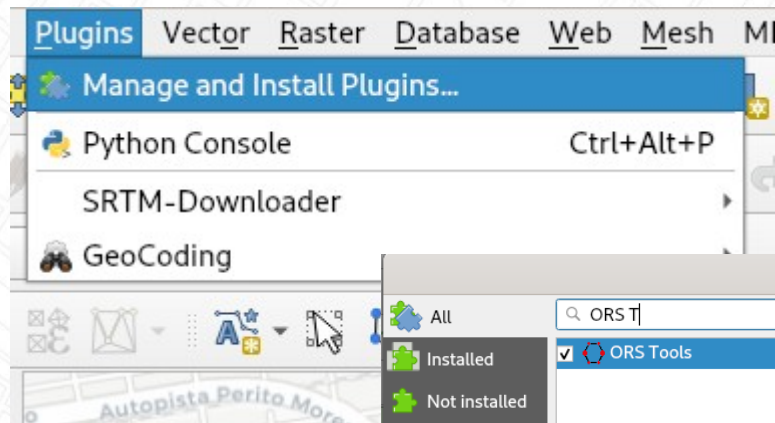
Request a token

Token type\*

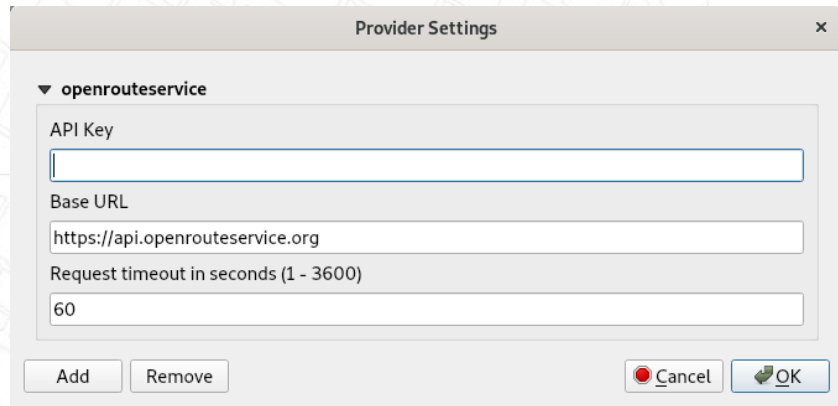
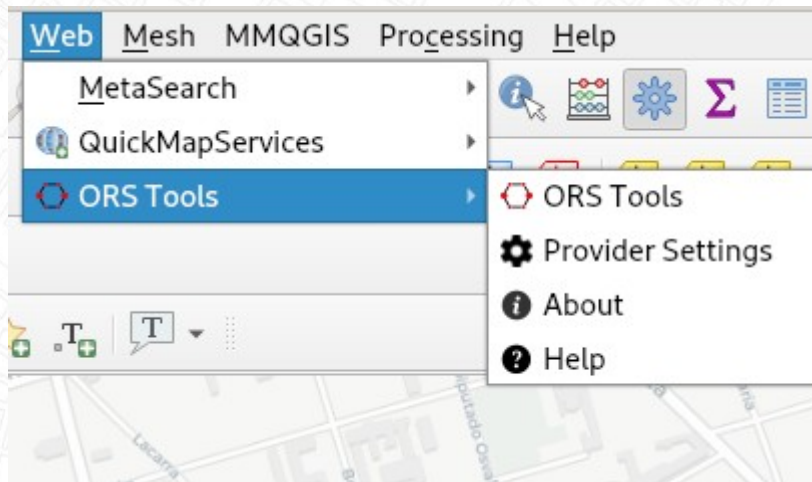
▼ Token name\*

CREATE TOKEN >

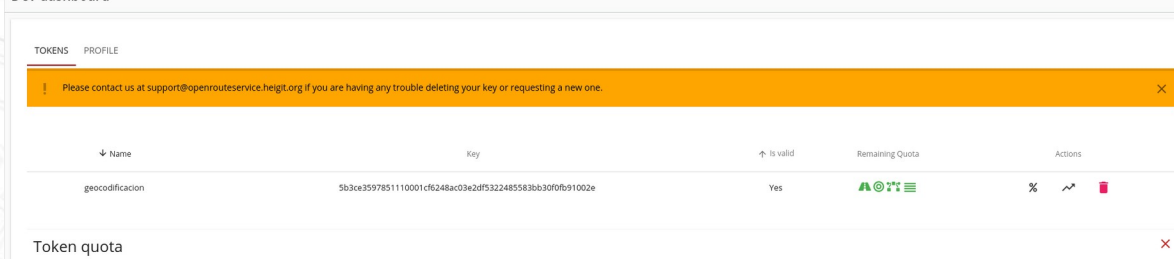
# Instalación ORS Tools



# Configuración API Key



## Dev dashboard





## Processing Toolbox



Q ORS Tools

► Recently used

▼ ORS Tools

► Directions

▼ Isochrones

🕒 Isochrones from layer

La herramienta permite calcular isocronas desde una capa de puntos (que no sea multipunto) o también desde puntos seleccionados al vuelo.

**Isochrones From Layer**

Parameters Log

**Provider**  
openrouteservice

**Travel mode**  
driving-car

**Input Point layer**  
puntos [EPSG:4326]

☐ Selected features only

**Input layer ID Field (mutually exclusive with Point option) [optional]**

**Dimension**  
time

**Comma-separated ranges [min or m]**  
5, 10

▼ **Advanced Parameters**

**Features to avoid [optional]**  
0 options selected

**Types of borders to avoid [optional]**  
[Not selected]

**Comma-separated list of ids of countries to avoid [optional]**

**Polygons to avoid [optional]**

☐ Selected features only

**Isochrones from layer**

The Isochrone algorithm returns service/reachability areas for multiple locations and time/distance ranges.

You need to have a valid API key ('Web' menu ► 'ORS Tools' ► 'Configuration') or sign up at <https://openrouteservice.org/sign-up/>.

Current [restriction limits](#) for the openrouteservice API apply.

**Input layers:** only Point layers are allowed, **not MultiPoint**.

**ID Field:** values will transfer to the output layer and can be used to join layers or group features afterwards.

**Ranges:** parameter needs to be a comma-separated list of integer values, no decimal points.

**Advanced Parameters:** see [the documentation](#) for descriptions.

**Output layer:** a Polygon layer with ID, isochrone center latitude and longitude, range value, travel mode and total population (from [GHSL](#)).

The CRS is EPSG:4326.

You can extract the center point using the Create points layer from table tool ('Processing' ► 'Vector creation').

0%

Help Advanced Run as Batch Process... Close Run

**Provider:** especifica el servidor al que se conecta la API. Hay que tener ya configurada la key

**Travel mode:** la modalidad de desplazamiento. Puede ser en diferentes tipos de vehículos, bici, caminando, silla de rueda.

**Dimension:** tiempo o distancia

**Comma-separated ranges:** el rango de la isocrona según la dimension.

Existen opciones avanzadas para generar restricciones en el ruteo



Parameters

Log

Provider



openrouteservice

Travel mode

foot-walking

Input Point layer

\* puntos [EPSG:4326]



☐ Selected features only

Input layer ID Field (mutually exclusive with Point option) [optional]

123 id

Dimension

time


Comma-separated ranges [min or m]

5, 10, 30

▼ Advanced Parameters


Features to avoid [optional]

0 options selected






Types of borders to avoid [optional]

[Not selected]



Comma-separated list of ids of countries to avoid [optional]


Polygons to avoid [optional]



☐ Selected features only


0%

Cancel

 Help

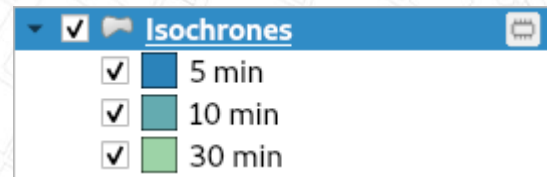
Advanced ▼

Run as Batch Process...

 Close

 Run

## Caminando 5, 10, 30 minutos





**Isochrones From Layer** x

Parameters Log

Provider  
openrouteservice

Travel mode  
driving-car

Input Point layer  
puntos [EPSG:4326]   ...

☐ Selected features only

Input layer ID Field (mutually exclusive with Point option) [optional]  
123 id

Dimension  
distance



Comma-separated ranges [min or m]  
500,1000,5000

▼ **Advanced Parameters**

Features to avoid [optional]  
0 options selected ...

Types of borders to avoid [optional]  
[Not selected]




Comma-separated list of ids of countries to avoid [optional]

Polygons to avoid [optional]  
   ...

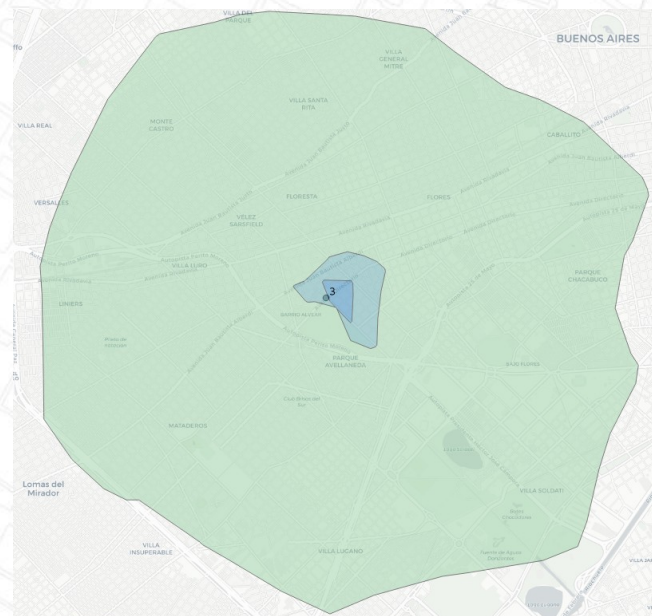
☐ Selected features only

0%

Cancel

 Help Advanced ▼ Run as Batch Process...  Close  Run

## Manejando 500, 1000, 5000 metros



**Isochrones From Layer**

Parameters Log

Provider  
openrouteservice

Travel mode  
foot-walking

Input Point layer  
puntos [EPSG:4326]

☐ Selected features only

Input layer ID Field (mutually exclusive with Point option) [optional]  
123 id

Dimension  
time

Comma-separated ranges [min or m]  
5, 10, 30

▼ **Advanced Parameters**

Features to avoid [optional]  
0 options selected

Types of borders to avoid [optional]  
[Not selected]

Comma-separated list of ids of countries to avoid [optional]

Polygons to avoid [optional]

☐ Selected features only

0%

Cancel

Help Advanced Run as Batch Process... Close Run

## Caminando 500, 1000, 5000 metros

