



Consiglio Nazionale  
Geometri e Geometri Laureati



# THE FUTURE OF TELEMATIC SERVICES FOR ITALIAN SURVEYORS

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Daniele BRANCATO, Luca DAL BUONO



## FIG Working Week 2016

CHRISTCHURCH, NEW ZEALAND 2-6 MAY 2016

Recovery

from disaster

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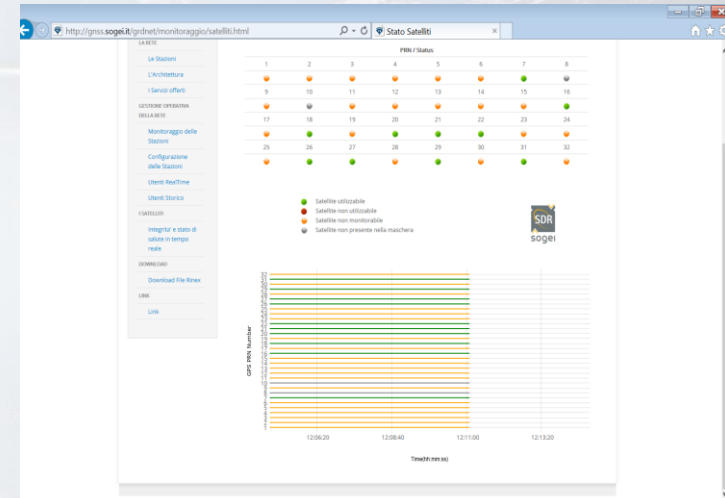
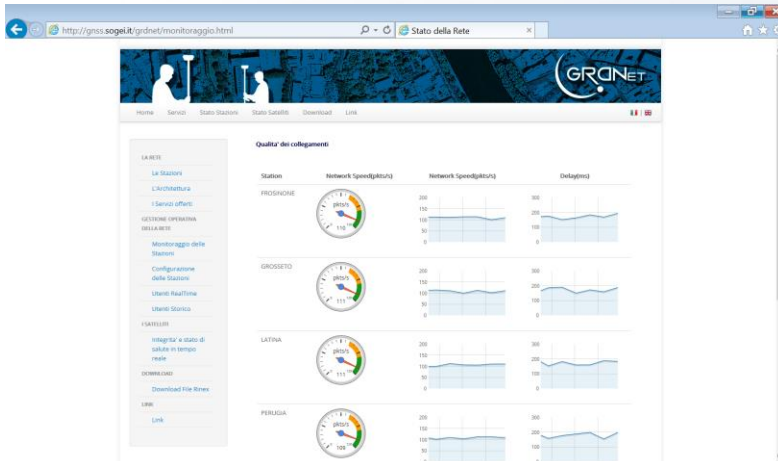
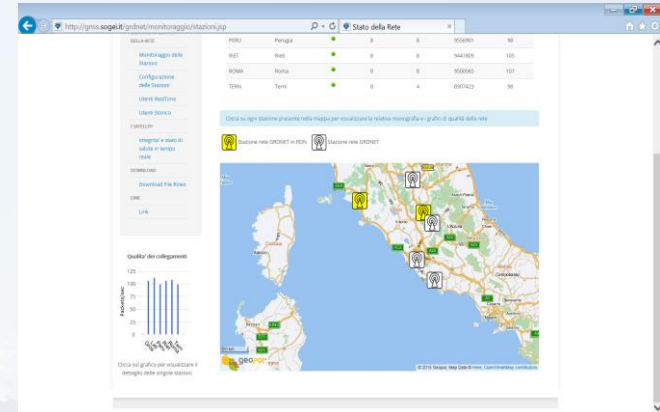
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**GRDNet (GNSS R&D Network)**, is an advanced GNSS Augmentation Network RTK Infrastructure able to provide RTK correction services based on MRS (Multi-Reference Station)/VRS (Virtual Reference Station) techniques and to integrate any kind of Reference Receiver





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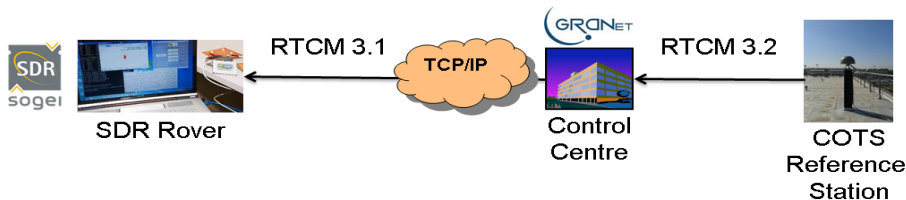
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A Software Defined Radio single frequency real-time GNSS receiver, whose hardware component is reduced to the simple sampler, while all the signal processing is performed via software on a program running on a PC or a Tablet

### RTK-SDR – Real Physical Station Processing

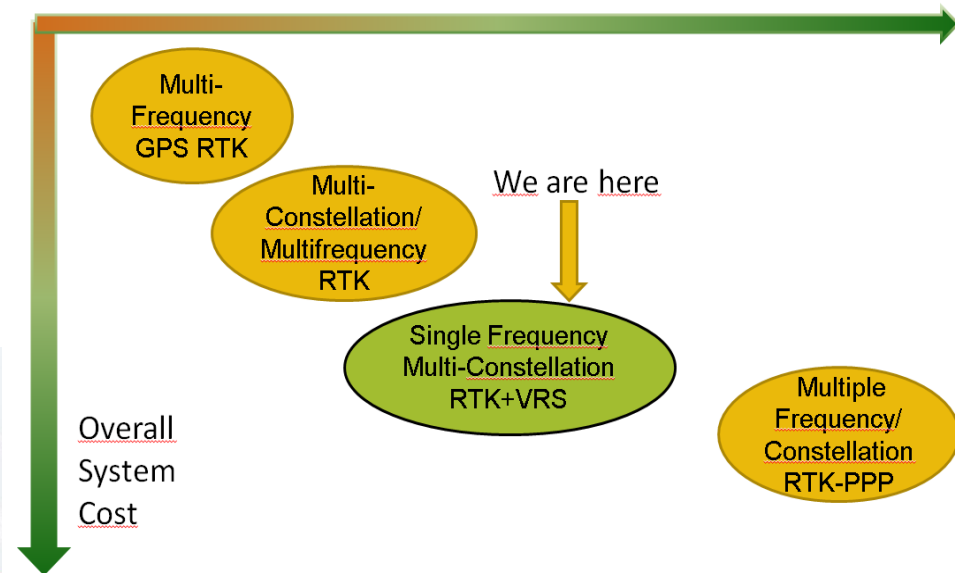
- Sampling frequency: 4.092 MHz @ Baseband
- Geodetic Reference Station data from a Local Augmentation Network
- GNSS SDR Rover with COTS surveying antenna
- Communication Interfaces toward the LAAS Service Centre:
  - Mobile Communication or internal LAN
  - NTRIP protocol
  - RTCM 3.1 1004 and 1005 messages
- Carrier-smoothed PR with SBAS corrections applied



### GNSS High Precision Surveying Evolution

Local Augmentation Infrastructures

Global Augmentation Infrastructures





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## The Architecture for the Test

- SDR Reference Station: SDR on a PC feeding the GRDNet Control Center for NTRIP corrections delivery in RTCM format
- Rover Receiver: SDR on a Tablet



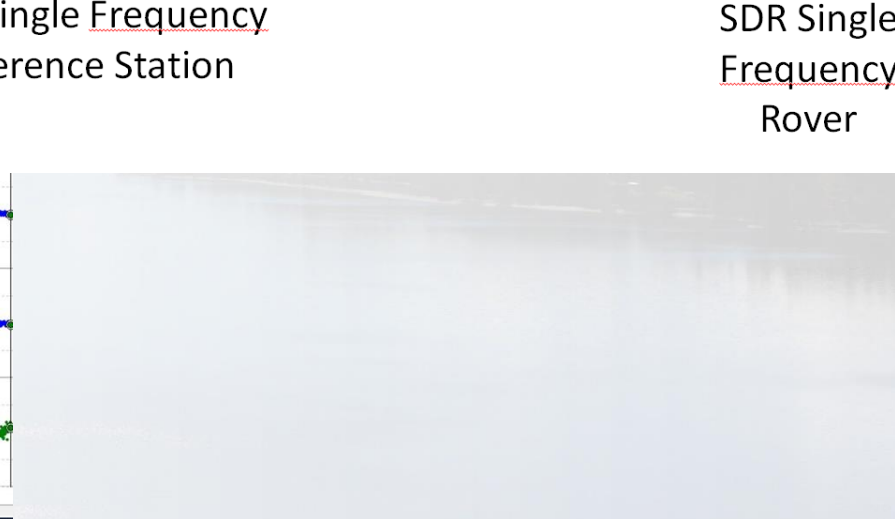
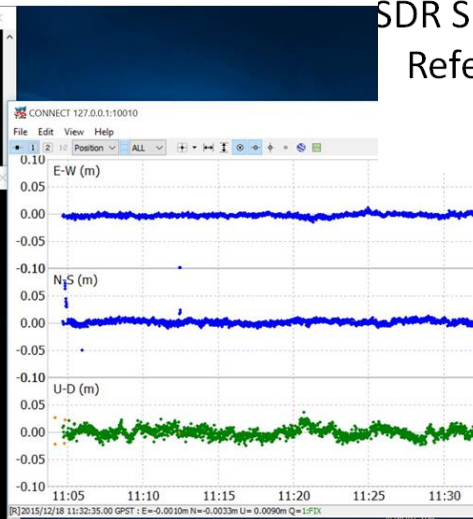
## Total SDR High Precision Results

```

time of receiver clock rover: 2015/12/18 11:32:34.999999978
time sys offset (glo-gps)(s): 0.000000000
solution interval (s) : 1.000
age of differential (s) : 3.000
ratio for ar validation : 191.363
# of satellites rover : 9
# of satellites base : 10
# of valid satellites : 9
GDOP/PDOP/HDOP/VDOP : 2.4,2.1,1.1,1.8

-----GNSS SDR SOGIEI-----
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RECEIVER OPTIONS:
Clock Steering: ON Actual Sampling Frequency: 4092000.302
Doppler Bias: 116.09Hz Accum Drift Corr: -693.56
Carrier Phase Smoothing: ON Method: Hatch(Fixed Win) Win: 330
Tropo Correction Model: SAAS Avg Corr: 3.98m
Iono Correction Model: EGNOS[prn:120] Avg Corr: 3.46m

PRN C/N0 Elev CSwin SlowC FastC Tropo Iono
1 51.1 54.18 330/330 2.8 -0.3 3.0 2.8
3 54.3 69.16 330/330 0.0 -0.5 2.6 2.3
  
```



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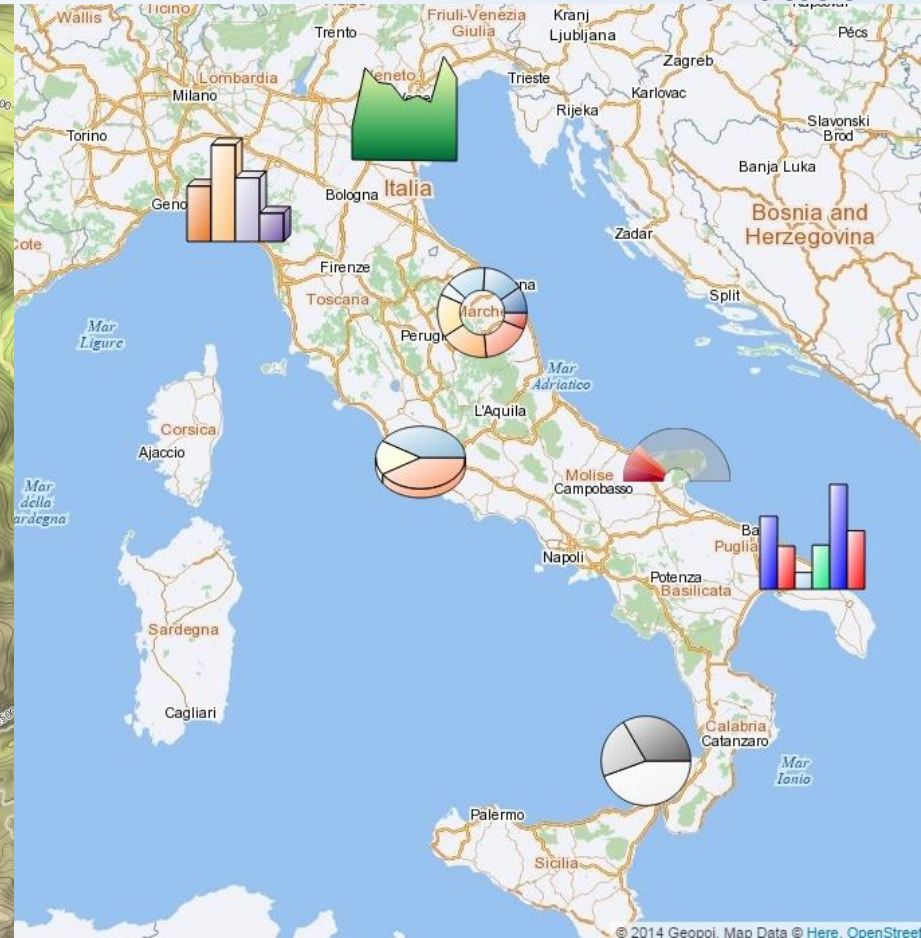
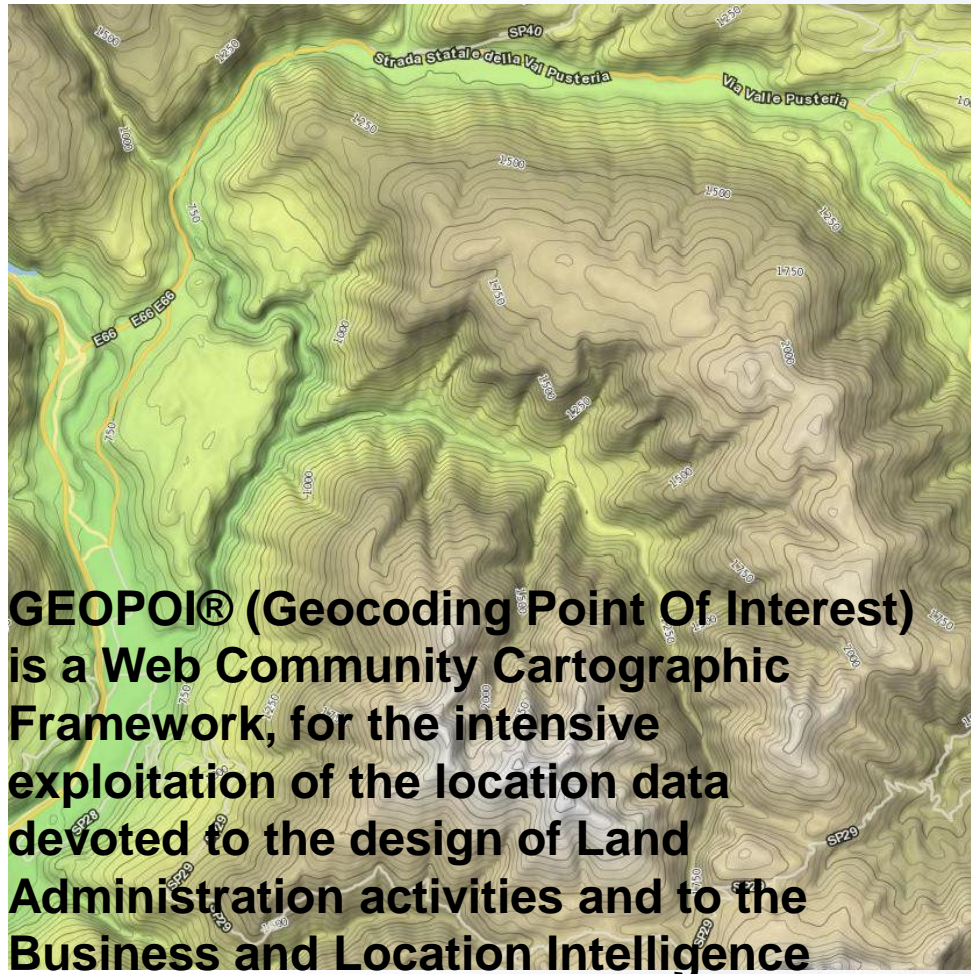


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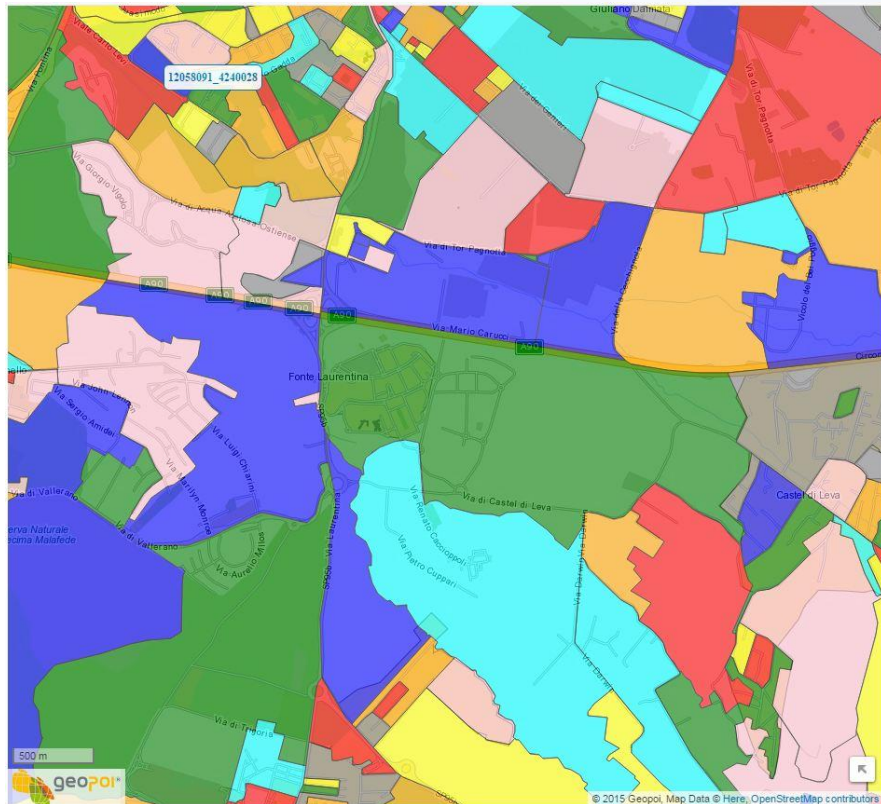


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Carica Cerca Salva Tutti

100 63 (63%) 2 (2%) 35 (35%)

1 2 3 4

Prov	Comune	Indirizzo	Risultato	C
AL	CANTALUPO LIGURE	S.P.SERRAVALLE/CABELLA LOC.TA' PERTUSO SN		
AL	TICINETO	VIA G. MATTEOTTI 106	Via Matteotti 105, Ticineto (AL)	
AL	TORTONA	VIA PIEMONTE 11	Via Piemonte 11, Tortona (AL)	
AV	MONTELLA	VIA SAN FRANCESCO SNC	Via San Francesco 1, Montella (AV)	
AV	ROTONDI	S.S. APPIA KM 239+139 SNC	Via Appia 1, Rotondi (AV)	
BG	NEMBRO	VIA ROMA 52	Via Roma 52, Nembro	

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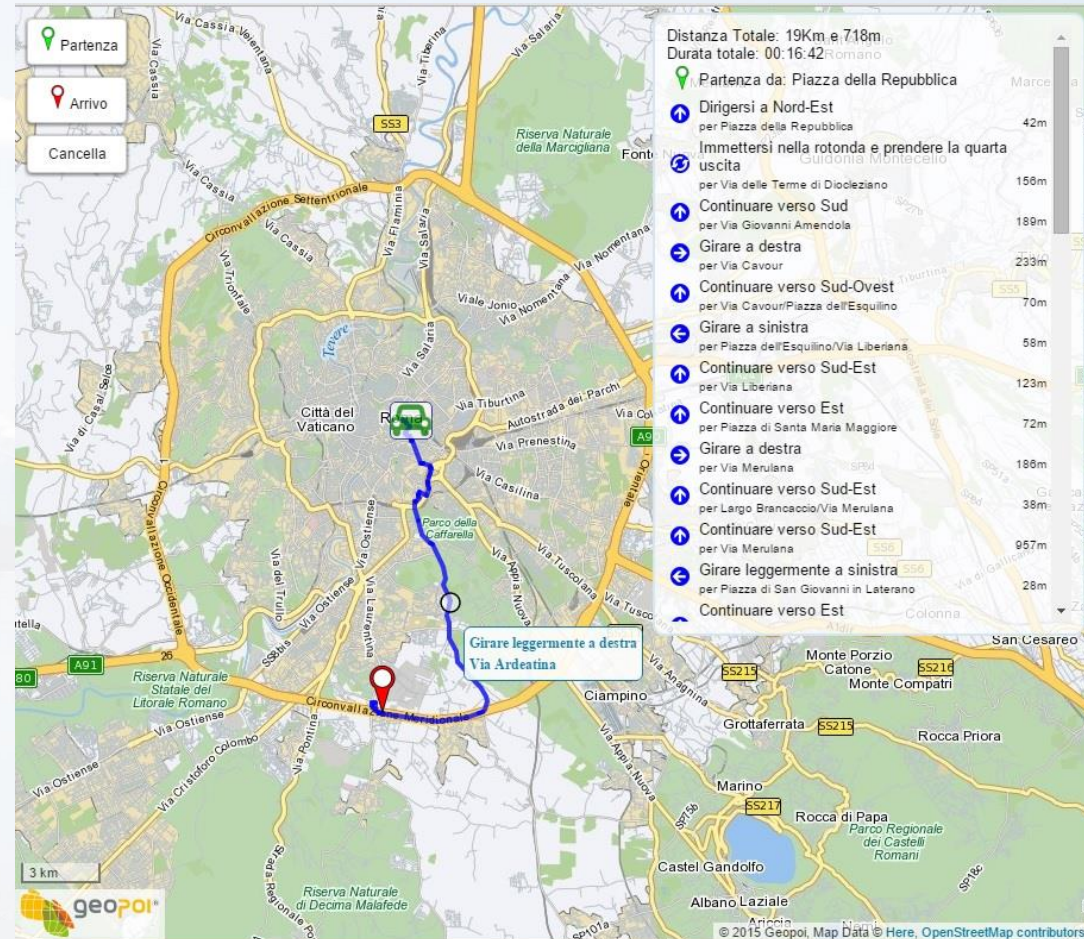
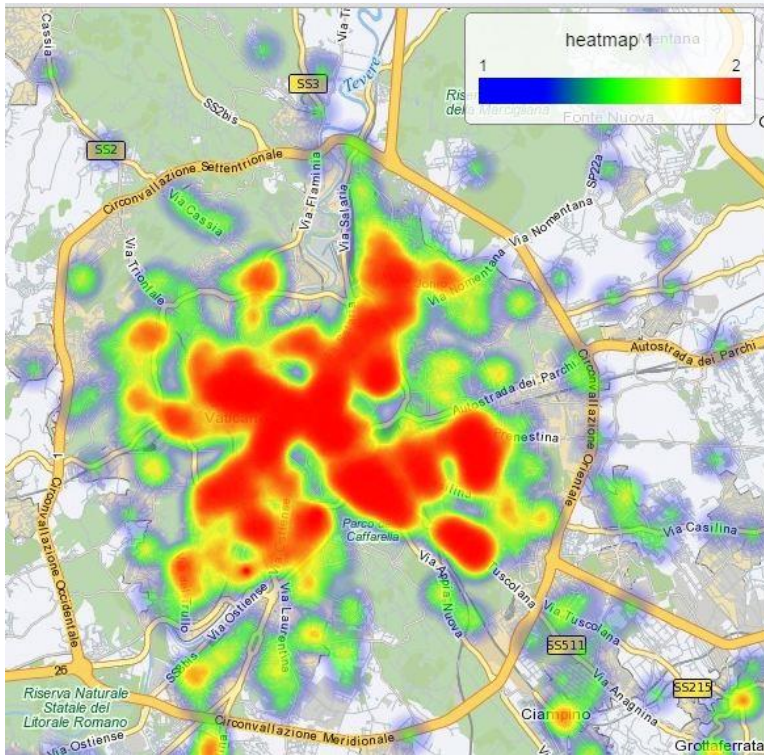


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# THANK YOU





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