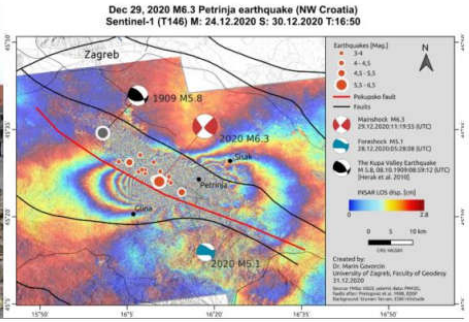


Danijel Šugar

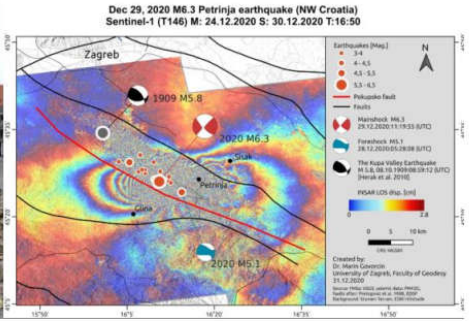
EO4GEO training: Fast disaster response – satellite technologies for surface displacement monitoring

GNSS

July 12th – 14th, 2021

University of Zagreb – Faculty of Geodesy

Co-funded by the Erasmus+ Programme of the European Union



Danijel Šugar

EO4GEO training: Fast disaster response – satellite technologies for surface displacement monitoring

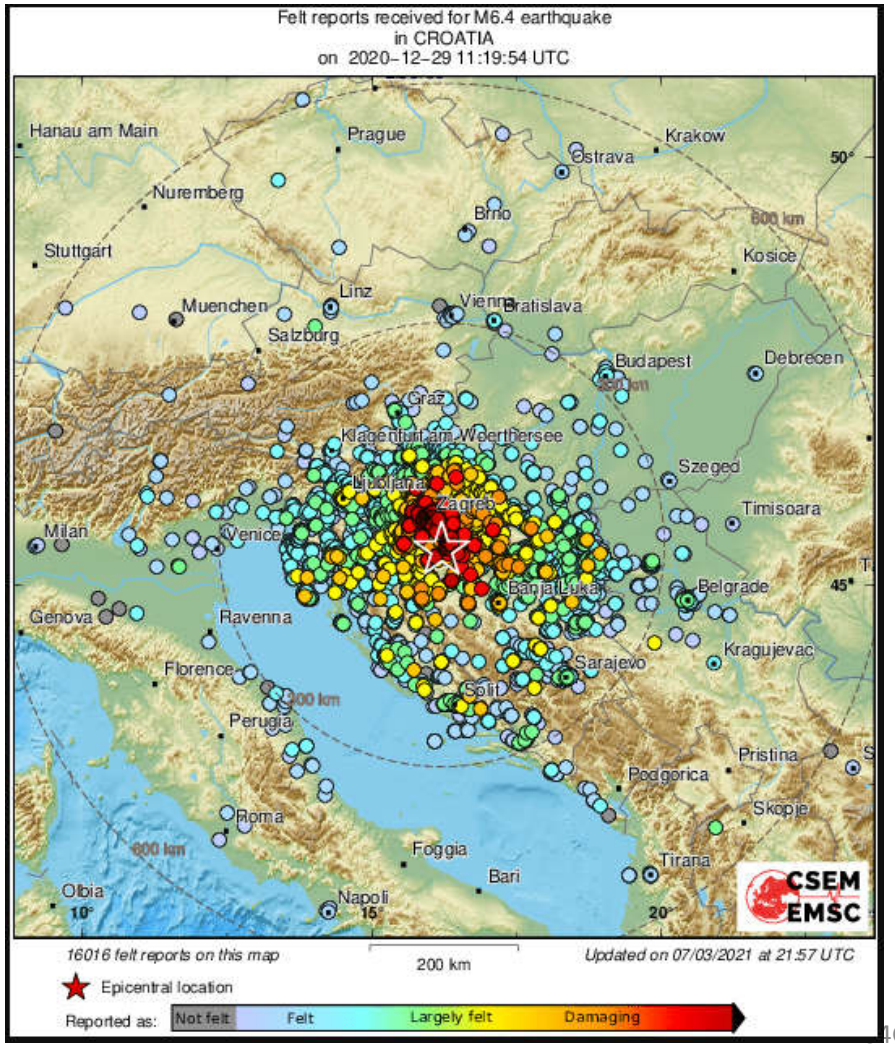
Displacement of CROPOS SISA station in the period 27th December 2020 – 6th January 2021 assessed by GNSS PPP & Static Relative Positioning method

University of Zagreb – Faculty of Geodesy

E04GEO training 13 & 14 July 2021

Co-funded by the Erasmus+ Programme of the European Union

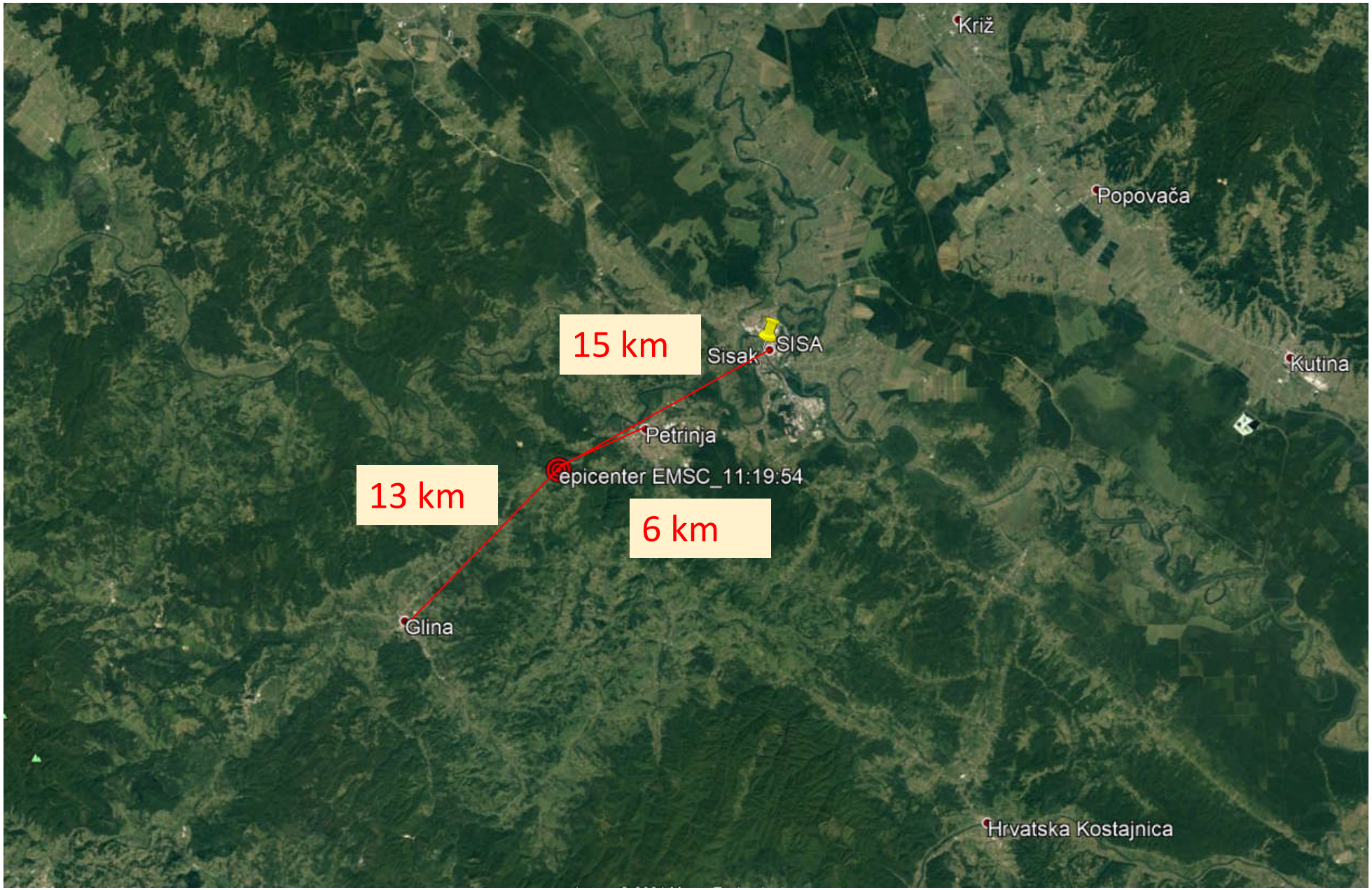
Motivation instead of introduction



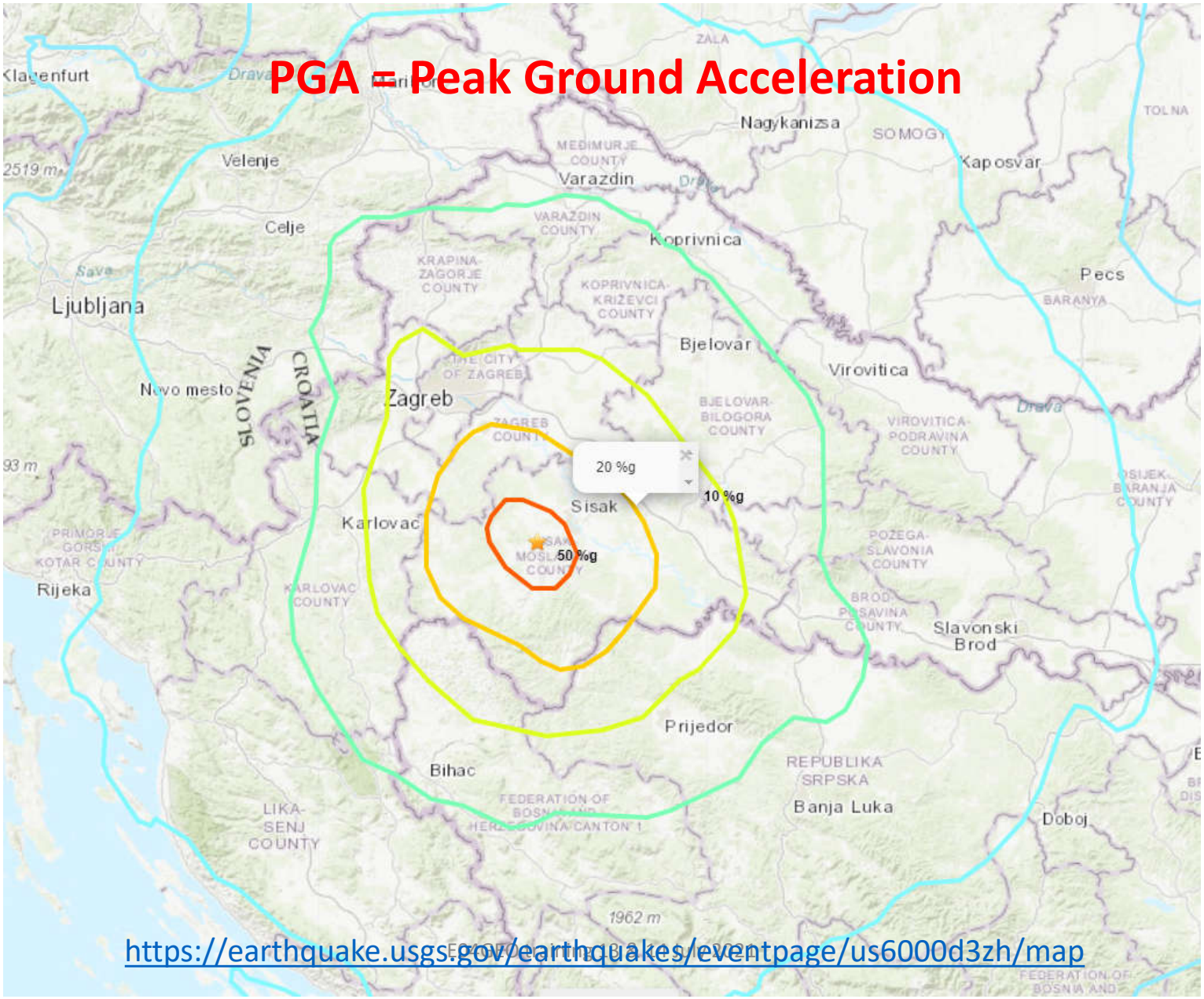
https://www.emsc-csem.org/#2

Petrinja earthquake, 29th December 2020

Source	EMSC
Latitude	45.42°
Longitude	16.21°
Depth	10 km
Magnitude	M_w = 6.4
Time of origin	11:19:54.1 UTC

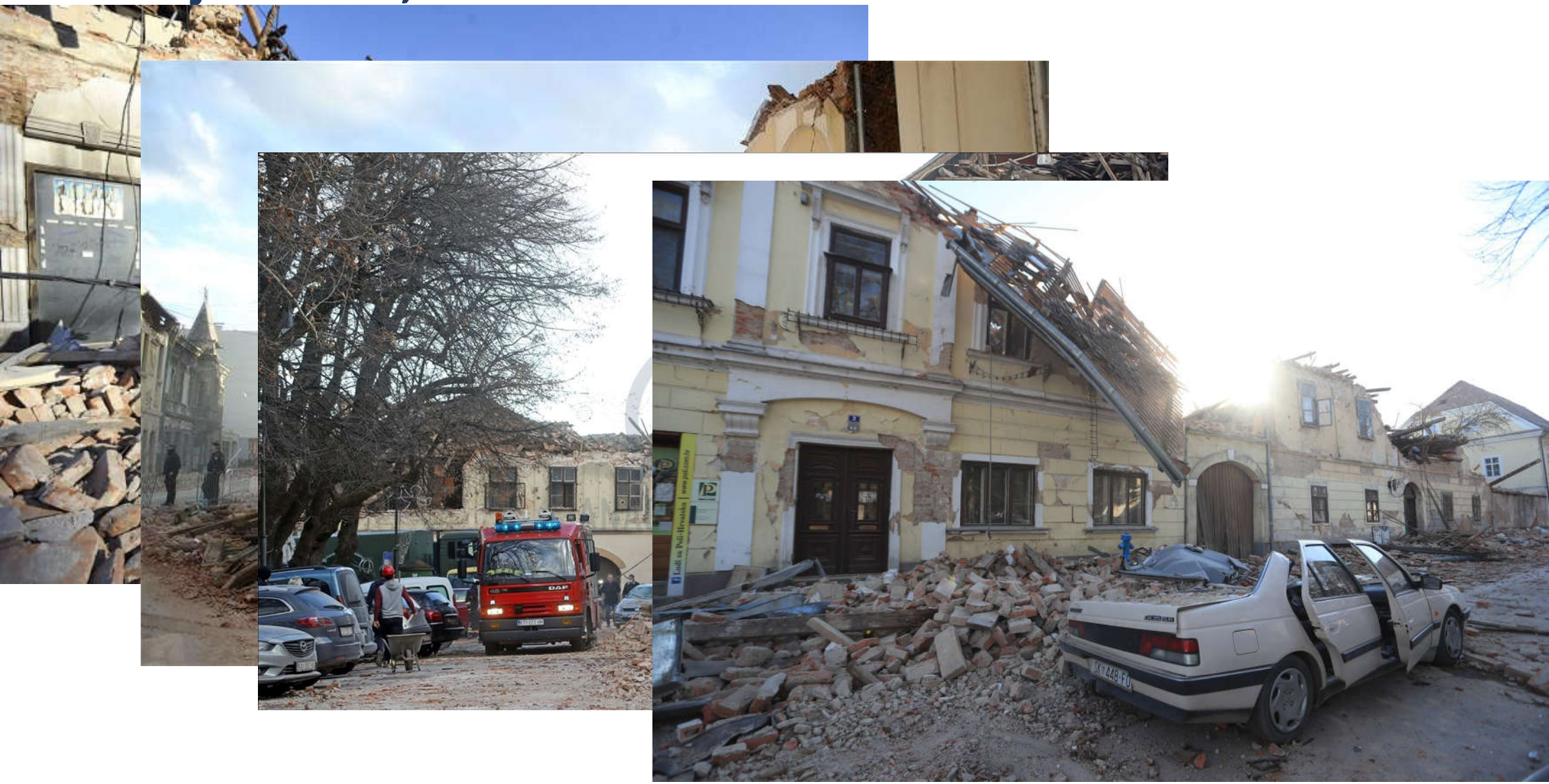

Križ
Popovača
15 km
SISA
Sisak
Kutina
Petrinja
epicenter EMSC_11:19:54
13 km
6 km
Glina
Hrvatska Kostajnica

PGA = Peak Ground Acceleration



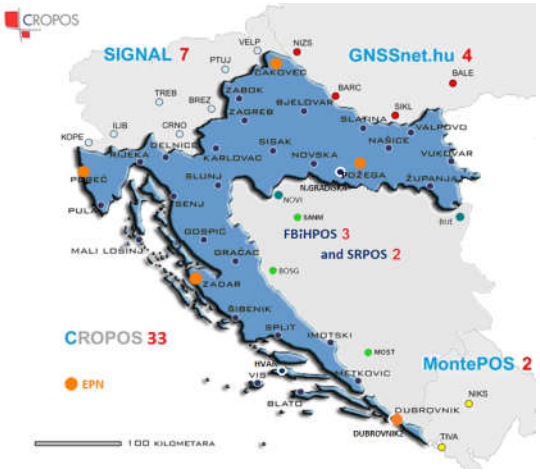
https://earthquake.usgs.gov/earthquakes/eventpage/us6000d3zh/map

Petrinja centre, 29th December 2020



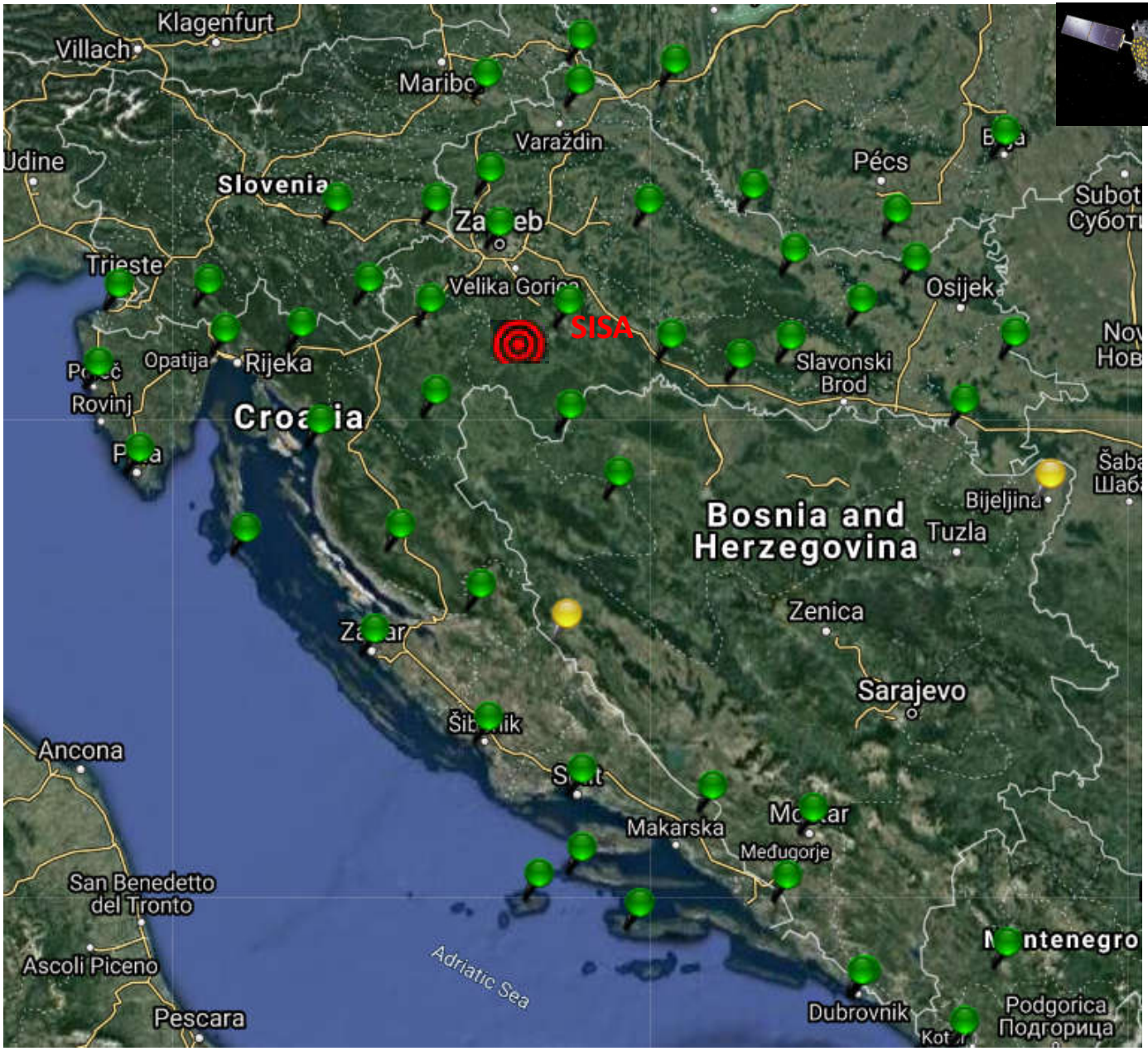
CROPOS

- 33 stations (HR)
- 18 stations from neighboring networks
- Σ = 51 stations

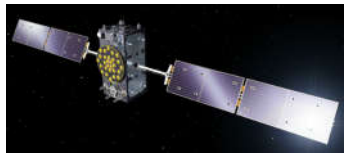


CROPOS

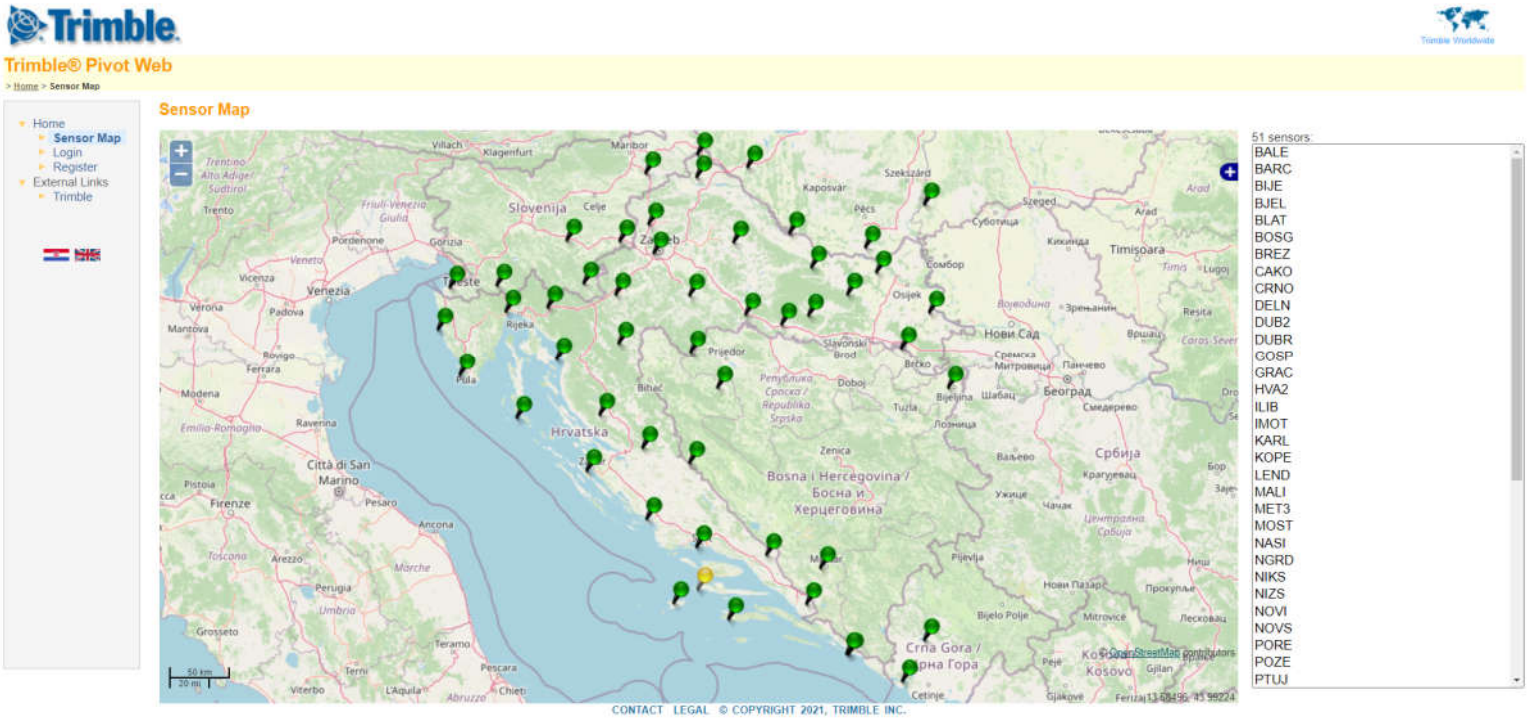
https://www.cropos.hr/



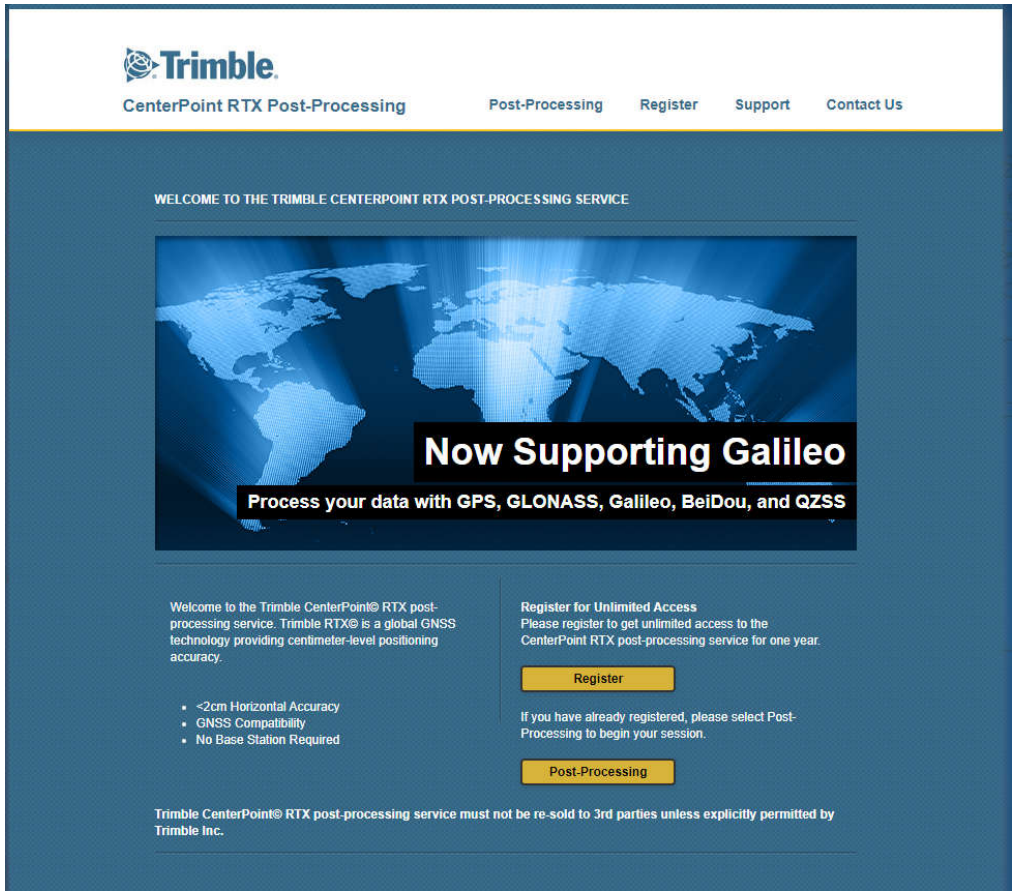
CROPOS - GPPS

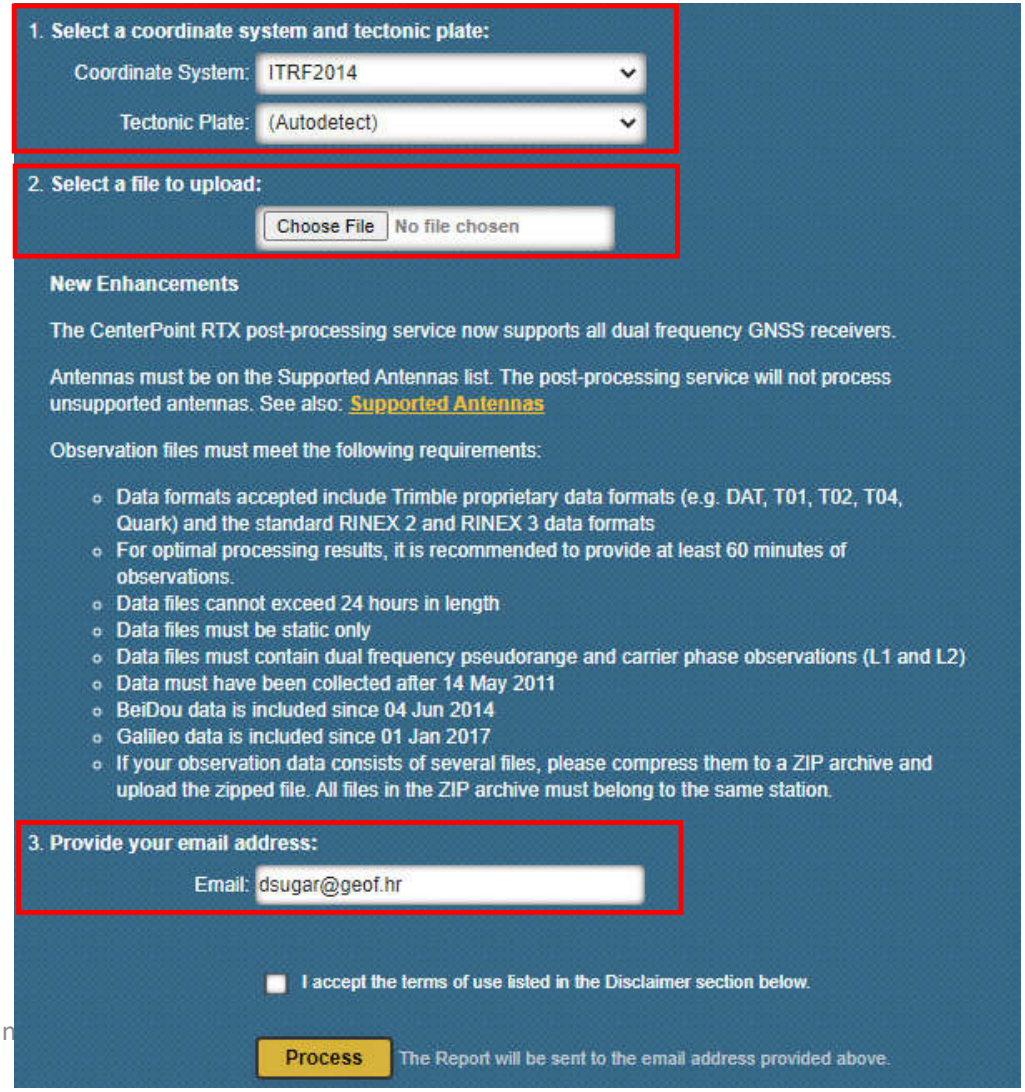


- **SISA**
- **Trimble proprietary T02 format**
- **15 seconds**
- **Timeframe (11 days):**
  - 27.12.2020.
  - 28.12.2020.
  - 29.12.2020.
  - 30.12.2020.
  - 31.12.2020.
  - 01.01.2021.
  - 02.01.2021.
  - 03.01.2021.
  - 04.01.2021.
  - 05.01.2021.
  - 06.01.2021.



Trimble CenterPoint RTX Post-Processing





https://www.trimblertx.com/

- 27.12.2020.
- 28.12.2020.
- 29.12.2020.
- 30.12.2020.
- 31.12.2020.
- 01.01.2021.
- 02.01.2021.
- 03.01.2021.
- 04.01.2021.
- 05.01.2021.
- 06.01.2021.

Trimble CenterPoint RTX Post-Processing

Trimble
CORRECTION SERVICES

Dear Customer,

Your uploaded file (SISA3620.t02) was successfully processed.

The processing result is a report which contains coordinates in ITRF2014 (reference epoch) and ITRF08 (current epoch). For tectonic plate corrections the plate EURASIA was used. As per your request, the tectonic plate was determined automatically by the RTX-PP server based on the estimated latitude and longitude of the observation data.

The report is attached to this e-mail in XML and PDF formats.

This e-mail was generated automatically by TrimbleRTX.com.

Powered by
Trimble
CORRECTION SERVICES

Trimble

Post-Processing Service Based on RTX Technology

TrimbleRTX.com

Contributor:	dsugar@geof.hr
Reference Name:	SISA3620.t02
Upload Date:	07/13/2021 14:15:24 UTC
Report Time Frame:	
Start Time:	12/27/2020 00:00:00 UTC
End Time:	12/27/2020 23:59:45 UTC
Observation File Type(s):	T02
Observation File(s):	SISA3620.t02
Antenna:	
Name:	TRM115000.00 TZGD
Height:	0.000 m
Reference:	Bottom of antenna mount
Receiver Name:	TRIMBLE ALLOY
Coordinate Systems:	ITRF2014
Tectonic Plate:	Eurasia (Auto-detected)
Tectonic Plate Model:	MORVEL56
Processing Interval:	15 s

Statistics

# Total Obs	# Usable Obs	# Used Obs	Percent
5760	5760	5760	100

Used Satellites

# Total Satellites:	80
GPS:	G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G12 G13 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32
GLONASS:	R01 R02 R03 R04 R05 R07 R08 R09 R12 R13 R14 R15 R16 R17 R18 R19 R20 R21 R22 R24
Galileo:	E01 E02 E03 E04 E05 E07 E08 E09 E11 E12 E13 E15 E19 E21 E24 E25 E26 E27 E30 E31 E33 E36
BeiDou:	C06 C07 C09 C10 C11 C12 C13 C14

Processing Results

ITRF2014 at Epoch 2010.0		
Coordinate	**Value**	**σ**
X	4297851.915 m	0.003 m
Y	1262317.958 m	0.003 m
Z	4525446.017 m	0.003 m
Latitude	45° 29' 7.48603" N	0.002 m
Longitude	16° 22' 4.76558" E	0.002 m
El. Height	158.894 m	0.004 m

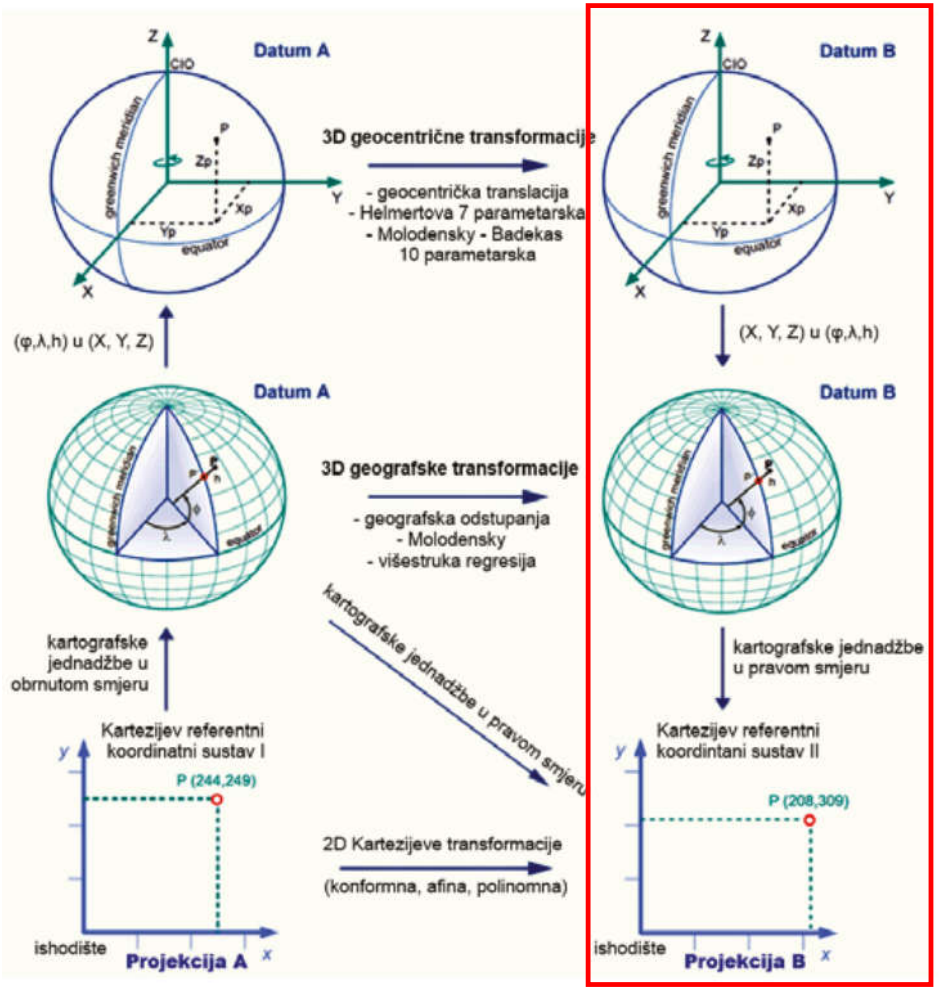
ITRF2014 at Epoch 2020.99		
Coordinate	**Value**	**σ**
X	4297851.752 m	0.003 m
Y	1262318.133 m	0.003 m
Z	4525446.123 m	0.003 m
Latitude	45° 29' 7.49090" N	0.002 m
Longitude	16° 22' 4.77541" E	0.002 m
El. Height	158.895 m	0.004 m

Report Information

Trimble RTX Solution ID:	25540745
Solution Type:	Static
Software Version:	8.5.0.19198
Creation Date:	07/13/2021 14:17:40 UTC

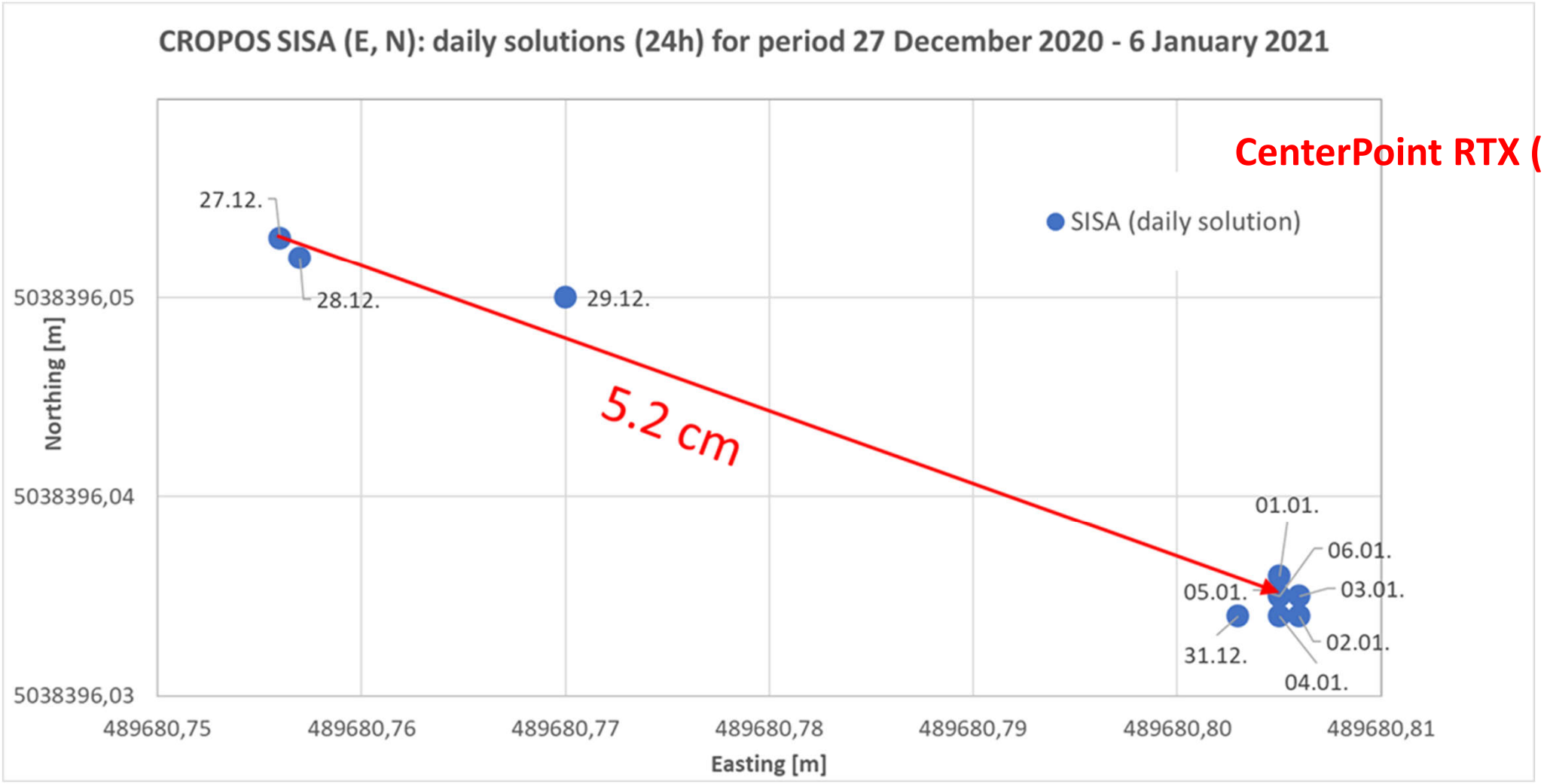
Trimble CenterPoint RTX Post-Processing

- **Transformation: (X, Y, Z) ITRF 2014, e = 2010.0 → (E, N, h) GRS80**

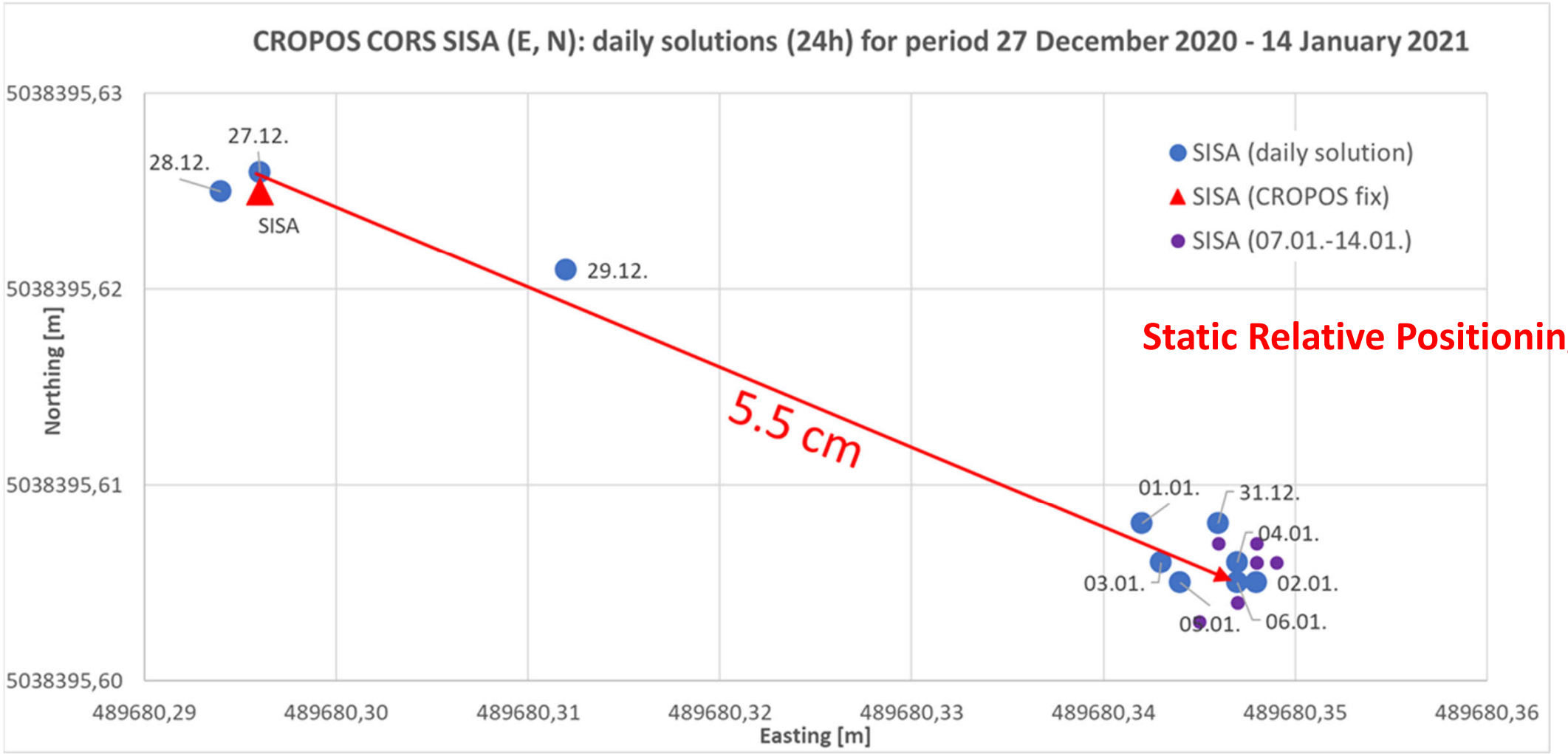


Herent, M., Horvat, H., Kriste, I. (2013): Transformacija koordinata homogenih polja u HDKS, Ekscentar br. 16, pp.42-45

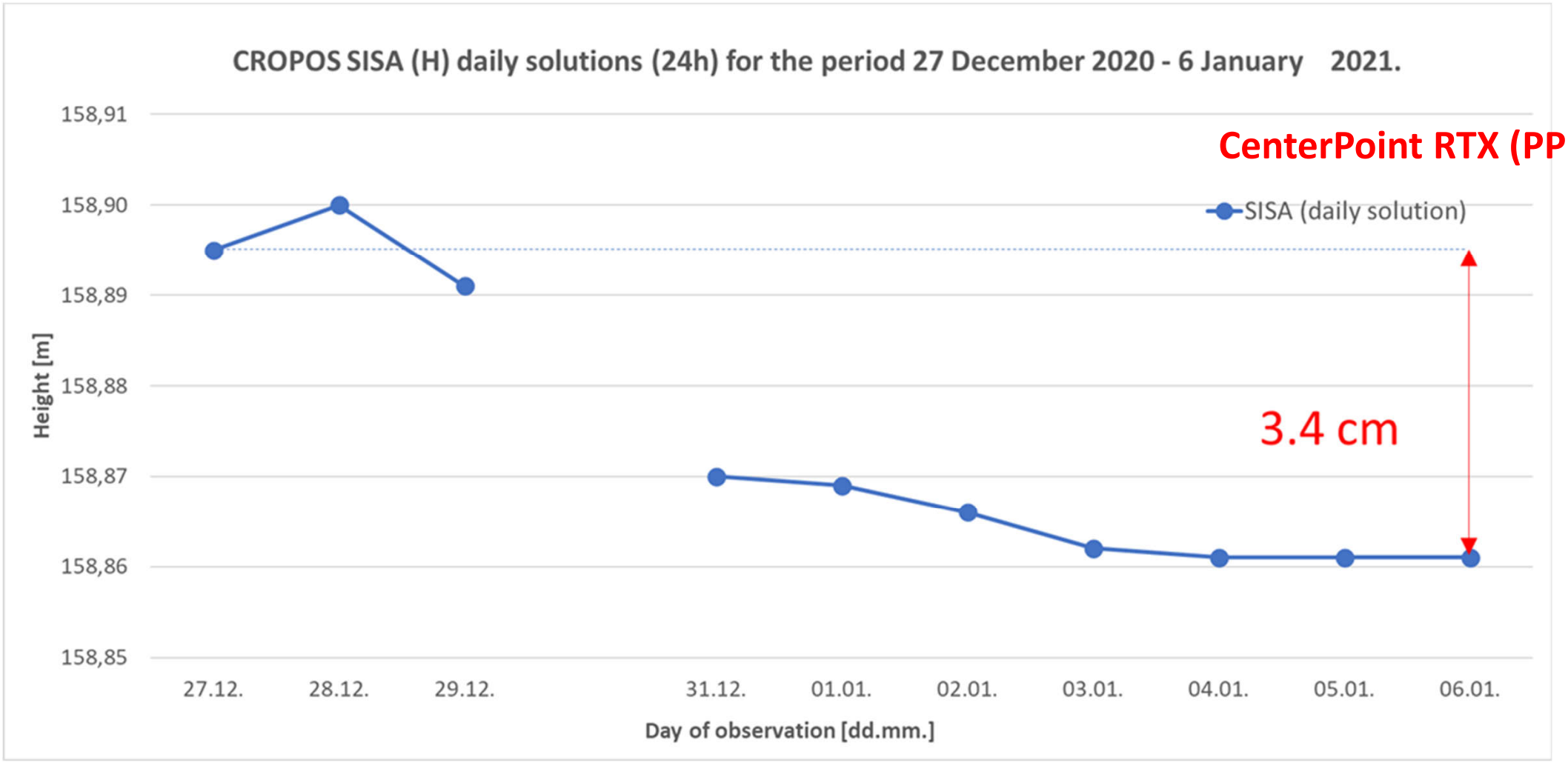
SISA – horizontal displacement (27.12. – 06.01.2021.



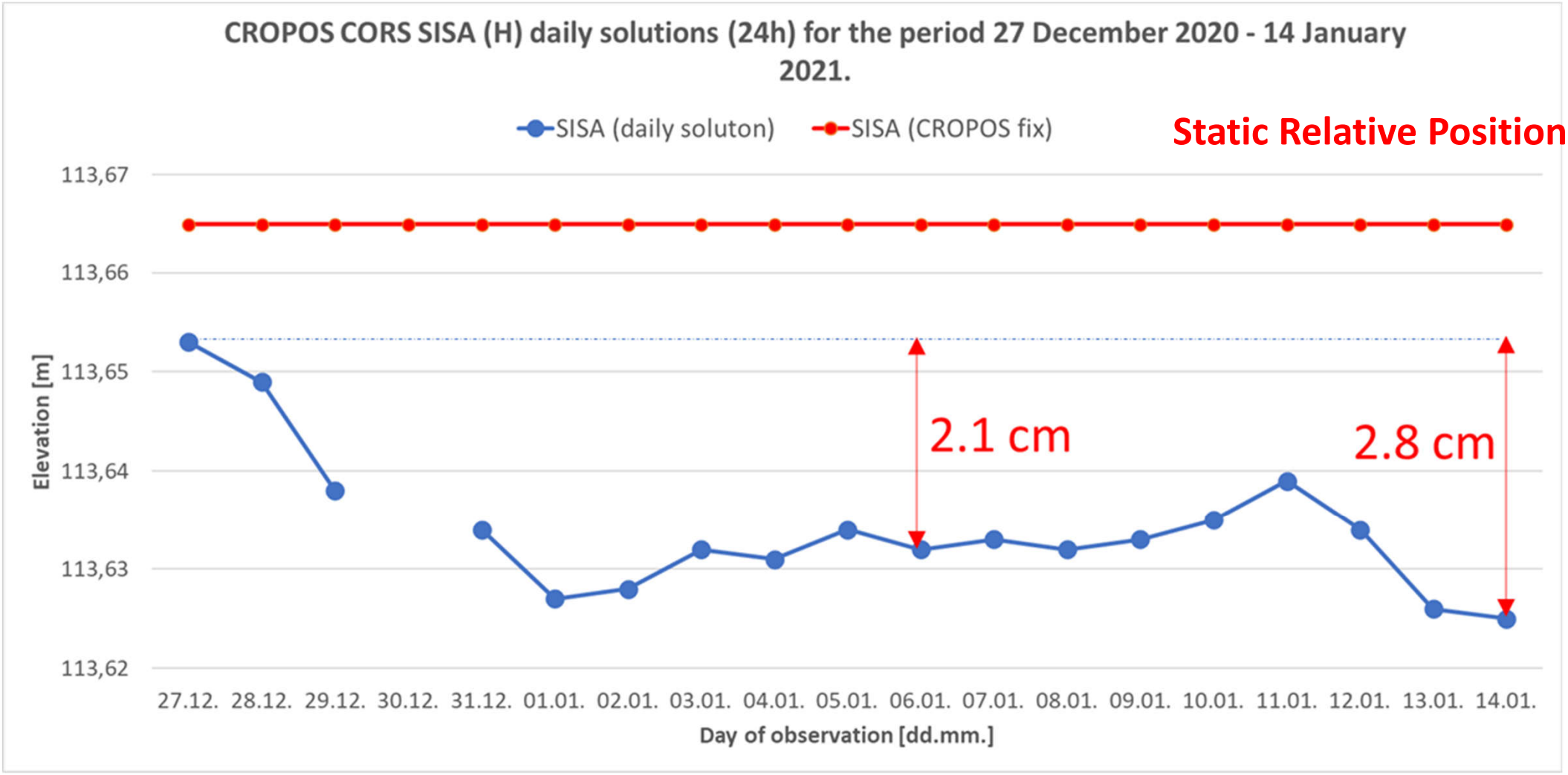
SISA – horizontal displacement (27.12. – 06.01.2021.

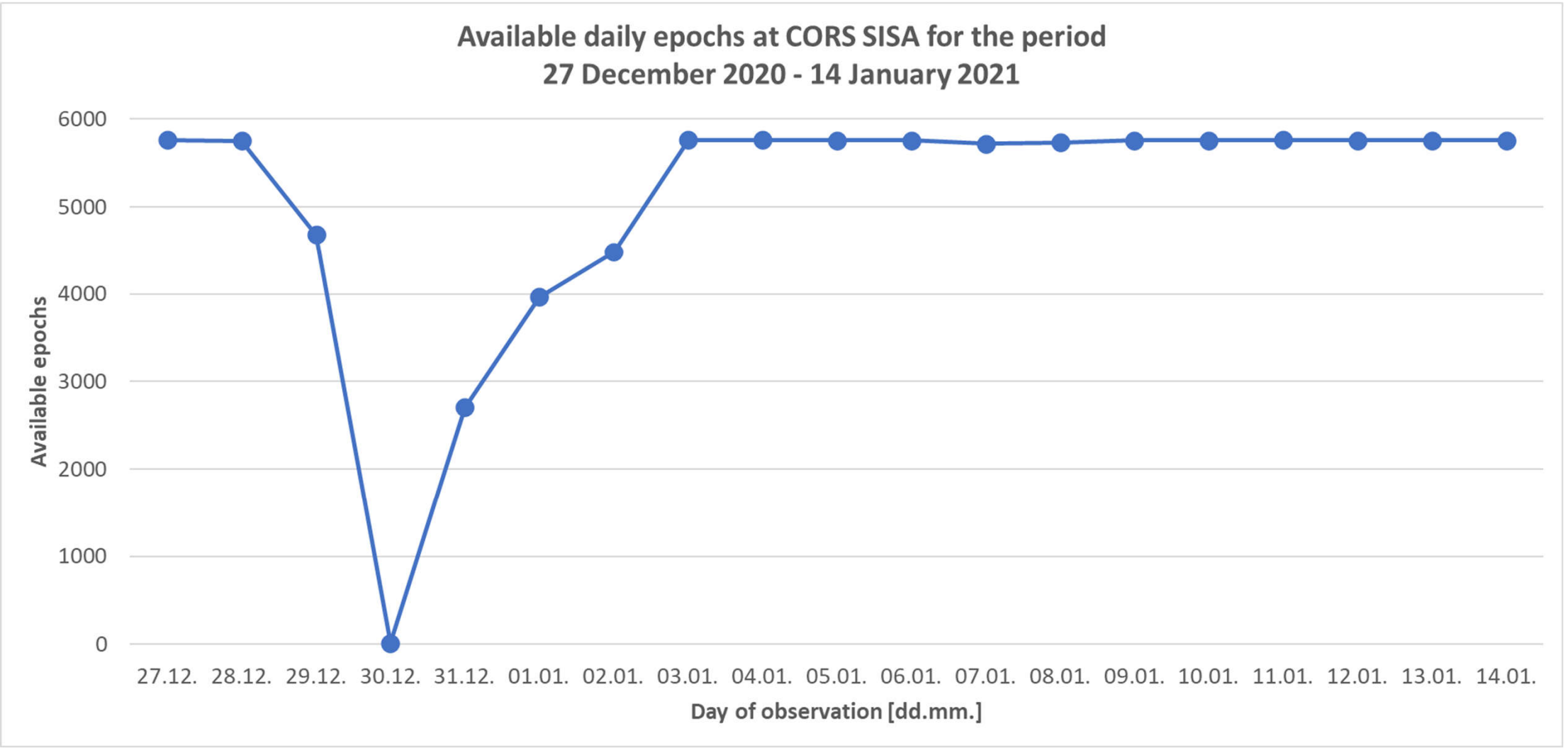


SISA – vertical displacement (27.12. – 06.01.2021.

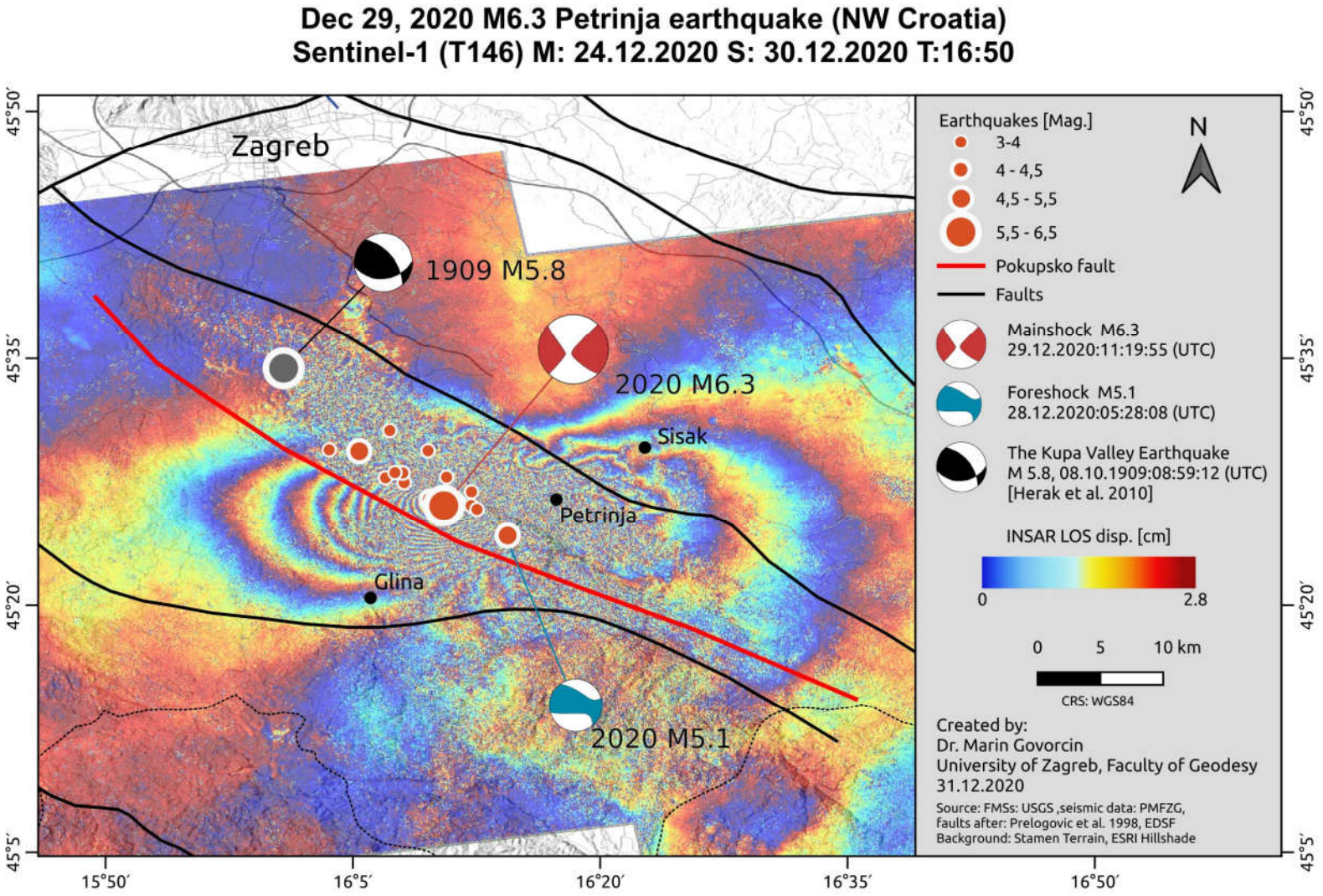


SISA – vertical displacement (27.12. – 06.01.2021.



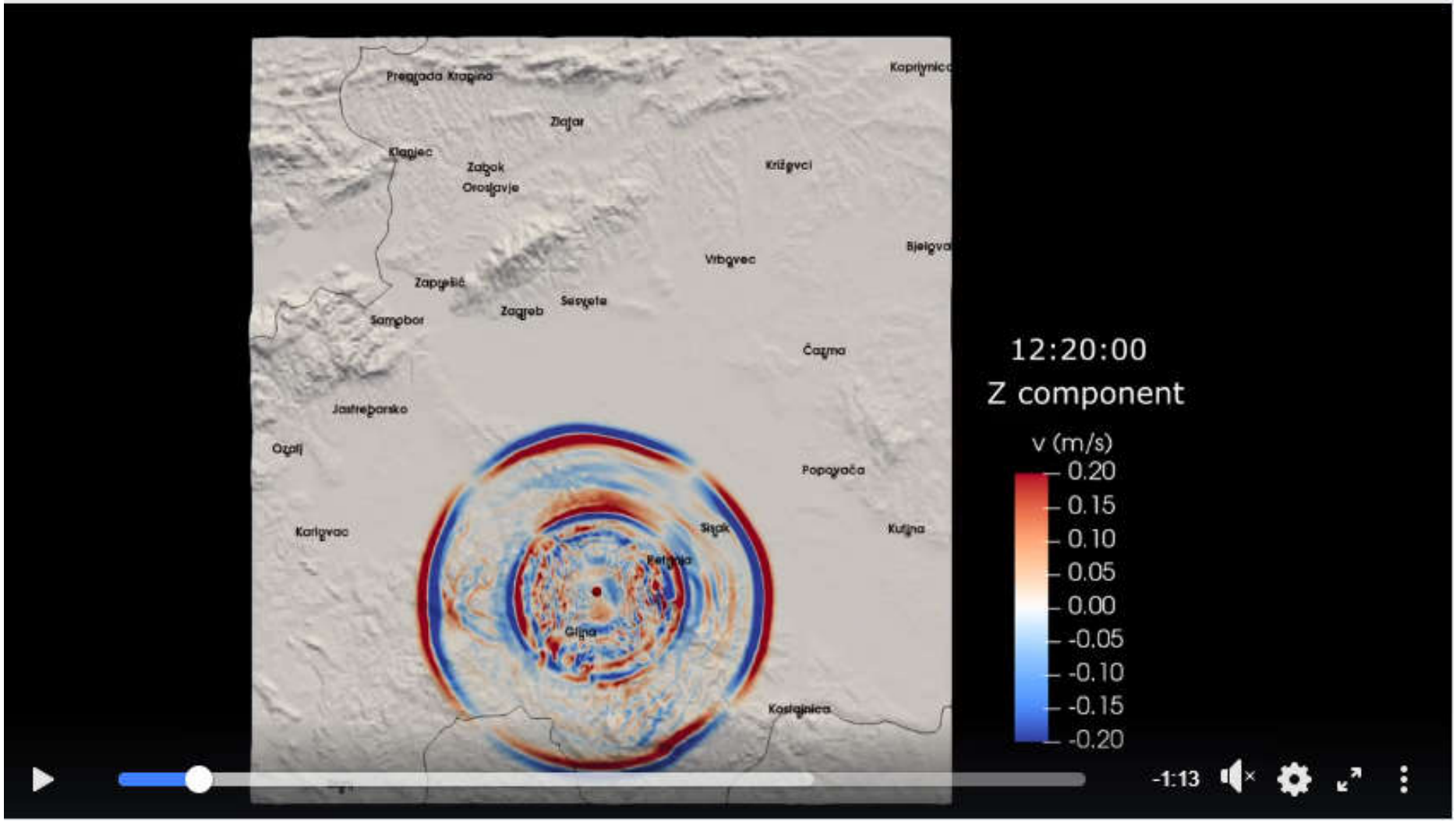

Available daily epochs at CORS SISA for the period
27 December 2020 - 14 January 2021
Available epochs
6000
5000
4000
3000
2000
1000
0
27.12.
28.12.
29.12.
30.12.
31.12.
01.01.
02.01.
03.01.
04.01.
05.01.
06.01.
07.01.
08.01.
09.01.
10.01.
11.01.
12.01.
13.01.
14.01.
Day of observation [dd.mm.]

Petrinja epicentral area: 12/2020 (M6.3)

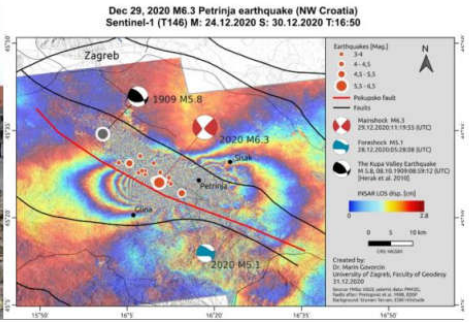


https://twitter.com/Govorcin/status/1344422722403753984/photo/1

Petrinja epicentral area: 12/2020 (M6.3)



https://www.facebook.com/geofizika.uzivo/videos/potres-kod-petrinje-simulacija-potresne-tre%C5%A1nje/164199575240912/



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