A Microwave Monitoring Service for the Study of the Stromboli Volcano Deformation

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Consiglio Nazionale delle Ricerche
istituto per il rilevamento elettromagnetico dell'ambiente

UNIVERSITÀ DEGLI STUDI FIRENZE

PROTEZIONE CIVILE

UNIVERSITÀ DEGLI STUDI DI NAPOLI PARTHENOPE

EGU-2020, 4-8 May 2020, Vienna, Austria

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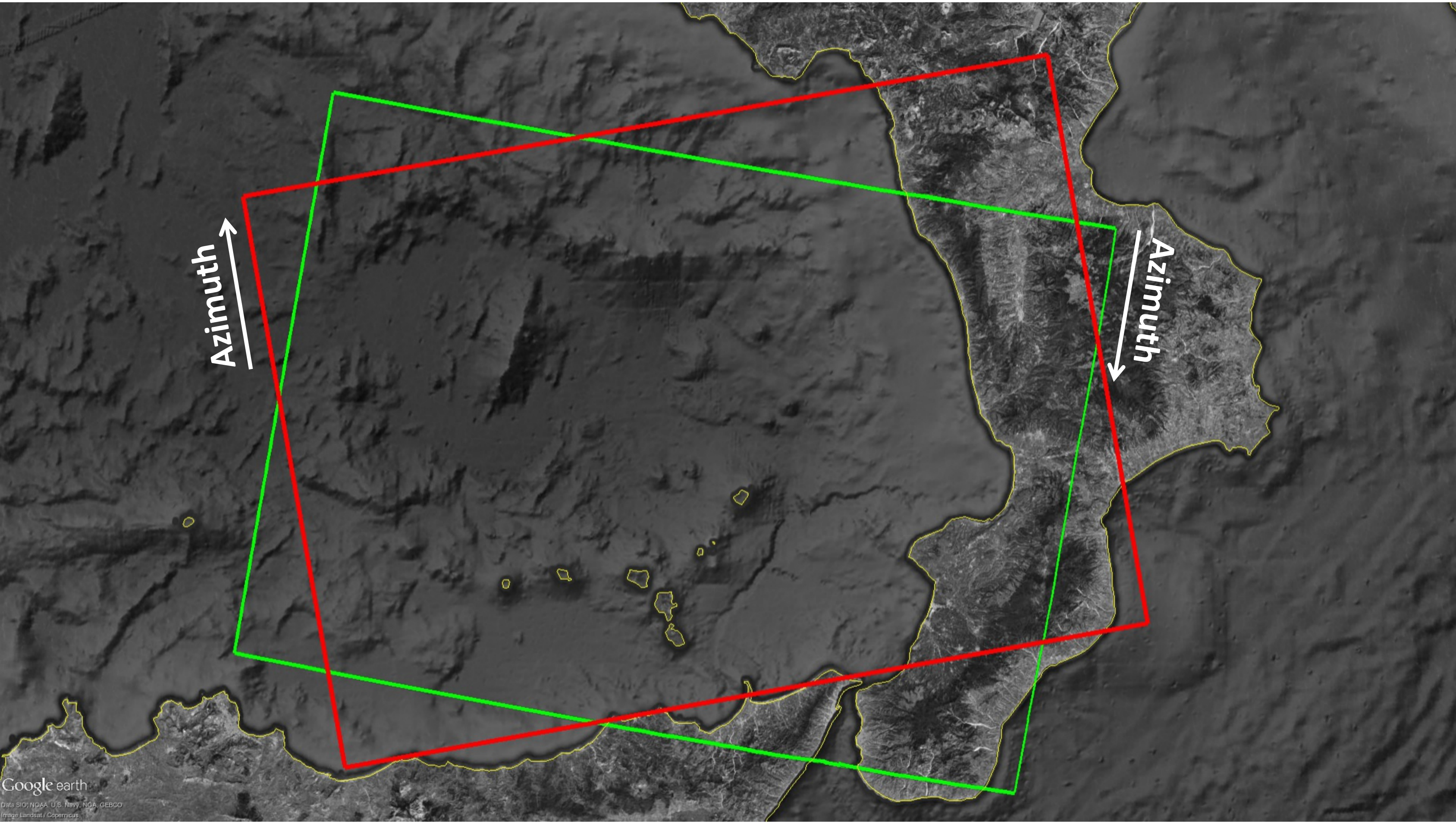
Spaceborne Dataset: Sentinel-1 constellation



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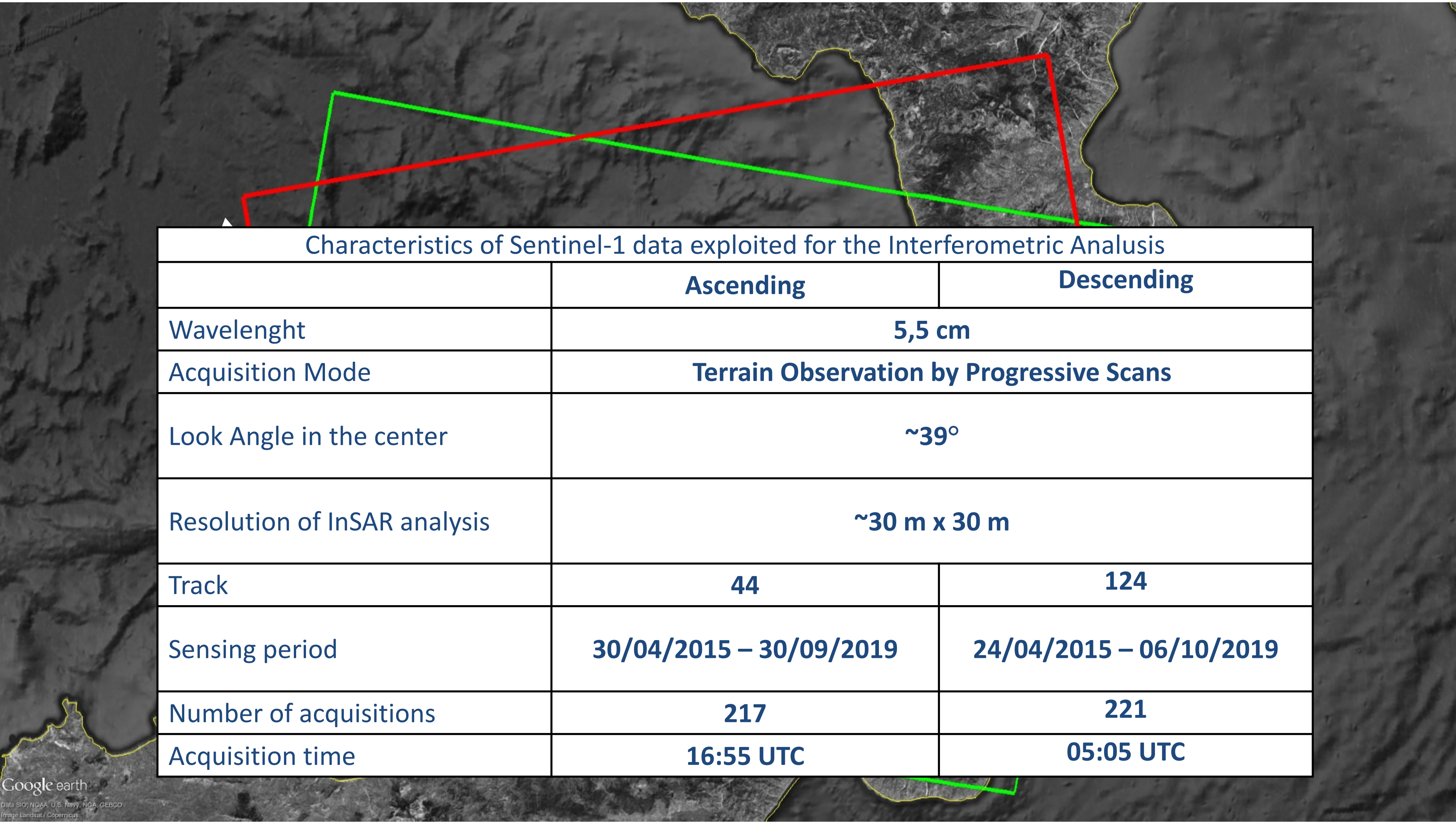

Characteristics of Sentinel-1 data exploited for the Interferometric Analusis		
	Ascending	**Descending**
Wavelenght	**5,5 cm**	
Acquisition Mode	**Terrain Observation by Progressive Scans**	
Look Angle in the center	**~39°**	
Resolution of InSAR analysis	**~30 m x 30 m**	
Track	**44**	**124**
Sensing period	**30/04/2015 – 30/09/2019**	**24/04/2015 – 06/10/2019**
Number of acquisitions	**217**	**221**
Acquisition time	**16:55 UTC**	**05:05 UTC**

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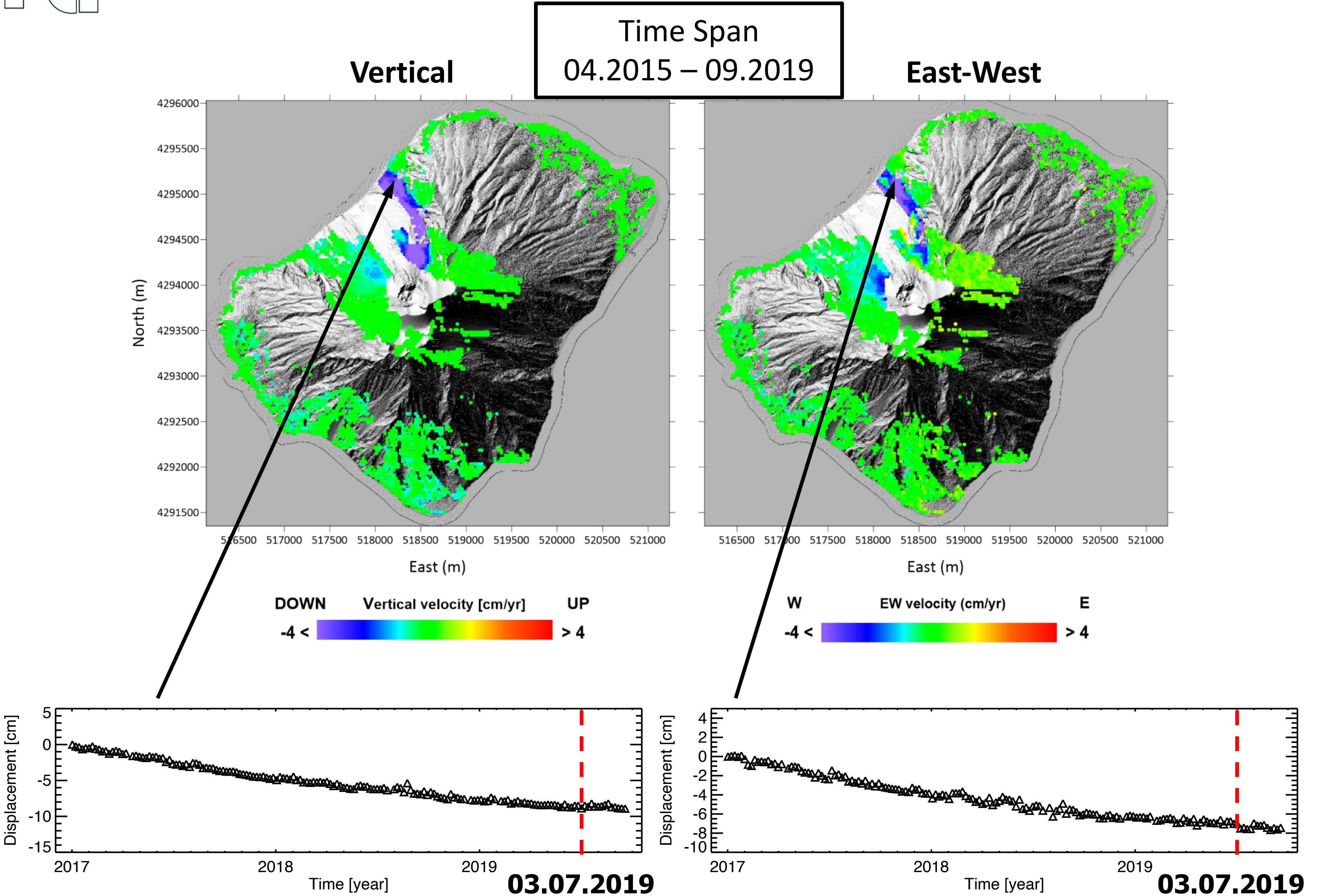
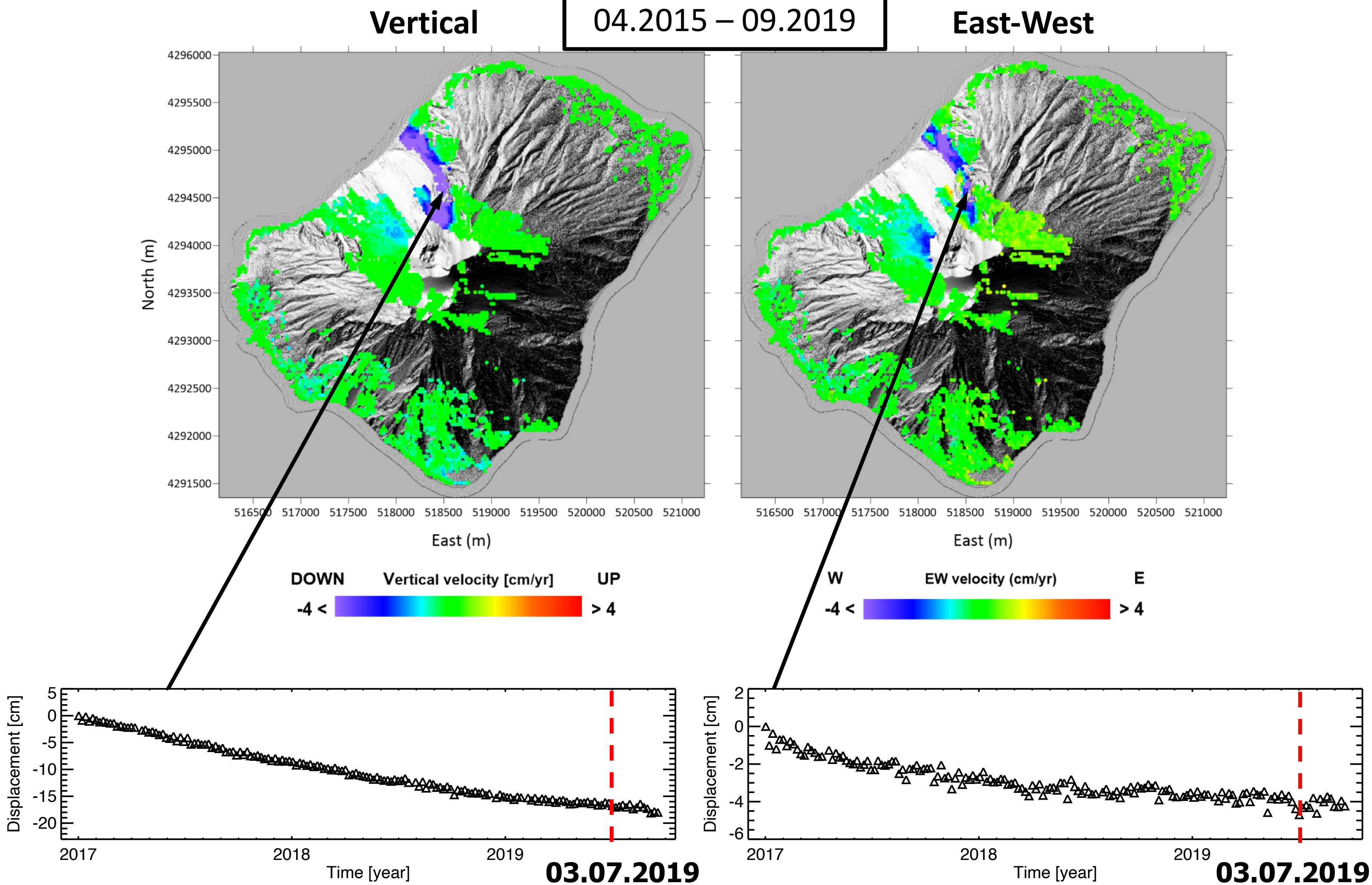
Vertical and East-West displacement components

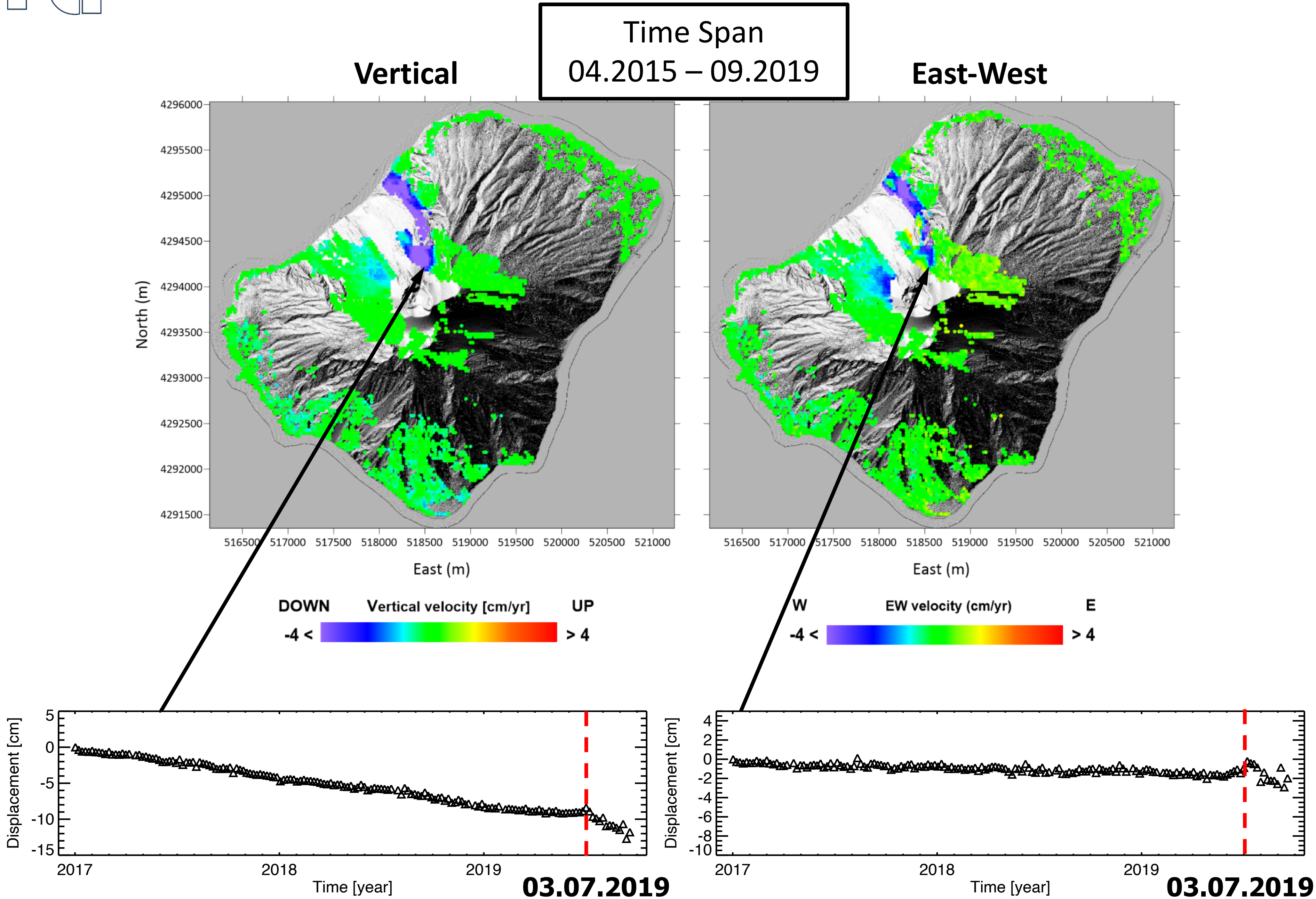


Vertical and East-West displacement components

Time Span
04.2015 – 09.2019



Vertical and East-West displacement components

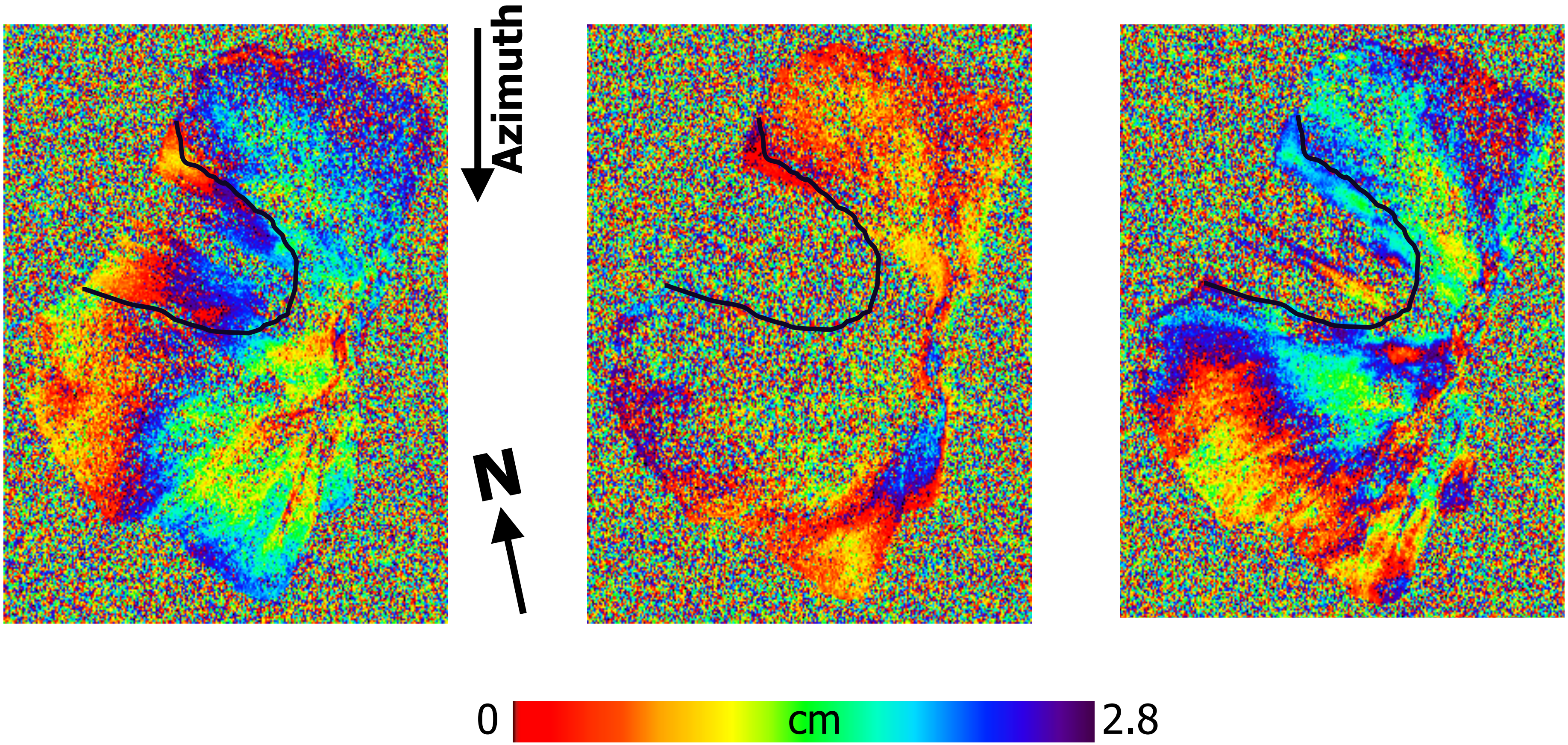


July 3 2019 Volcano Crisis: Sentinel-1 Interferograms

Pre-event July 3
20.06.2019 – 26.06.2019

Co-event July 3
26.06.2019 – 08.07.2019

Post-event July 3
08.07.2019 – 14.07.2019



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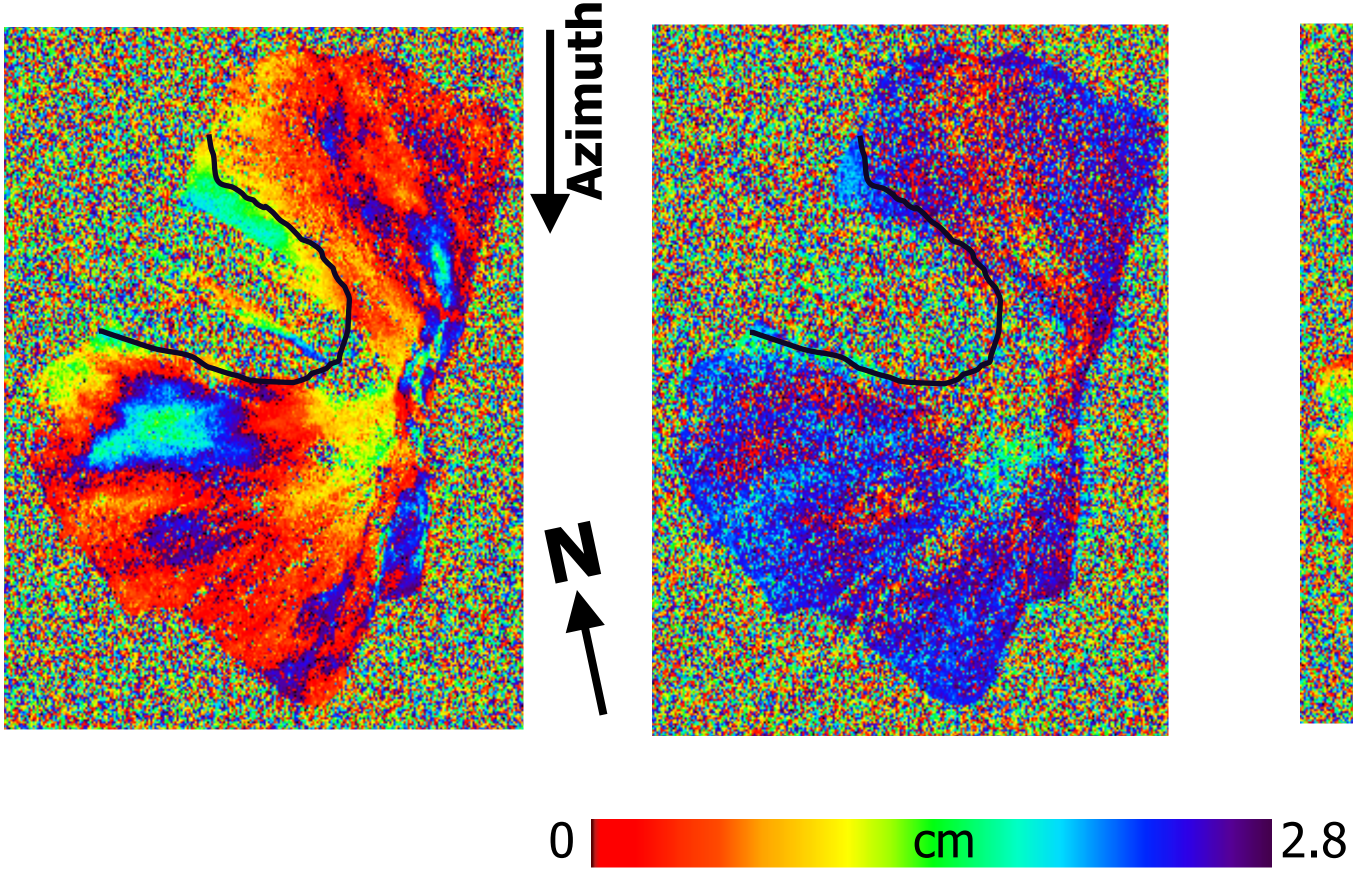
August 28 2019 Volcano Crisis: Sentinel-1 Interferograms

Pre-event August 28
19.08.2019 – 25.08.2019

Co-event August 28
25.08.2019 – 31.08.2019

Post-event August 28
31.08.2019 – 06.09.2019



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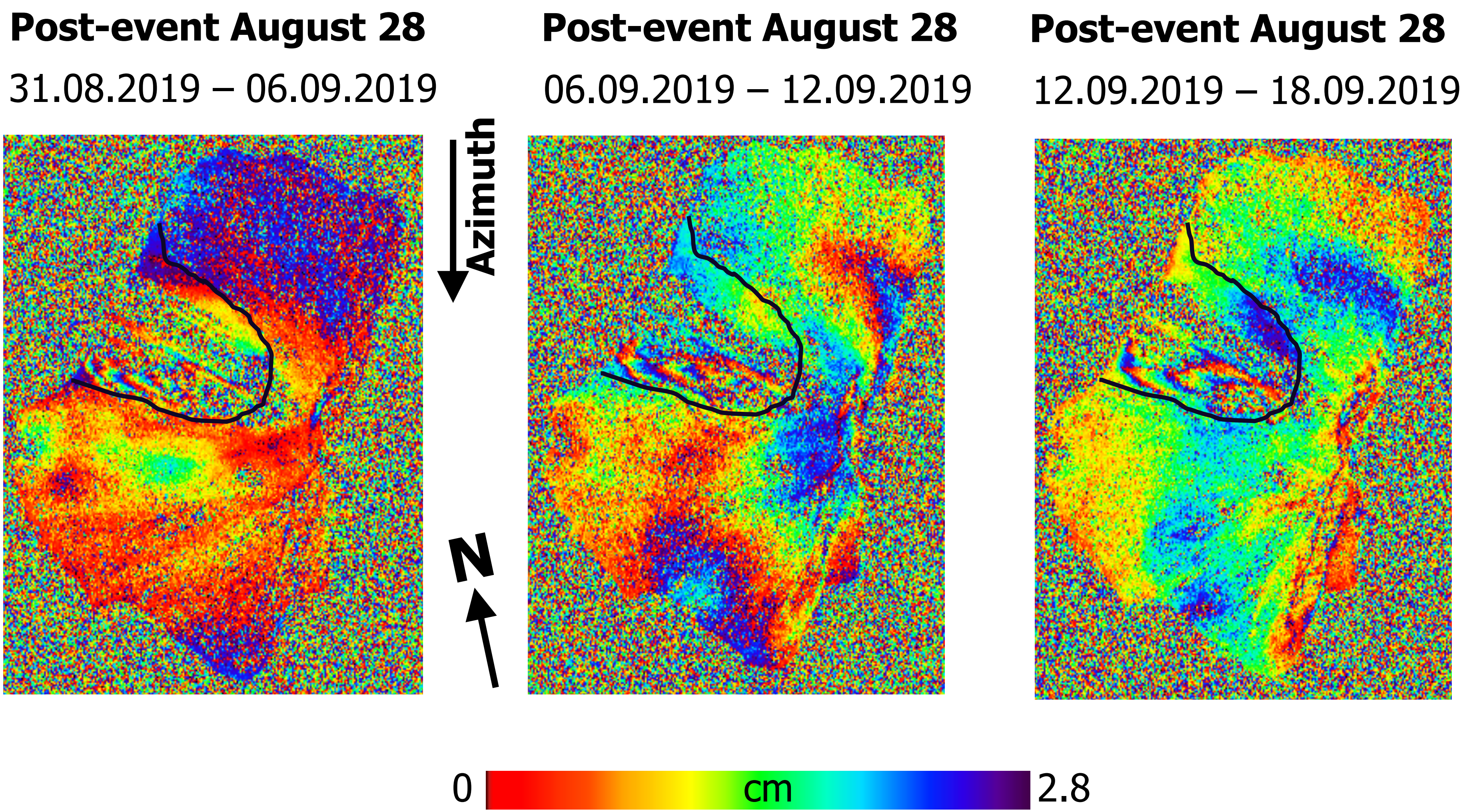
August 28 2019 Volcano Crisis: Sentinel-1 Interferograms



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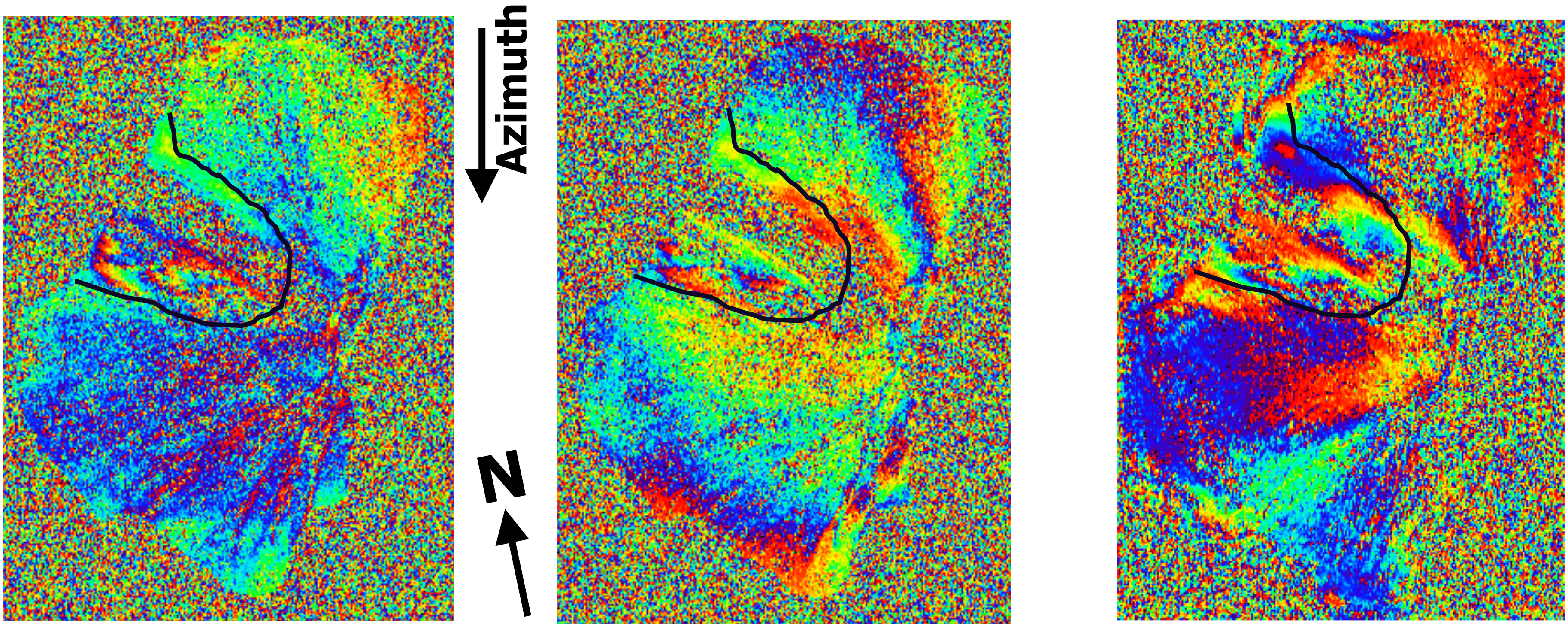
August 28 2019 Volcano Crisis: Sentinel-1 Interferograms

Post-event August 28
18.09.2019 – 24.09.2019

Post-event August 28
24.09.2019 – 30.09.2019

Post-event August 28
30.09.2019 – 06.10.2019



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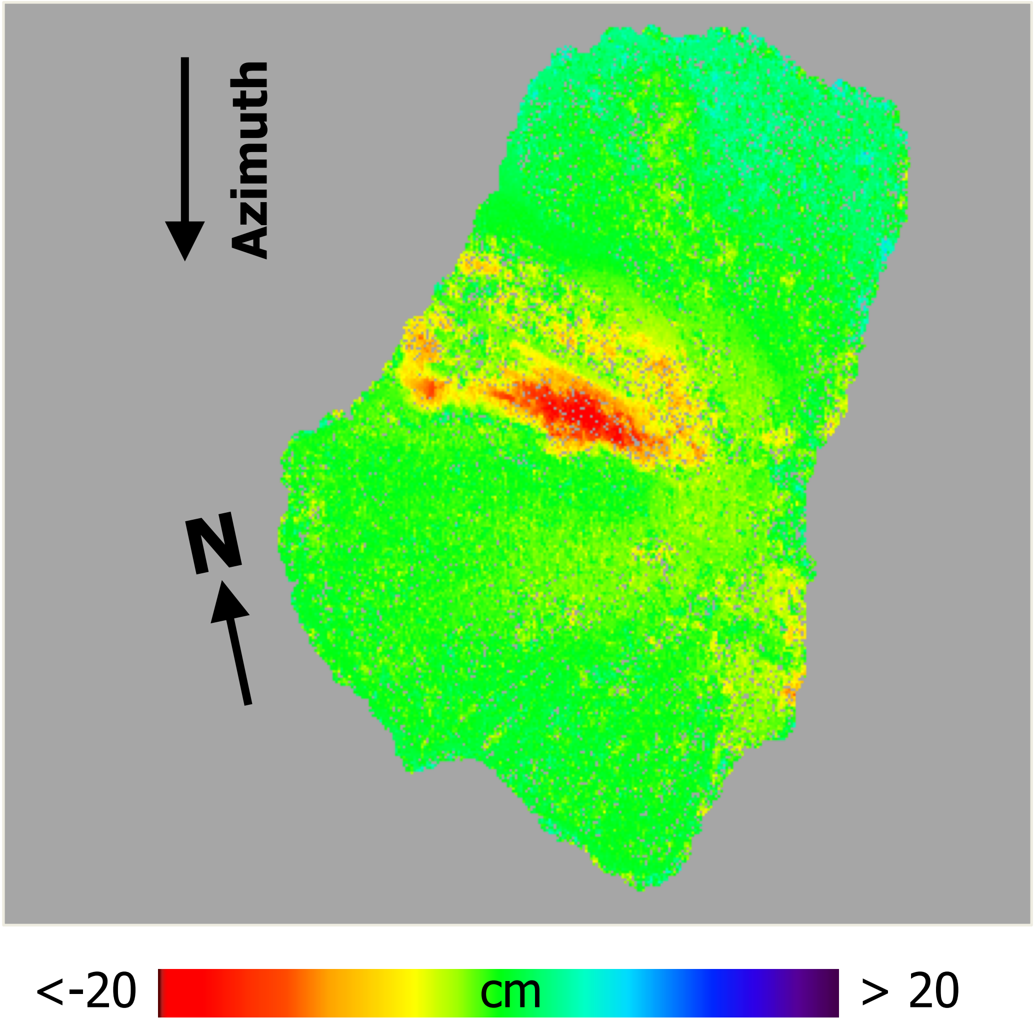
August 28 2019 Volcano Crisis: Sintinel-1 Stacking

(from August 31 2019 to October 6 2019)



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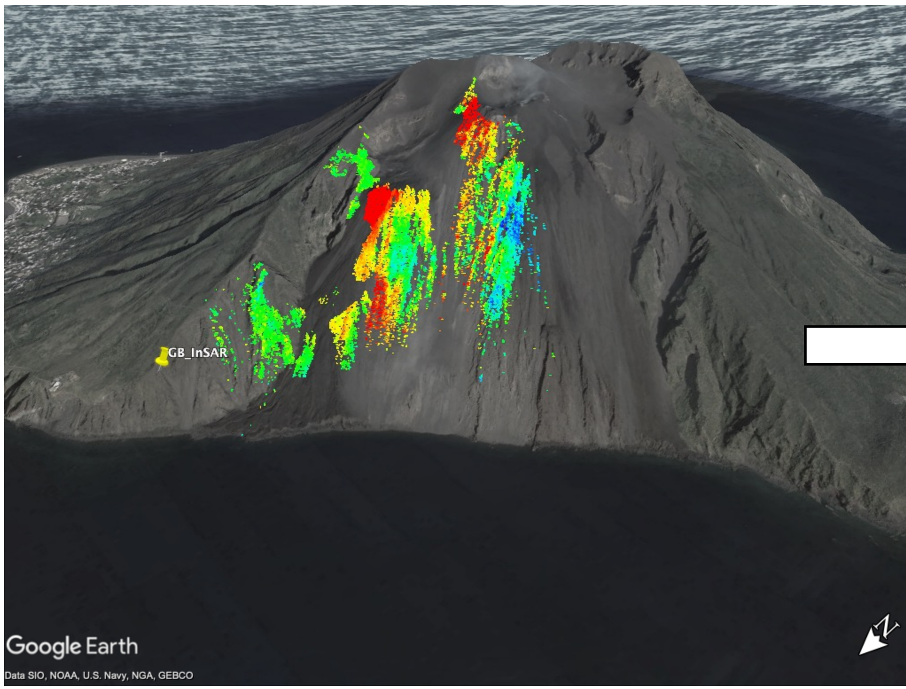
Ground Based InSAR Analysis

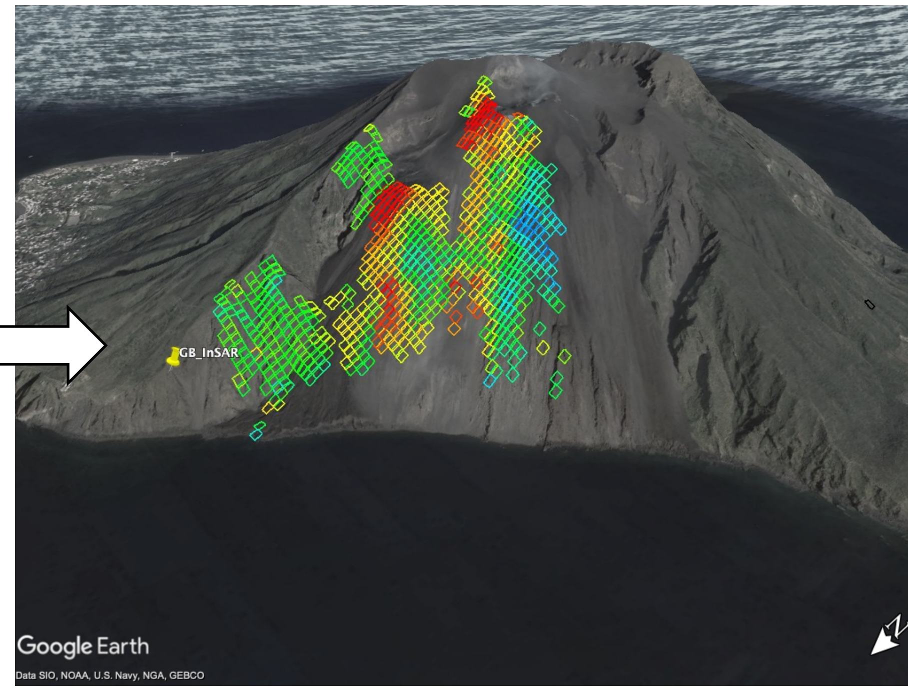
Cumulative Deformation: from March 2015 to September 2019

Full Resolution (~2m)



Min= -374 cm; Max= 80 cm

Low Resolution (~30m)



Min= -334 cm; Max= 50 cm

<-100 cm > 100

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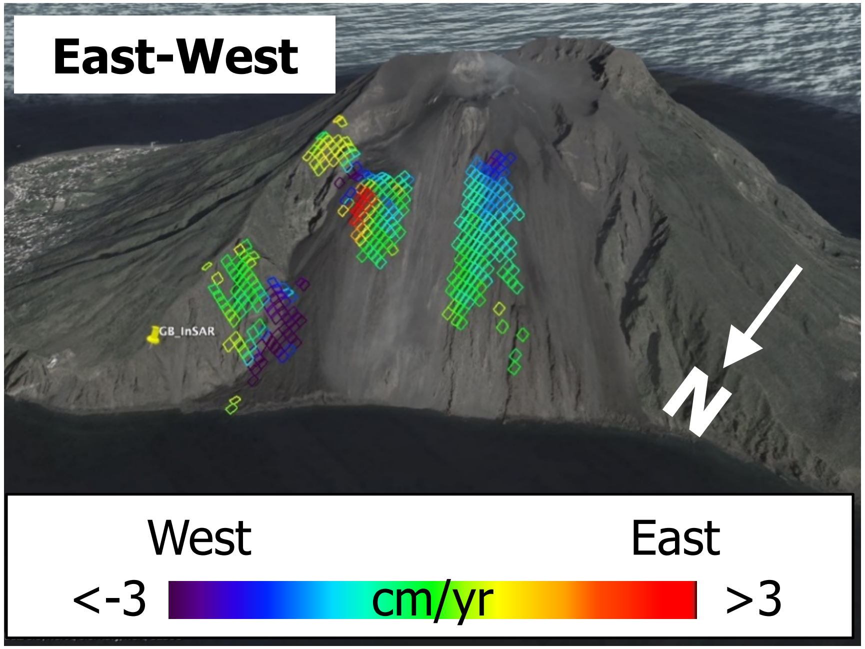
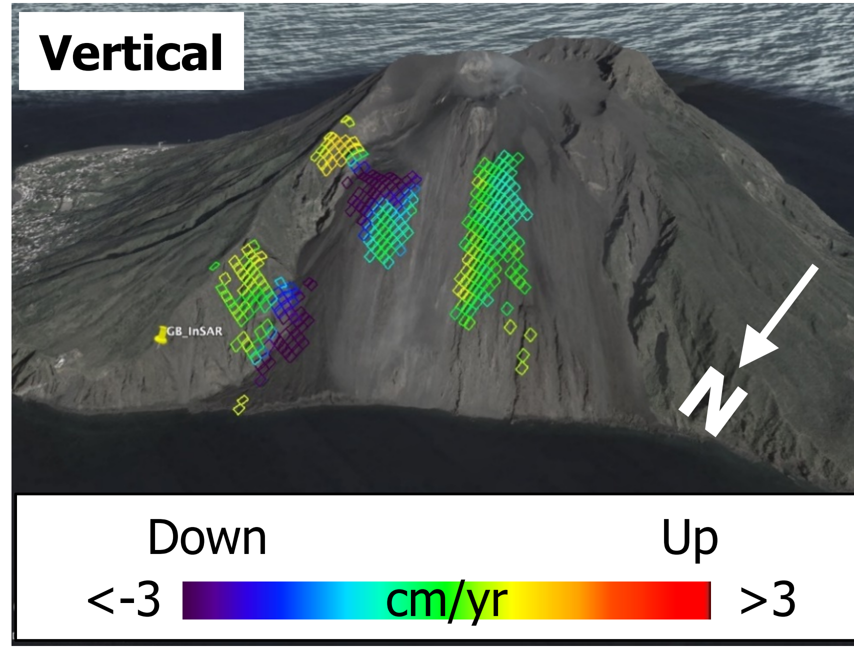
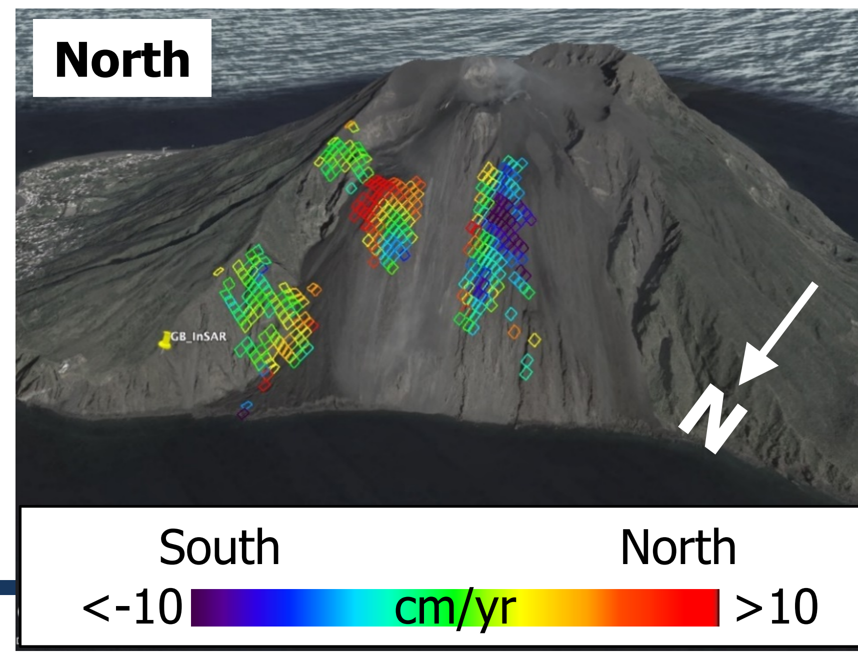
Sentinel-1 InSAR and GB-InSAR Data Integration



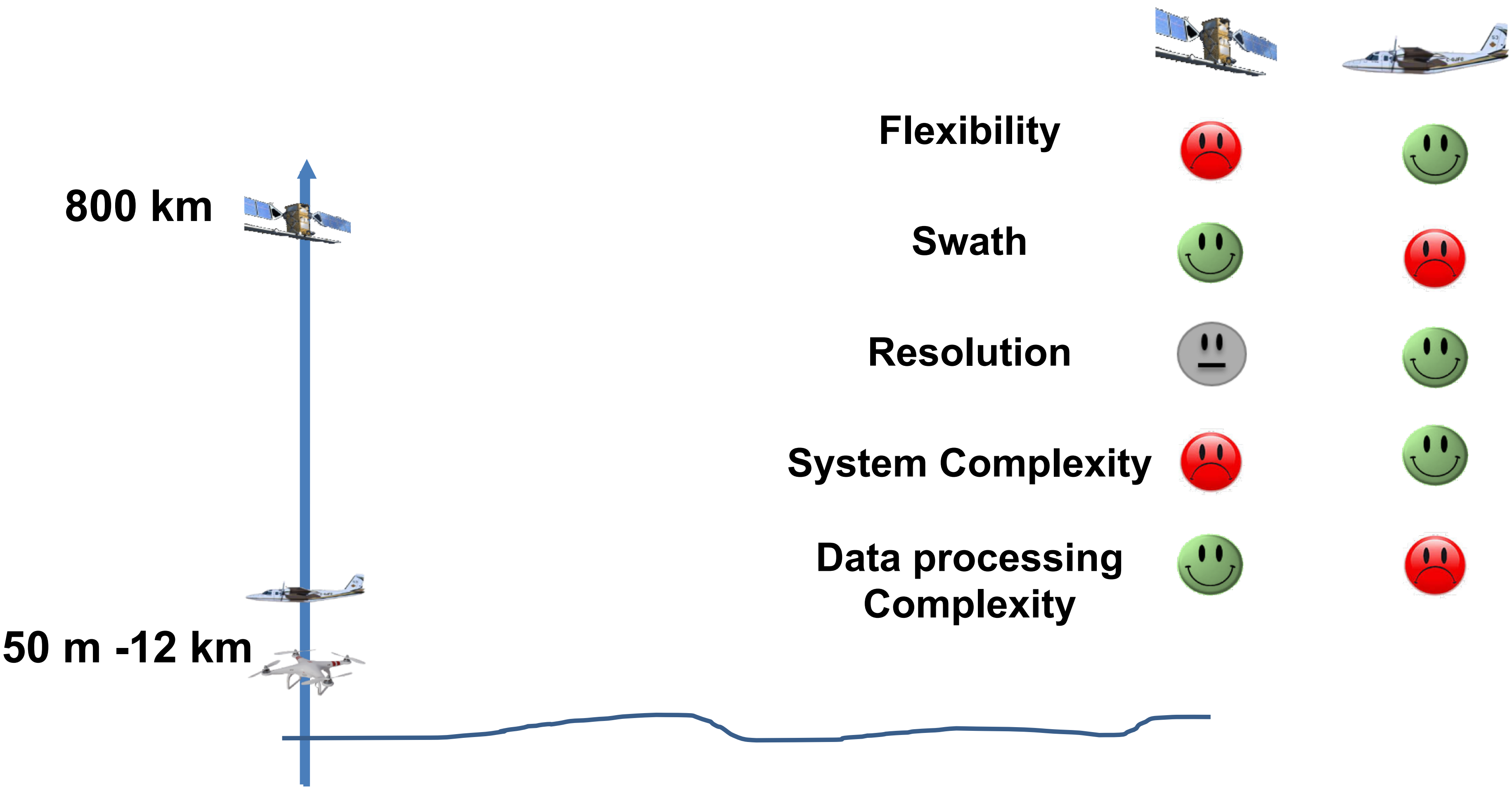




3D Deformation Field of Sciara del Fuoco

Mean Deformation Velocity
March 2015 - September 2019

Airborne SAR methodology for volcano monitoring: Motivations



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Airborne SAR methodology for volcano monitoring: Exploited System

AXIS SAR SYSTEM

Single-pass Interferometric SAR developed by Elettra Microwave

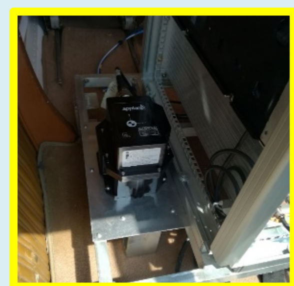
RADAR: AXIS

Table I - Technical Specifications

RADAR	
Central frequency	9.55 GHz
Bandwidth	200 MHz
PRF	1200 Hz
Transmitted Power	5 W
Mapping swath	Up to 3 Km
Interferometry	Single-Pass
Flight Altitude	Up to 3 Km

Aircraft: Cessna 172

Navigation System: Applanix POS AV



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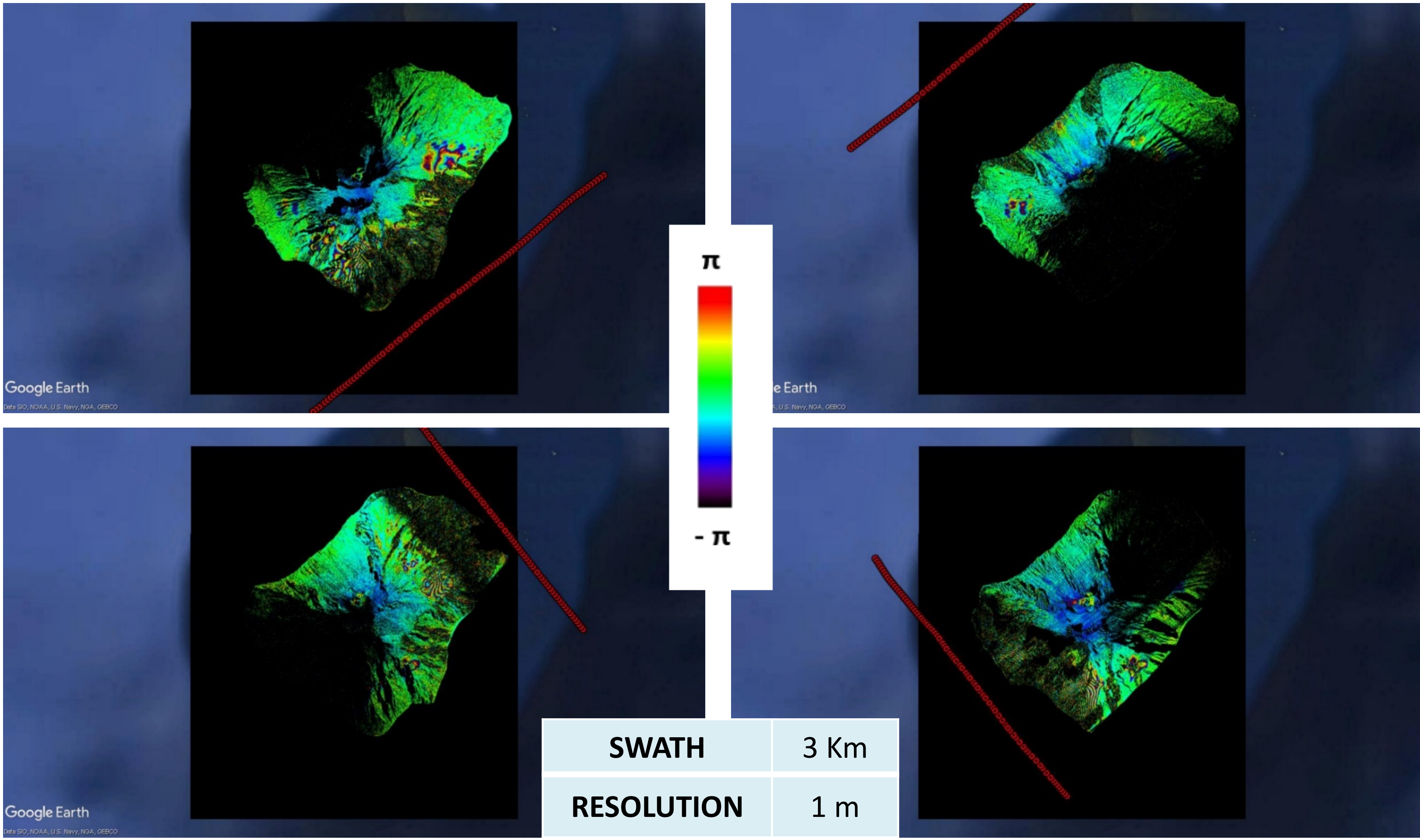
Airborne SAR methodology for volcano monitoring: Stromboli Island Case Study

Flight campaigns July 7-8 2019



SWATH	3 Km
RESOLUTION	1 m

Thank You !

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