

Synchronisation of High-Resolution Imageries Acquired by NOAA and SUOMI NFP Satellites for Active Fire Detection over Etna Volcano

Presented by

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PLANNING

Study area

Motivations and challenges

Protocol Experiment and validation

Protocol: Sensors Specifications

Near Real acquisition of images: case 1

Near Real acquisition of images: case 2

Conclusion

Perspectives

Study Area



Study area. Etna mount located in Sicily, Italy.

The spatial resolution is 50 km

Date : Eruption of 02 june 2025

Motivations and challenges

- Mount Etna is the highest Mediterranean island mountain and the most active stratovolcano in the world.
- The almost continuous eruptive activity of Mount Etna continues to influence volcanology, geophysics and other Earth science disciplines.
- The remote sensing (satellites) could provide several information about the distant volcanoes or hazards.



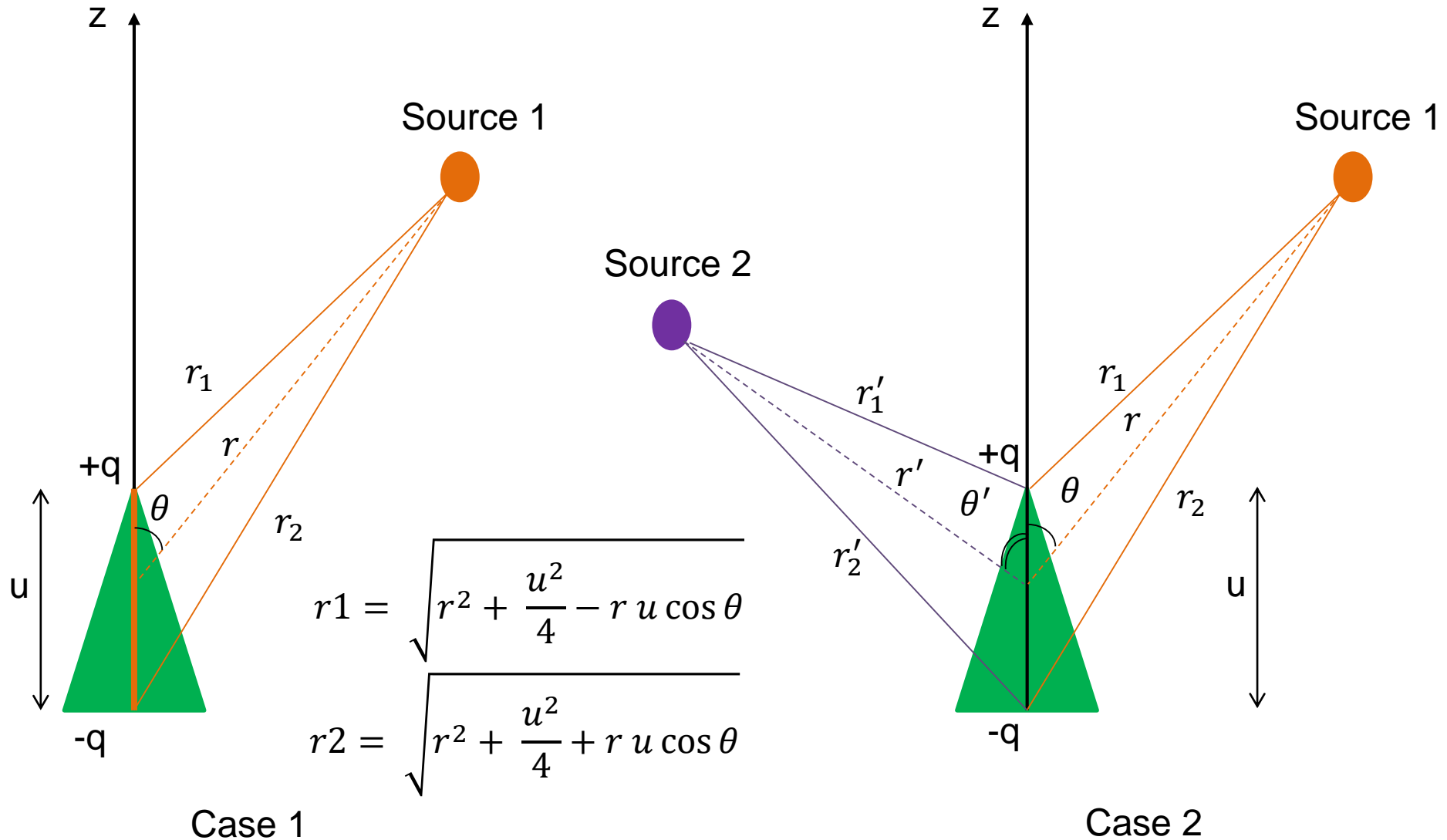
Date of Inscription: 2013

Property: Natural



© Ente Parco Etna

Protocol: Experiment and Validation



Protocol: Sensors Specifications

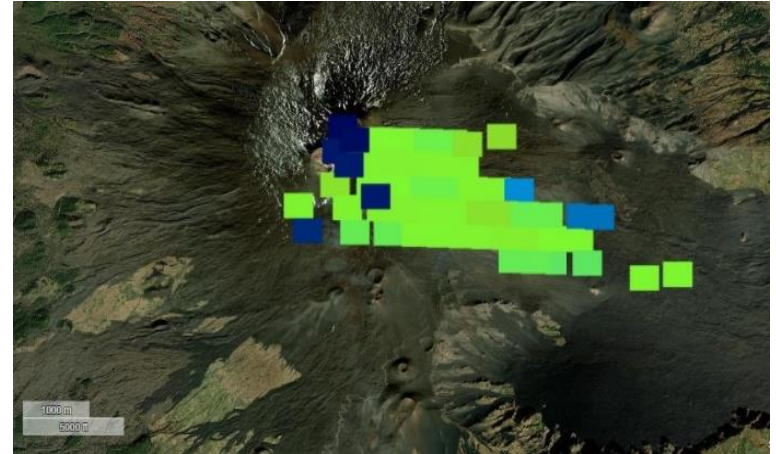
The specifications of sensors experimented in the study:
SNPP and NOAA-20.

Product Latency (hours)	1-4		1-4	
Sensor	VIIRS (M-bands)		VIIRS (I-bands)	
Satellite	SNPP	NOAA-20	SNPP	NOAA-20
Equator Crossing Time	13.30 LT	12.40 LT	13.30 LT	12.40 LT
Global Coverage	Every 12 h		Every 12 h	
Spectral region	MIR, TIR		MIR, TIR	
Pixel resolution at nadir	0.75 km		0.375 km	
Spectral range (μm)	3.973-4.128		3.550-3.930	
	10.26-11.26		10.56-12.43	
ID	M-13		I-4	
Bands (s)	M-15		I-5	

Near-Real acquisition of images

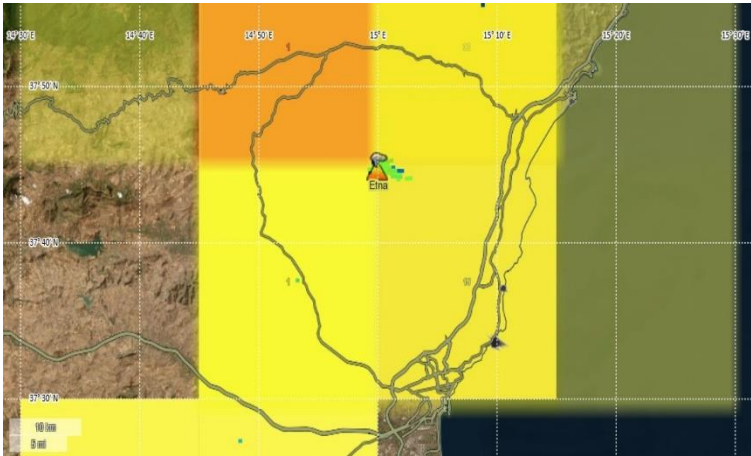


The visualization of the lava flows of Etna volcano (red= NOAA-20, yellow= S-NPP). The spatial resolution is 1 km.



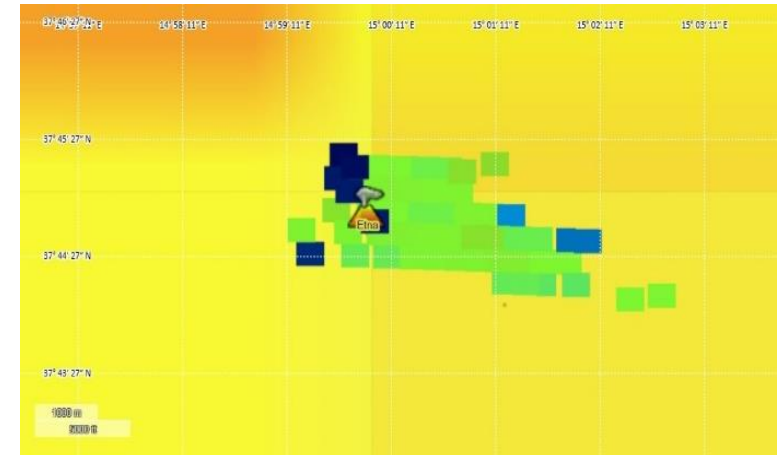
The macro-visualization of the lava flows of Etna volcano (green = NOAA-20, blue = SNPP). The spatial resolution is 1 km.

Near Real acquisition of images 2



The macro-visualization of Etna volcano (the spatial resolution is 10 km).

- All green-blue color nuances corresponding to lava flows are clearly displayed.
- The severity of the eruption volcano are labelled by yellow (low) and orange color (high).



The enlarged visualization (the spatial resolution is 1 km) highlights in depth the severity of the eruption volcano (low to high).

Conclusion

- ✓ We presented an experimental study to estimate the severity of the Etna volcano eruption through the synchronization of NOAA-20 and S-NPP with the same wavelength (375m).
- ✓ We visualized the lava flows remotely over an active volcano at two spatial resolutions (1 km and 10 km).
- ✓ We highlighted the mixed pixels in the images to estimate in depth the severity and the intensity of the heat and the lava flow in the landscape, according to their pixel reflectance.

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Perspectives

- ✓ Investigating the depth of the thermally active volcanic area of Mount Etna over lands and in the (sea-)ocean that could be impacted by the latent heat flux transfer.

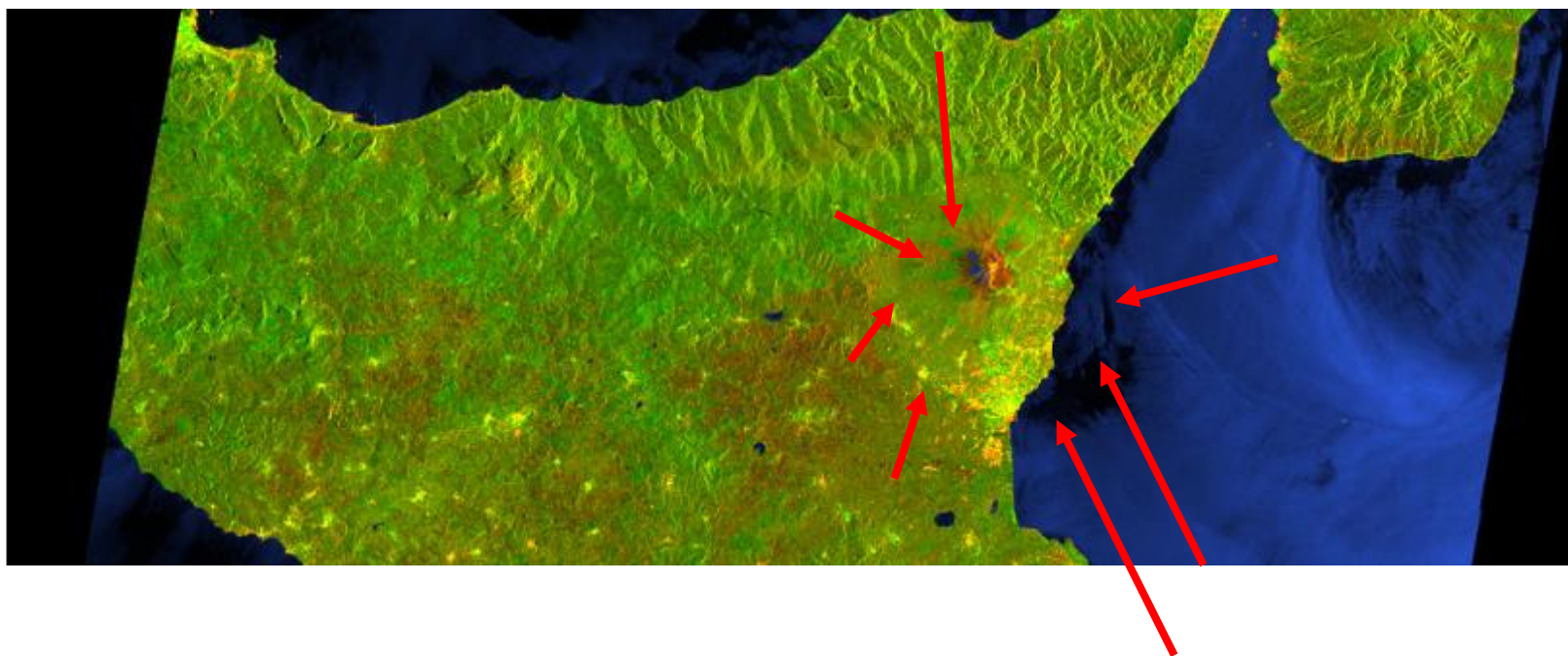
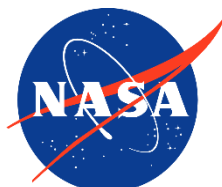


Image SAR acquired by Sentinel-1 (band C), June 2025 (Data courtesy of ESA)

Acknowledgements

ECSA-12
2025
Conference



EARTH SCIENCE
APPLIED SCIENCES

Thank you for your attention