

Università degli Studi di Padova

Satellite data analysis for monitoring of territory, infrastructure and mobility

Anselmo Bettio - 37th Cycle

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PhD Project Work presentation - 27/10/2021





- Motivations and Objectives
- SAR images: acquisition and advantages
- Project work operative plan
- Conclusions



Motivations





Ministero dell'Università e della Ricerca

PNRR plan (Piano Nazionale di Ripresa e Resilienza)

- Improvement of the Earth
 Observation capability and
 expansions of its applications
- High performace big data analysis
- Technologies for sustainable agriculture (Agritech)
- Sustainable mobility





EO Examples





Detection of deforestation and degradation with Sentinel-1 [1] Wide-Area Near-Real-Time Monitoring of Tropical Forest Degradation and Deforestation Using Sentinel-1 by Dirk Hoekman

> [2] The Use of Sentinel-1 Time-Series Data to Improve Flood Monitoring in Arid Areas by Sandro Martinis

Flood event in Webi Shabelle River, Somalia and Ethiopia (May 2016)



Burn areas detection of the Sardinia wildfire (25 July 2021) with Sentinel-2. Anselmo Bettio



80-90%

60-70%









The **objectives** of this research work are the definition, the implementation and the validation of new algorithms and methods finalized to the monitoring of critical infrastructures and/or several terrestrial activities in order to fulfill the goals in terms of sustainability and security.



SAR images advantages



Passive remote sensing



The image is created capturing the light sun reflected by the Earth

Active remote sensing



The image is created capturing the SAR signal reflected by the Earth. (1) Independent from atmospheric condition

(2) Amplitude and phase information









Venice in a High resolution SAR image



Project work











		FIRST YEAR							SECOND YEAR								THIRD YEAR								
WBS		% OF TASK	1	T1	-	Т2	T	3	Т	4	Т	1		Г2	T	3	T4		T1		T2	Т	3	Т	4
NUMBER	TASK TILE	COMPLETE	0	N D	J	FΜ	AM	IJ	JA	A S	0	N D	J	FΜ	AM	J	JΑ	S	O N	DJ	FΜ	AN	IJ	JA	A S
1	Analysis of applications, study and training																								
1.1	Analysis of applications	0%																							
1.2	State of the art of SAR satellite images	0%																							
1.3	Educational activities	0%																							
1.4	Acquisition of practical skills on SAR image analysis	0%																							
2	Algorithms definition and implementation																								
2.1	Ideation and development of the algorithms	0%																							
2.2	Educational activities	0%																							
2.3	Implementation of the algorithms	0%																							
3	Implementation and validation																								
3.1	Validation of the algorithms	0%																							
3.2	Educational activities	0%																							
3.3	Final thesis and documentation writing	0%																							







The expected results from this PhD work are the definition, implementation and validation of new methods and algorithms in an effort to further improve environment and infrastructure awareness relying on Big Earth Observation Data and Artificial Intelligence techniques.

Thanks for the attention



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