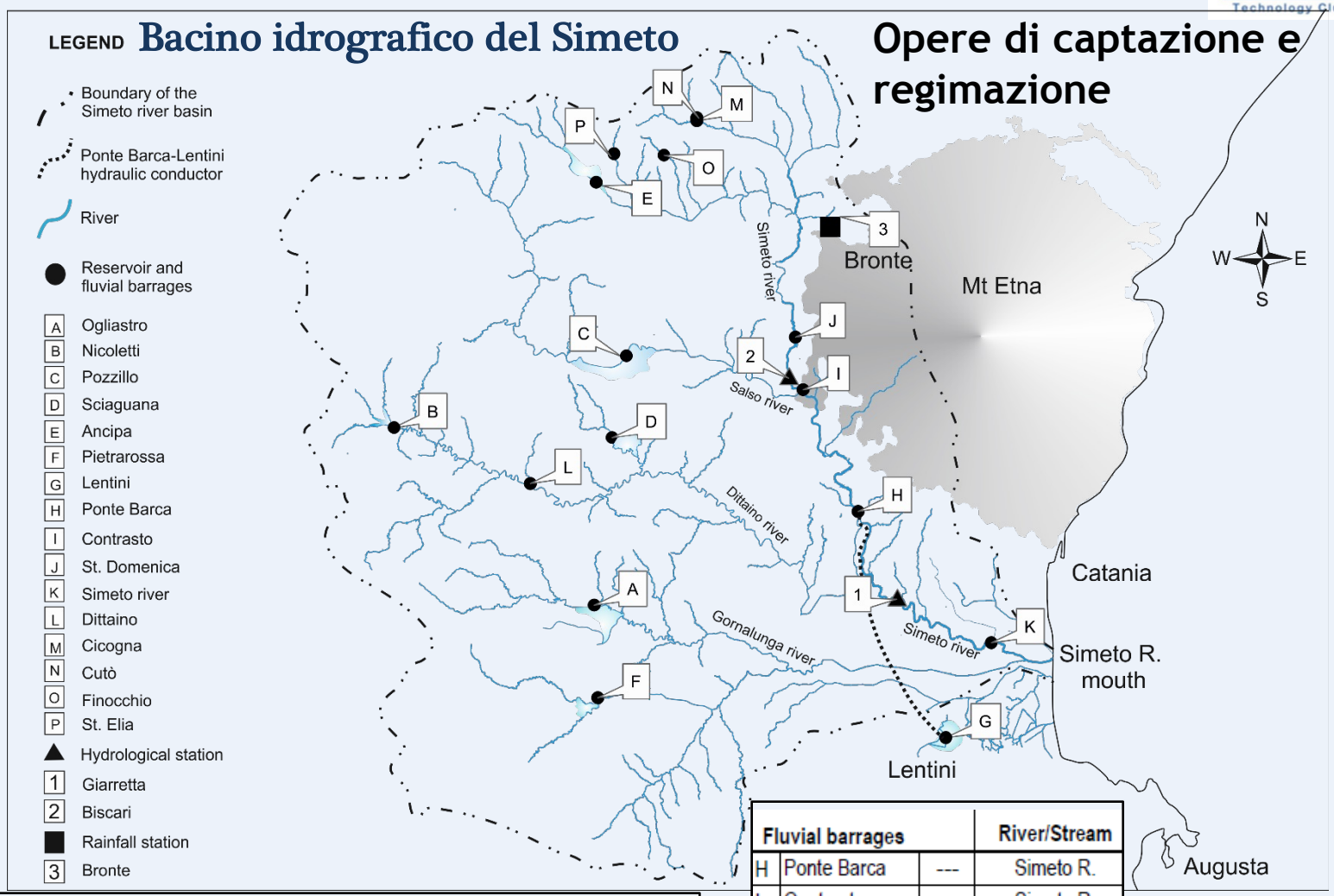
Bacino idrografico del Simeto



Reservoir/Dam		Year	River/Stream	Capacity (Mm^3)	Catch basin (km^2)
A	Ogliastro	1966	Gornalunga R.	108	170,6
B	Nicoletti	1973	Bozzetta S.	17,4	49.50
C	Pozzillo	1958	Salso R.	140,5	577
D	Sciaguana	1992	Sciaguana S.	9,9	64,89
E	Ancipa	1953	Troina R.	22	51
F	Pietrarossa	---	Pietrarossa S.	30	256,56
G	Lentini (*)	1991	-------	127	-------

Fluvial barrages			River/Stream
H	Ponte Barca	---	Simeto R.
I	Contrasto	---	Simeto R.
J	St. Domenica	---	Simeto R.
K	Simeto	---	Simeto R.
L	Dittaino	---	Dittaino S.
M	Cicogna	---	Cicogna S.
N	Cutò	---	Cutò S.
O	Finocchio	---	Finocchio S.
P	St. Elia	---	St. Elia S.

Soluzioni: lotta all'abusivismo

Secondo Legambiente, negli ultimi anni sono state demolite circa 140 costruzioni costruite illecitamente

SiciliaToday – 21.10.2013 - Oasi del Simeto, abbattute case abusive

Abusivismo: ripartono demolizioni nell'Oasi del Simeto a Catania
3 giugno 2014

SUD

Simeto, oasi dei veleni e regno dell'abusivismo edilizio
30/03/2016

Altri interventi "possibili"…abbattimento di barriere e dighe

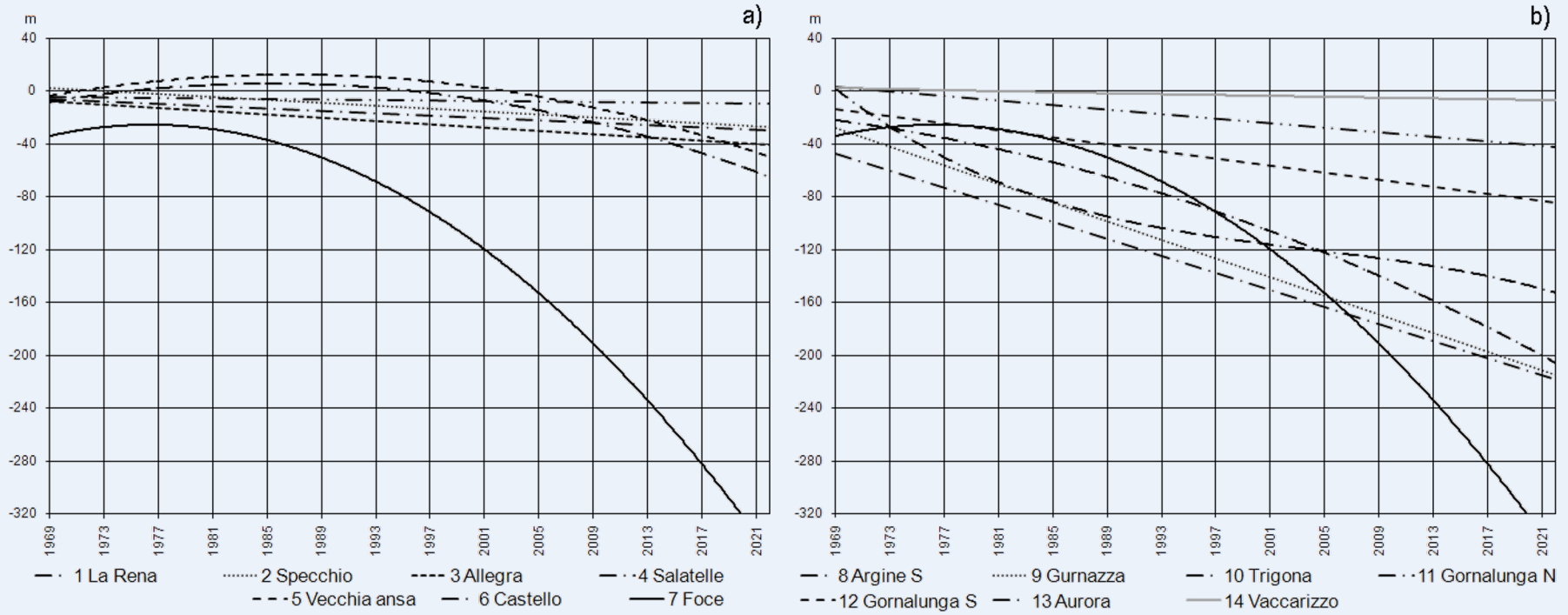
http://www.americanrivers.org/initiatives/dams/faqs/

Simulazione delle variazioni della linea di costa del Golfo di Catania al 2022

Previsione di arretramento

Nord 14 m

Sud 7 m



Foce 27 m

Received: 5 December 2022 | Revised: 24 May 2023 | Accepted: 26 May 2023
DOI: 10.1002/esp.5644

CASE STUDY

ESPL WILEY

Shoreline change dynamics along the Augusta coast, eastern Sicily, South Italy

FX Anjar Tri Laksono [1,2] | Laura Borzi [3] | Salvatore Distefano [3] | Lili Czirok [4,5] | Ákos Halmai [1] | Agata Di Stefano [3] | János Kovács [1]

[1]Doctoral School of Earth Sciences, Department of Geology and Meteorology, Institute of Geography and Earth Sciences, Faculty of Sciences, University of Pécs, Pécs, Hungary
[2]Department of Geological Engineering, Faculty of Engineering, Jenderal Soedirman University, Purwokerto, Indonesia
[3]Dipartimento di Scienze Biologiche, Geologiche e Ambientali, Sezione di Scienze della Terra, University of Catania, Catania, Italy

Abstract

The coastal region of Augusta, eastern Sicily, Italy, is a densely populated zone, where human pressures profoundly shaped the coastal and land dynamics. So far, understanding the interaction between natural and human processes in modelling coastal geomorphology is still quite challenging. However, coastal and environmental monitoring poses the bases for managing coastal areas properly. Therefore, the aim of this research was first to understand the medium-term shoreline changes along

Applicazione di nuove metodologie GIS

Immagini satellitari annualmente aggiornate e di facile acquisizione

Journal of *Marine Science and Engineering*

MDPI

Article

Shoreline Prediction Modelling as a Base Tool for Coastal Management: The Catania Plain Case Study (Italy)

Fx Anjar Tri Laksono [1,2,*], Laura Borzì [3,*], Salvatore Distefano [3], Agata Di Stefano [3] and János Kovács [1]

land

MDPI

Article

Shoreline Evolution and Environmental Changes at the NW Area of the Gulf of Gela (Sicily, Italy)

Laura Borzì [1,*], Giorgio Anfuso [2], Giorgio Manno [3], Salvatore Distefano [1], Salvatore Urso [1], Domenico Chiarella [4] and Agata Di Stefano [1]

DSAS DIGITAL SHORELINE ANALYSIS SYSTEM

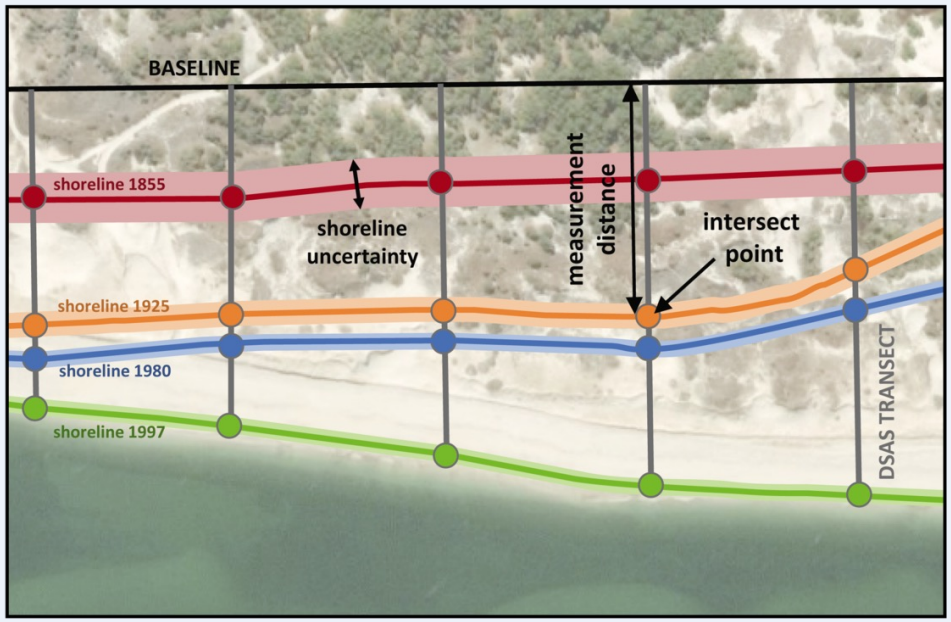
➡ *Free tool developed by the USGS and used in coastal evolution studies since the 1980s*

End Point Rate [m/year]
The ratio of the the distance of shoreline movement by the time elapsed between the oldest and the most recent shoreline

Weighted Linear Regression Rate [m/year]
The linear regression rate that places greater emphasis on data points for which the position uncertainty is smaller. The weight is defined as a function of the variance in the uncertainty of the measurement (Genz et al., 2007).

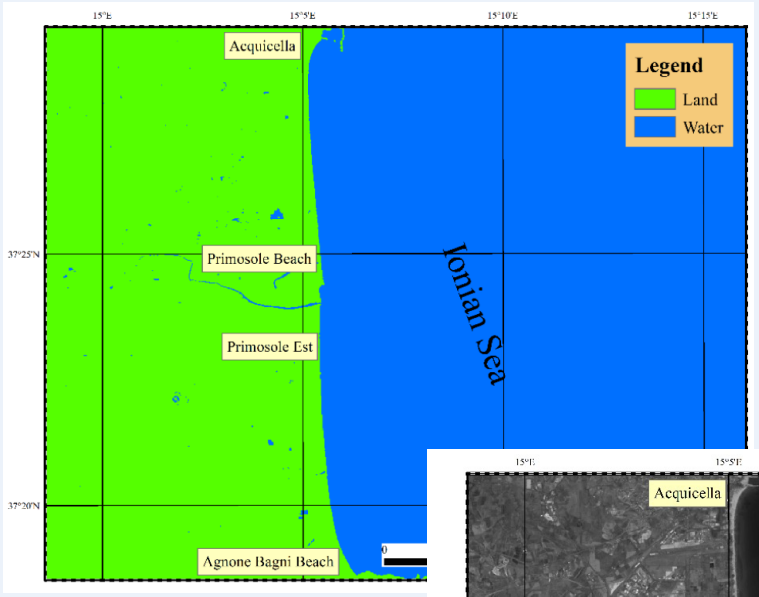
Shoreline Change Envelope [m]
The greatest distance among all the shorelines that intersect a given transect

Net Shoreline Movement [m]
The distance between the oldest and the youngest shorelines for each transect



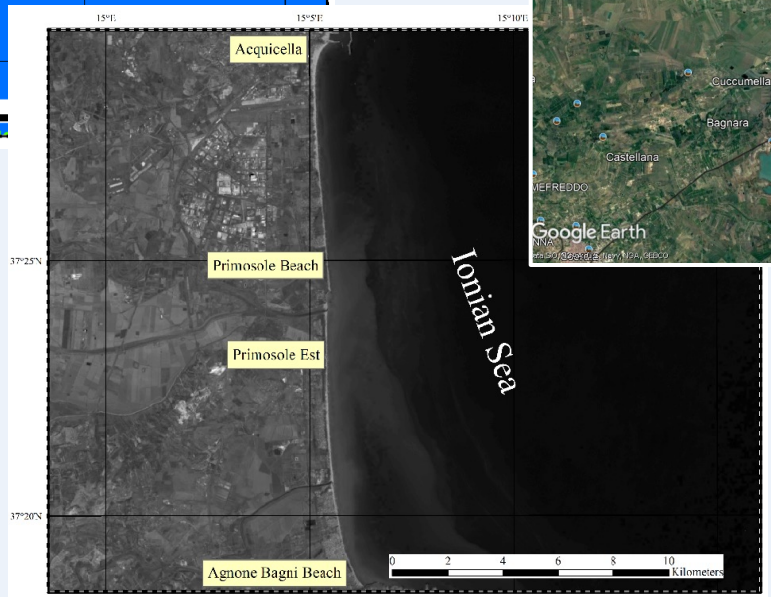
DATASET aggiornato con immagini satellitari a media e ad alta risoluzione

- Landsat
- Sentinel
- Google Earth



mNDWI

modified Normalized Difference Water Index



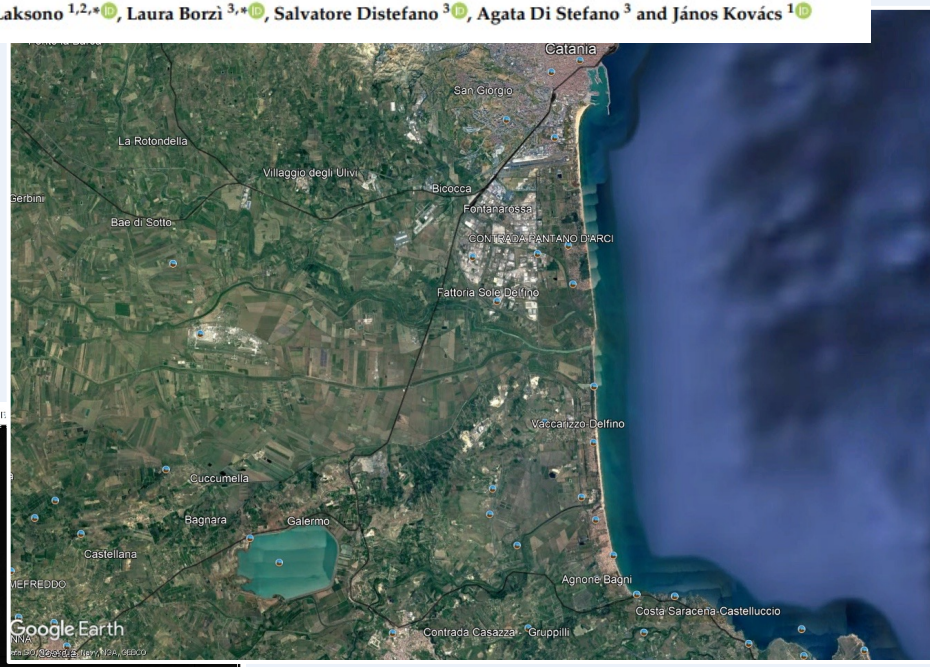
Journal of *Marine Science and Engineering*

MDPI

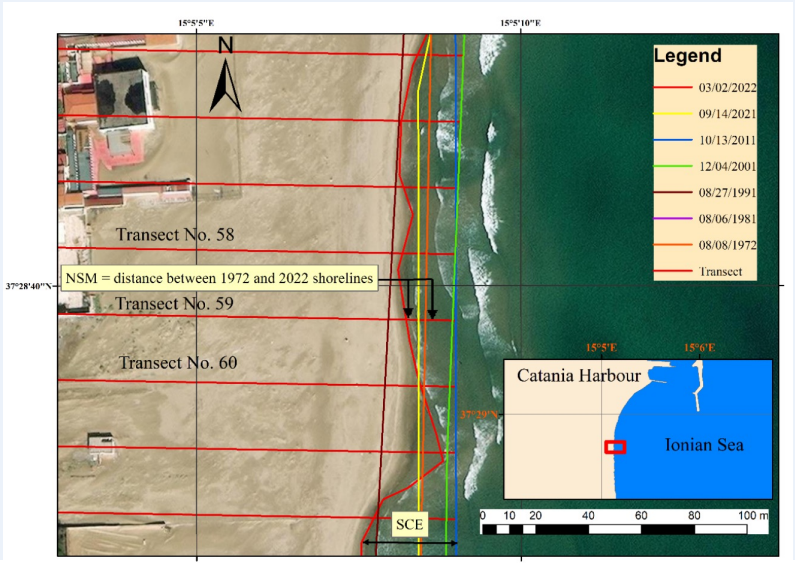
Article

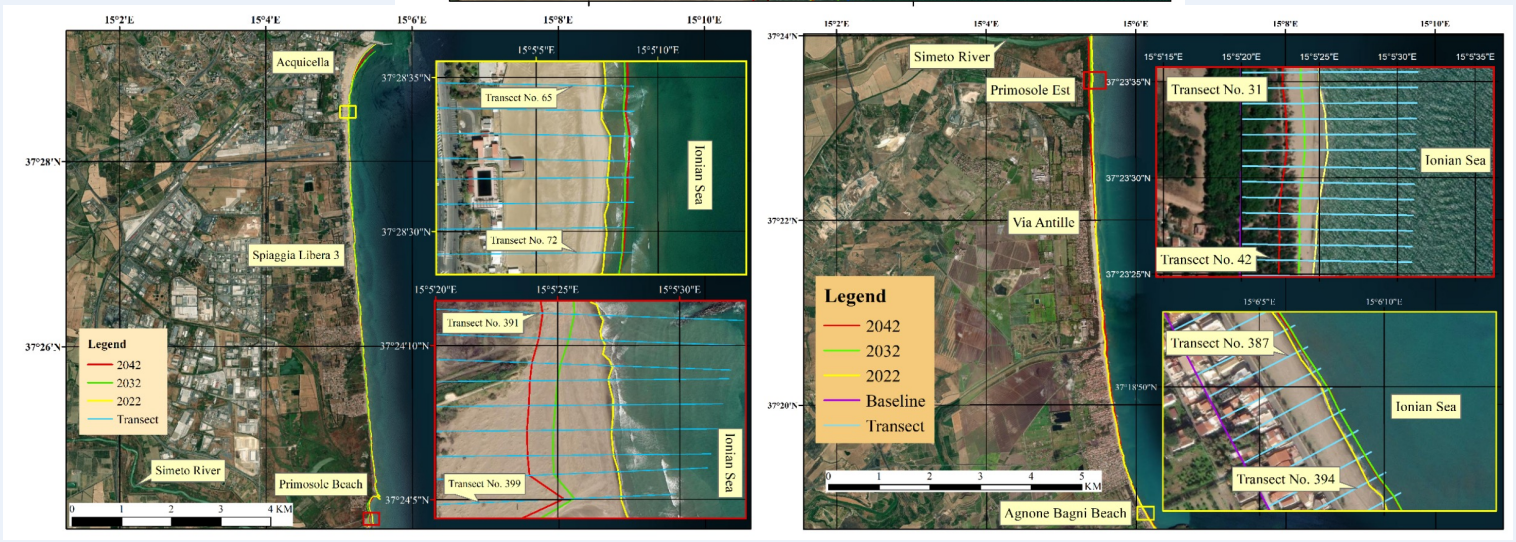
Shoreline Prediction Modelling as a Base Tool for Coastal Management: The Catania Plain Case Study (Italy)

Fx Anjar Tri Laksono [1,2,*], Laura Borzì [3,*], Salvatore Distefano [3], Agata Di Stefano [3] and János Kovács [1]

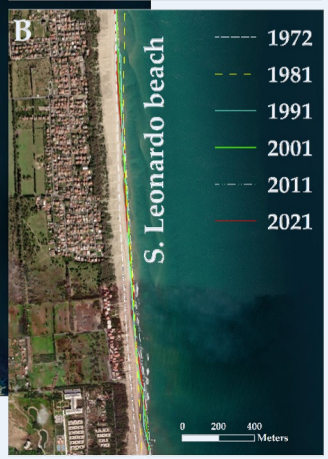


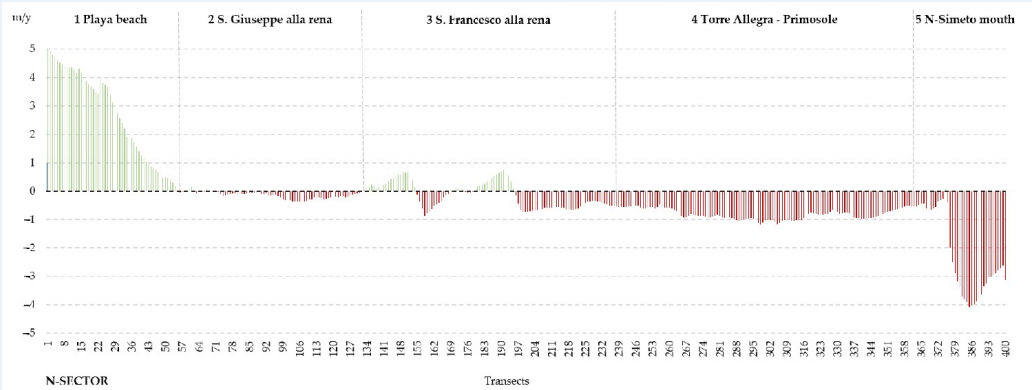
GIS → DSAS DIGITAL SHORELINE ANALYSIS SYSTEM

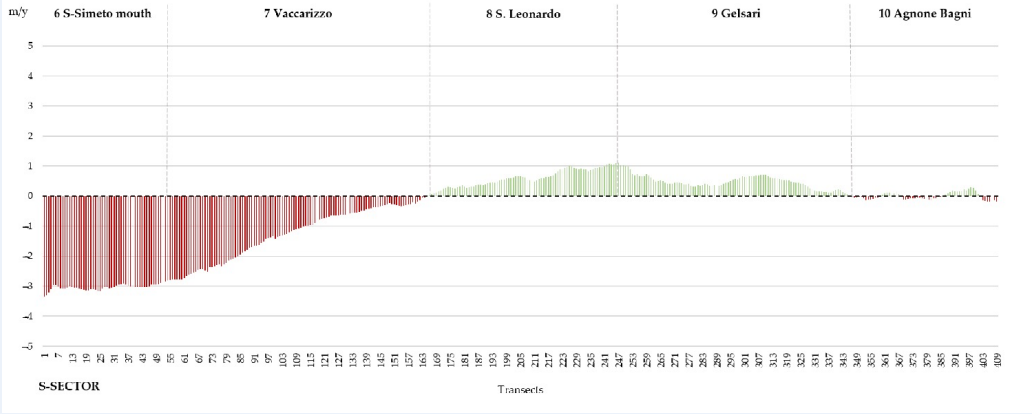




Variazione della linea di spiaggia nel medio periodo 1972 - 2021



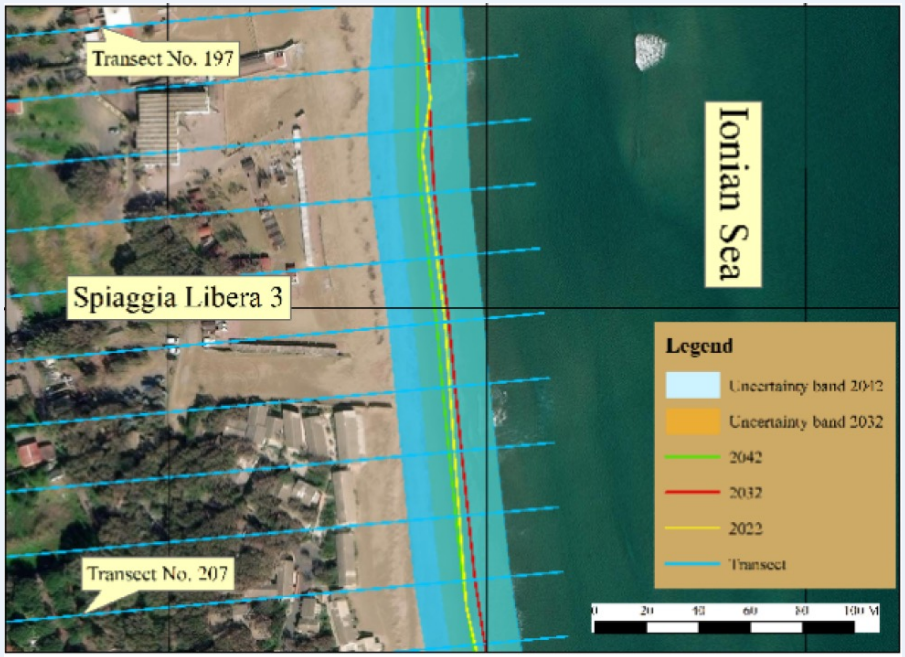


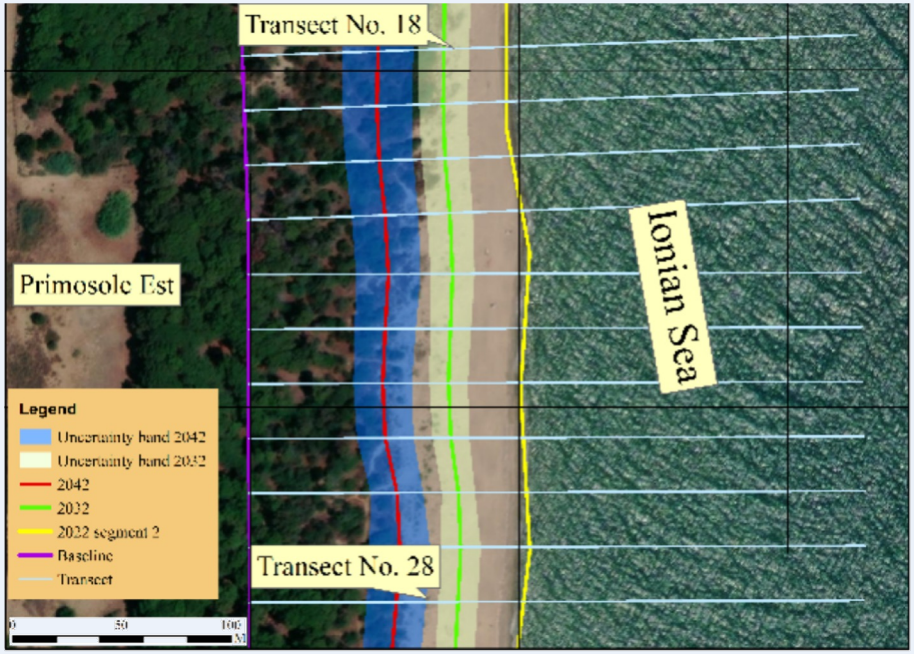


WLR medio nell'area della foce del fiume Simeto ➡ -3.2 m/year

Previsione delle variazioni della linea di spiaggia

GIS → Kalman filter method





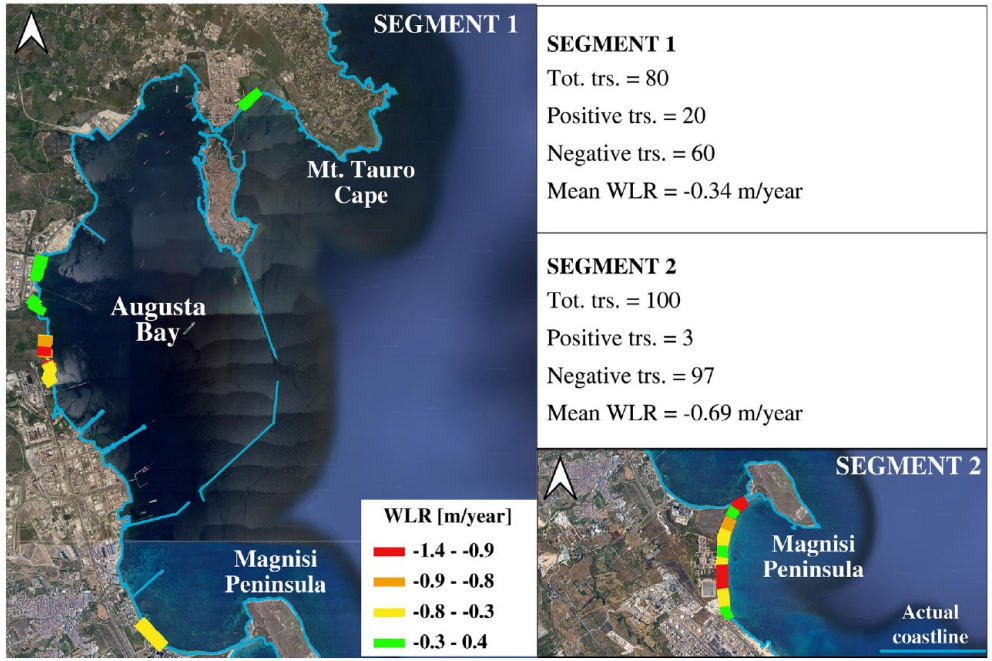
Di Stefano et al., 2013
Previsione evoluzione foce Simeto al 2021

Foce 27 m
Settori a Sud 7 m
Settori a Nord 14 m

2022 - 2042

Max NSM negativo previsto → -70 m

AUGUSTA Coastal evolution



SEGMENT 1
Tot. trs. = 80
Positive trs. = 20
Negative trs. = 60
Mean WLR = -0.34 m/year

SEGMENT 2
Tot. trs. = 100
Positive trs. = 3
Negative trs. = 97
Mean WLR = -0.69 m/year

Received: 5 December 2022 | Revised: 24 May 2023 | Accepted: 26 May 2023
DOI: 10.1002/esp.5644

CASE STUDY

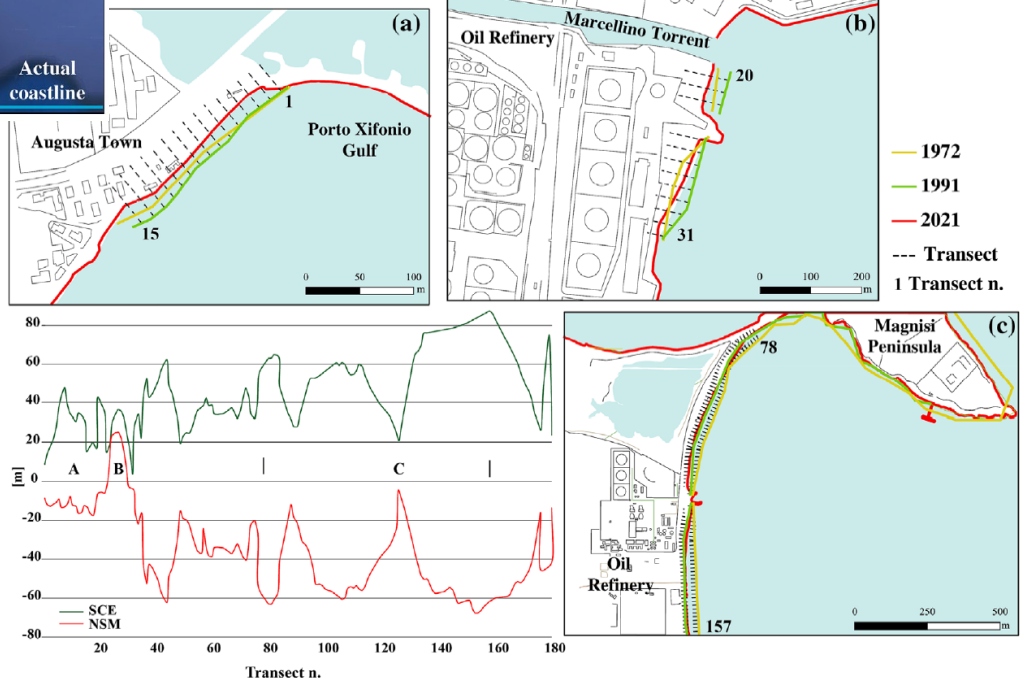
ESPL WILEY

Shoreline change dynamics along the Augusta coast, eastern Sicily, South Italy

FX Anjar Tri Laksono[1,2] | Laura Borzi[3] | Salvatore Distefano[3] | Lili Czirok[4,5] | Ákos Halmai[1] | Agata Di Stefano[3] | János Kovács[1]

[1]Doctoral School of Earth Sciences, Department of Geology and Meteorology, Institute of Geography and Earth Sciences, Faculty of Sciences, University of Pécs, Pécs, Hungary
[2]Department of Geological Engineering, Faculty of Engineering, Jenderal Soedirman University, Purwokerto, Indonesia
[3]Dipartimento di Scienze Biologiche, Geologiche e Ambientali, Sezione di Scienze della Terra, University of Catania, Catania, Italy

Abstract
The coastal region of Augusta, eastern Sicily, Italy, is a densely populated zone, where human pressures profoundly shaped the coastal and land dynamics. So far, understanding the interaction between natural and human processes in modelling coastal geomorphology is still quite challenging. However, coastal and environmental monitoring poses the bases for managing coastal areas properly. Therefore, the aim of this research was first to understand the medium-term shoreline changes along



land

MDPI

Article

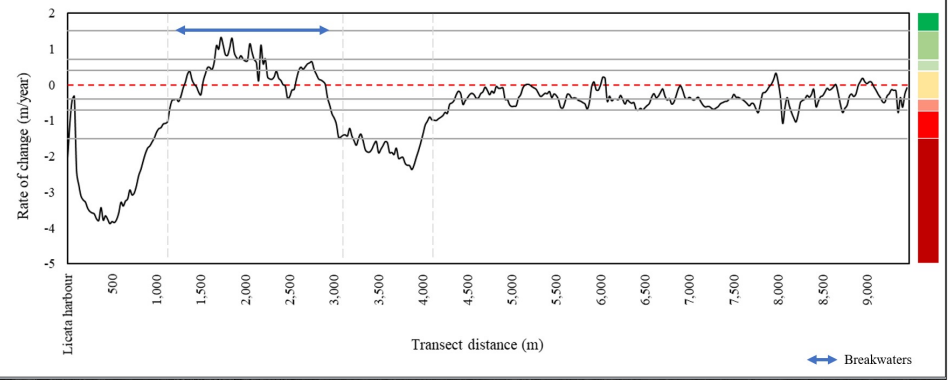
Shoreline Evolution and Environmental Changes at the NW Area of the Gulf of Gela (Sicily, Italy)

Laura Borzì [1,*], Giorgio Anfuso [2], Giorgio Manno [3], Salvatore Distefano [1], Salvatore Urso [1], Domenico Chiarella [4] and Agata Di Stefano [1]

Gulf of Gela

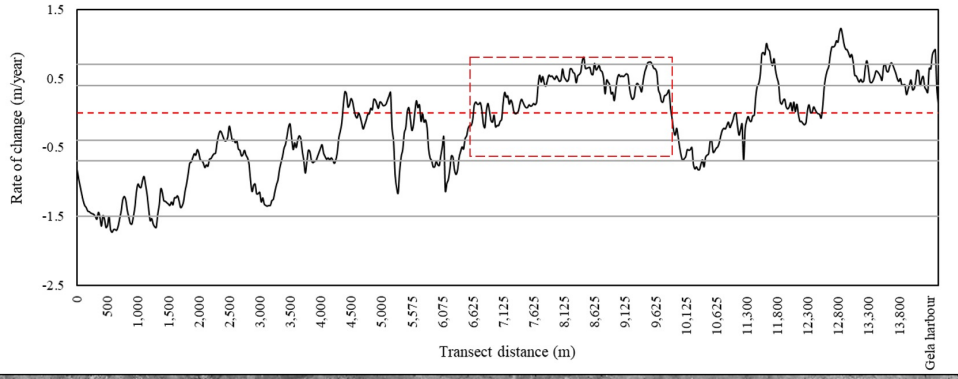
SECTOR 1

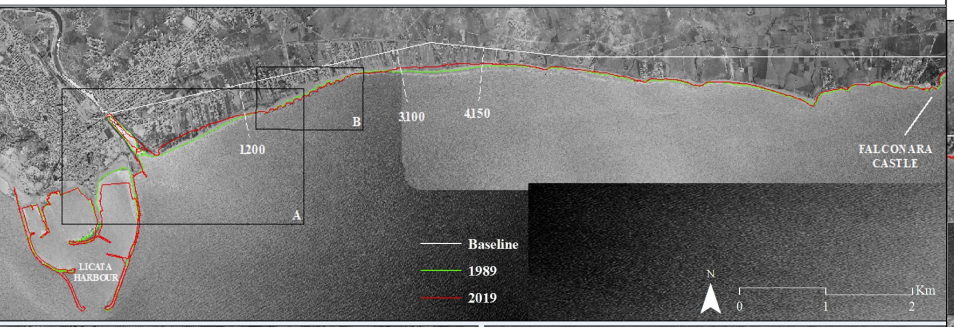
Licata harbour-Falconara Castle

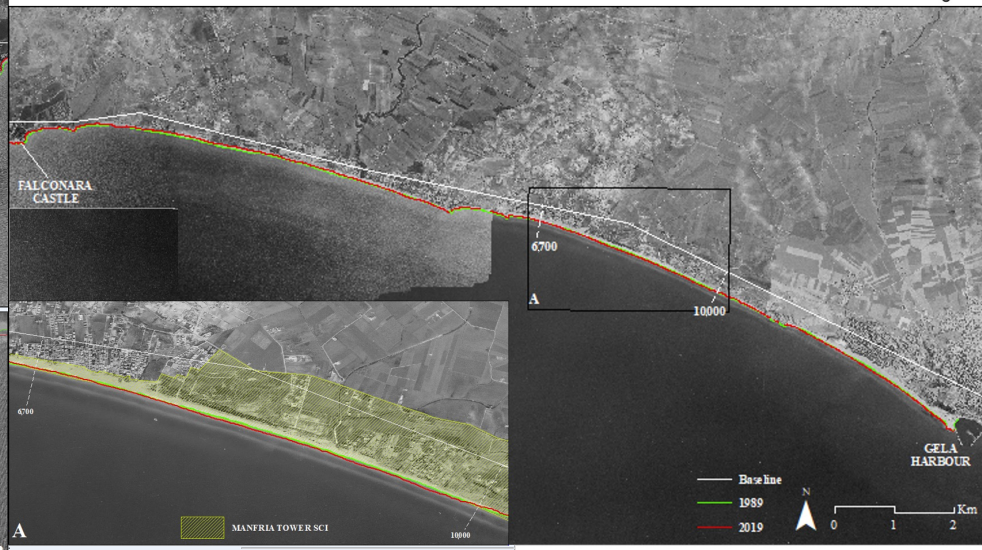


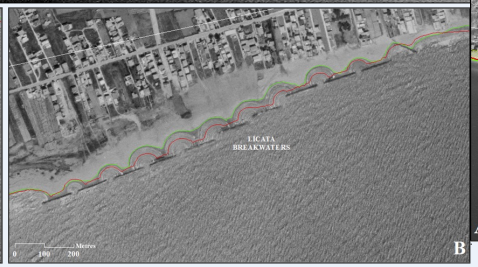
SECTOR 2

Falconara Castle-Gela harbour

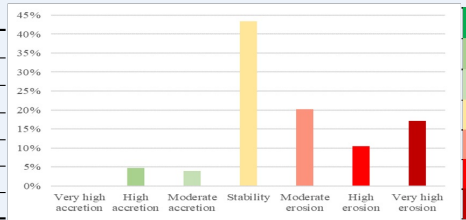




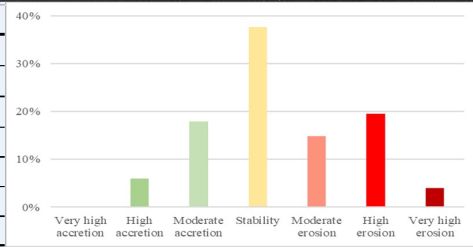




Class	No. of transects	Percentage
Very high accretion	0	0%
High accretion	18	5%
Moderate accretion	15	4%
Stability	165	43%
Moderate erosion	77	20%
High erosion	40	11%
Very high erosion	65	17%



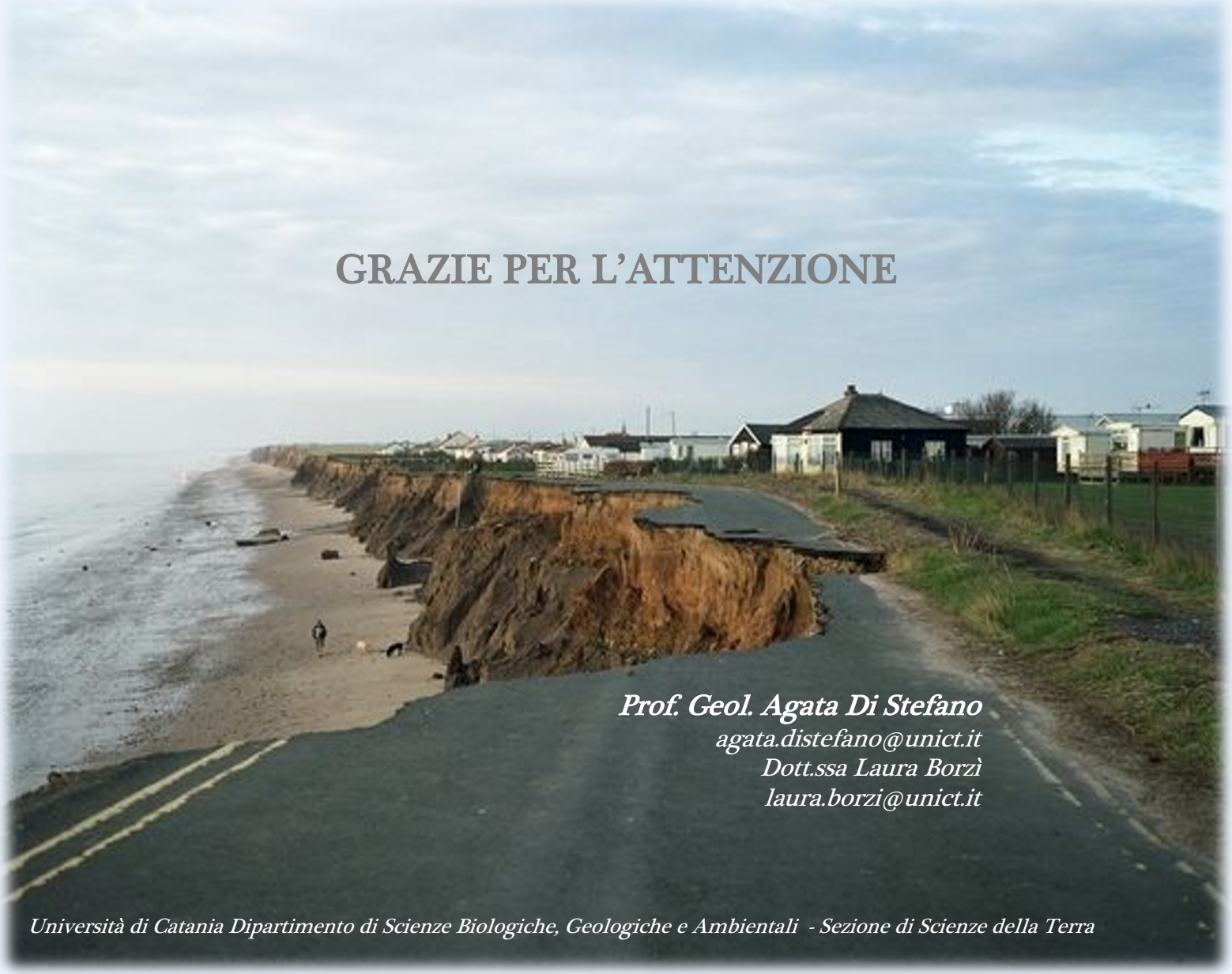
Class	No. of transects	Percentage
Very high accretion	0	0%
High accretion	33	6%
Moderate accretion	100	18%
Stability	210	38%
Moderate erosion	83	15%
High erosion	109	20%
Very high erosion	22	4%



spiaggia della Misita (AG)

spiaggia di Capo D’orlando (ME)

GRAZIE PER L'ATTENZIONE



Prof. Geol. Agata Di Stefano
agata.distefano@unict.it
Dott.ssa Laura Borzì
laura.borzi@unict.it

Università di Catania Dipartimento di Scienze Biologiche, Geologiche e Ambientali - Sezione di Scienze della Terra

METODOLOGIA

1. **Analisi della variazione della linea di costa**

LUNGO TERMINE

Analisi storica a partire dalla prima fonte cartografica disponibile

MEDIO/BREVE TERMINE

Analisi di foto satellitari degli ultimi 10/15 anni

ANALISI LINEA DI RIVA ATTUALE E TREND FUTURO

Misurazioni mensili della linea di costa (GPS) nell'arco dei 3 anni di dottorato

Definizione tassi di variazione nel lungo periodo

Trend di dettaglio degli ultimi anni

Valutazione del processo erosivo attuale

Delineazione della dinamica e dell'evoluzione del sistema litorale

2. **Altri dati**

Sedimenti

Meteomarini

Bacino idrografico

Raccolta base dati per formulazione dei trend futuri

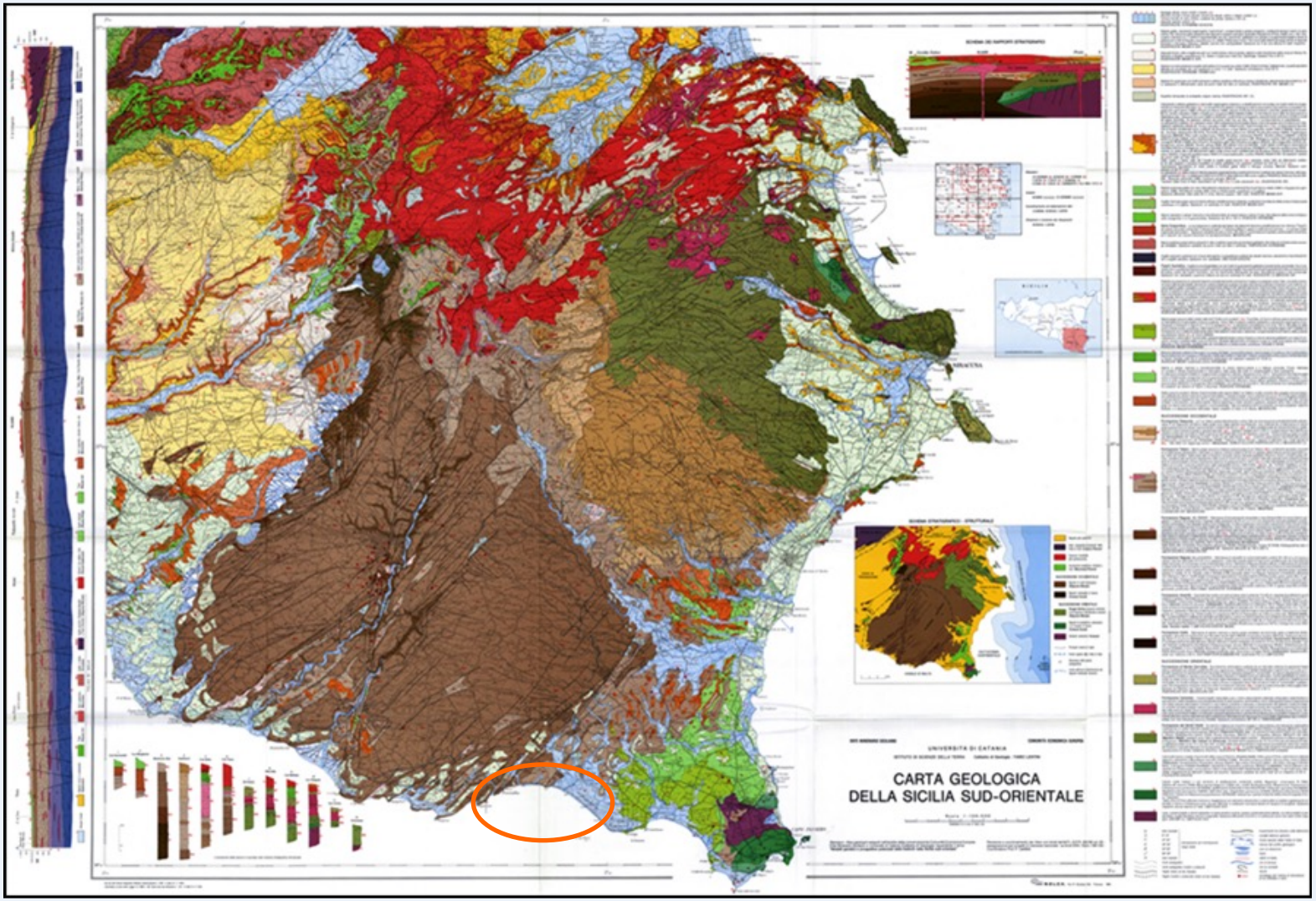
CAUSE INDIVIDUATE
ANTROPICHE VS NATURALI

POSSIBILI SOLUZIONI

Fenomeni di erosione Sicilia sud orientale: Casi Studio

Area di Pozzallo

Inquadramento geologico (Grasso et al. 1984)

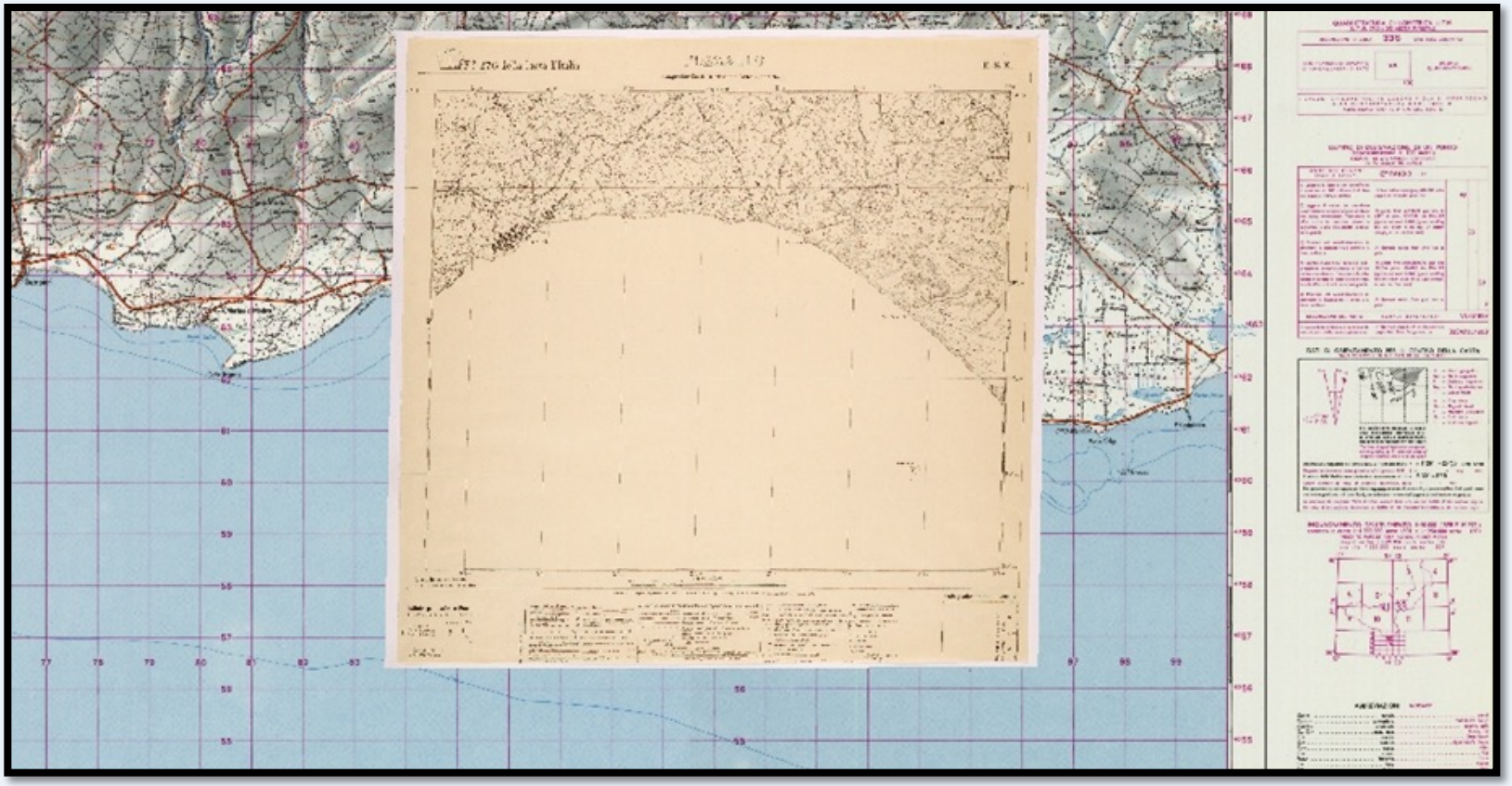


Fonti Cartografiche

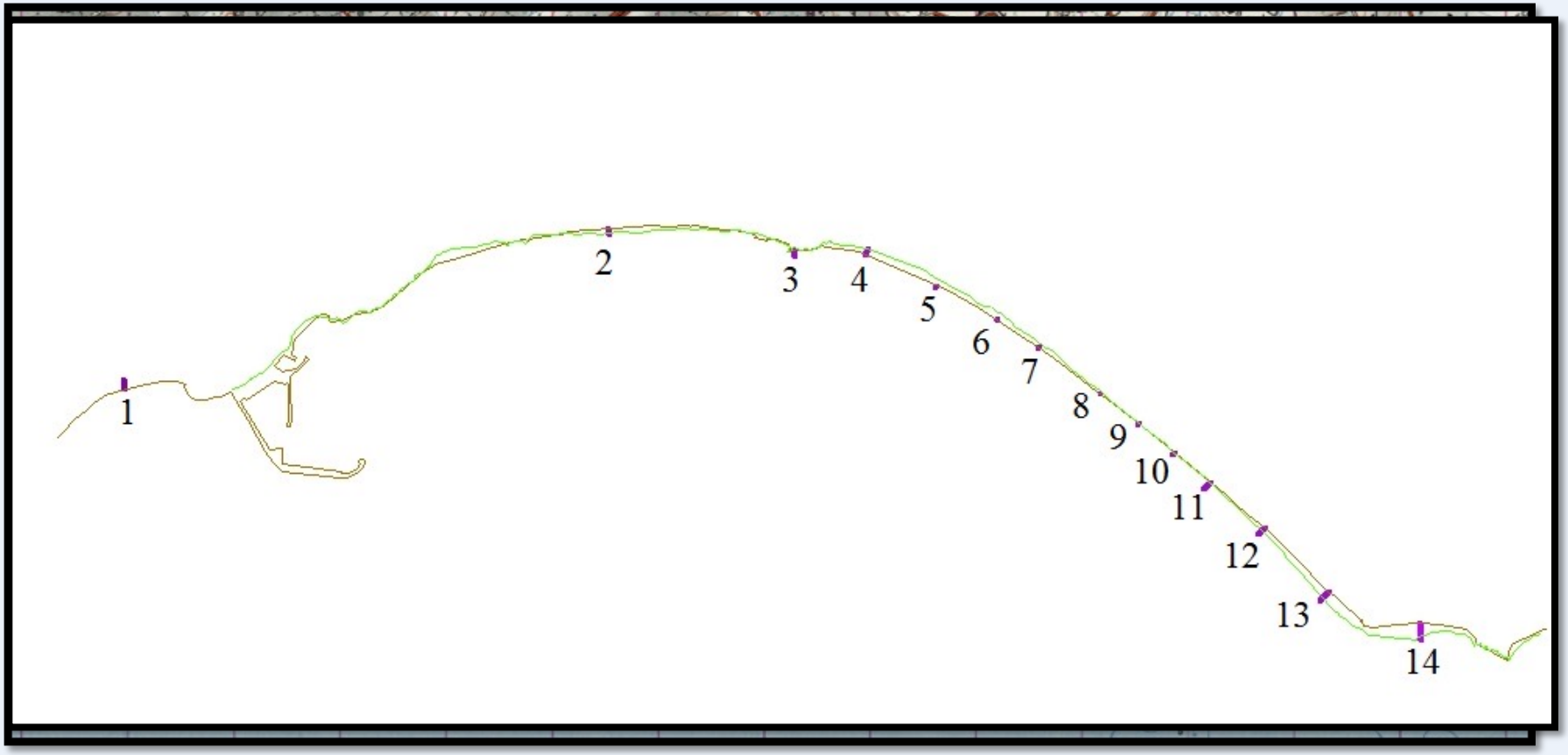
FONTE	SETTORE	ANNO	TIPOLOGIA	SCALA
IGM	FOGLIO 277	1880	CARTOGRAFIA	1:100.000
IGM	FOGLIO 276	1880	CARTOGRAFIA	1:100.000
IGM	TAVOLETTA 276 II SE	1928	CARTOGRAFIA	1:25.000
IGM	TAVOLETTA 277 III SO	1928	CARTOGRAFIA	1:25.000
ARMY MAP SERVICE	TAVOLETTA 276 II SE	1941	CARTOGRAFIA	1:25.000
ARMY MAP SERVICE	TAVOLETTA 277 III SO	1941	CARTOGRAFIA	1:25.000
IGM	FOGLIO 276	1955	CARTOGRAFIA	1:100.000
IGM	FOGLIO 277	1955	CARTOGRAFIA	1:100.000
IGM	FOGLIO 277	1970	CARTOGRAFIA	1:50.000

FONTE	TIPOLOGIA	ANNO
IGM	FOTO AEREA	1955
IGM	FOTO AEREA	1966
ISTELLA	FOTO AEREA	1989
IGM	FOTO AEREA	1995
ISTELLA	FOTO SATELLITARE	2005
ISTELLA	FOTO SATELLITARE	2016

Gereferenziazione



Transetti



Analisi granulometriche

	Dimensioni		Peso	Freq.	Cumul.
	ϕ	mm/μm	gr.	%	%
Setacciamento	-5	32,0	0	0,00	0,00
	-4,75	26,9	0	0,00	0,00
	-4,25	19,0	0	0,00	0,00
	-3,75	13,5	0	0,00	0,00
	-3,25	9,5	0	0,00	0,00
	-2,75	6,7	0	0,00	0,00
	-2,25	4,8	0	0,00	0,00
	-2,0	4,0	0	0,00	0,00
	-1,5	2,8	0	0,00	0,00
	-1,0	2,0	0	0,00	0,00
	-0,5	1,41	0,0	0,00	0,00
	0,0	1,0	0,0	0,00	0,00
	0,5	0,71	0,1	0,02	0,02
	1,0	0,5	0,3	0,06	0,08
	1,5	0,35	0,1	0,02	0,10
	2,0	0,25	4,0	0,79	0,89
	2,5	0,18	115,3	22,76	23,65
	3,0	0,125	355,3	70,15	93,80
	3,5	0,088	23,9	4,72	98,52
	4,0	0,063	4,2	0,83	99,35
Densimetria	4,58	0,042	0,00	0,650	100,00
	4,78	0,036	0,00	0,000	100,00
	5,07	0,030	0,00	0,000	100,00
	5,43	0,023	0,00	0,000	100,00
	5,93	0,016	0,00	0,000	100,00
	6,59	0,010	0,00	0,000	100,00
	6,72	0,009	0,00	0,000	100,00
	7,01	0,008	0,00	0,000	100,00
	7,22	0,007	0,00	0,000	100,00
	7,50	0,006	0,00	0,000	100,00
	7,71	0,005	0,00	0,000	100,00
	8,00	0,004	0,00	0,000	100,00
	8,20	0,003	0,00	0,000	100,00
	9,47	0,0014	0,00	0,000	100,00
	9,96	0,0010	0,00	0,000	100,00

Luogo Pozzallo

Campione: 1 Data: 13/5/16

Latitudine: 36°42'59,3"N

Longitudine: 14°48'46,6"E Profondità:

Università degli Studi di Catania
Dipartimento di Scienze Biologiche Geologiche e Ambientali

DESCRIZIONE CAMPIONE

Classificazione di WENTWORTH				
Denominazione		%		
Ciottolo	*medi*	0,00		
	medio fini	0,00	0,00	
	fini	0,00		
Ghiaia		0,00	0,00	99,35
Sabbia	*m. grossolana*	0,00		
	grossolana	0,08		
	media	0,81	99,35	
	fine	92,91		
	m.fine	5,55		
Limo	*Grossolano*	0,65		
	medio	0,00	0,65	
	Fine	0,00		0,65
	molto fine	0,00		
Argilla	*grossolana*	0,00		
	media	0,00	0,00	
	Fine	0,00		

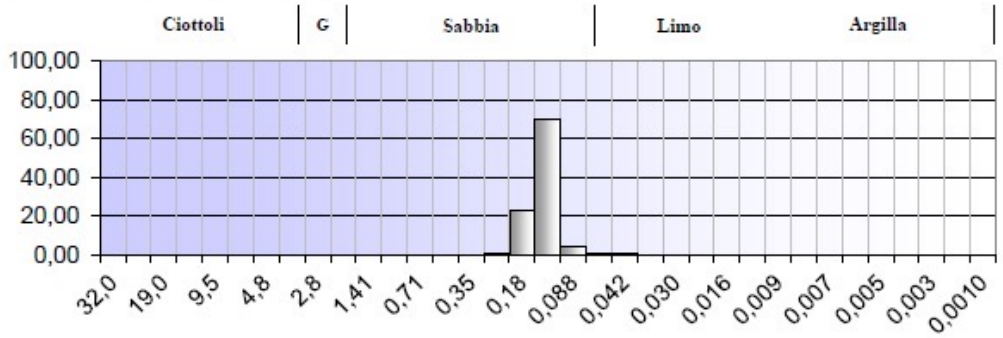
Par. Statistici	Folk e Ward	Momenti
Diametro medio:	2,650 *Mz*	2,668 *Mz*
Dev. Standard:	0,307 *s*	0,313 *s*
Azimmetria :	-0,171 *Sk*	0,579 *Sk*
Kurtosis :	1,192 *Kg*	9,438 *Kg*
Mediana:	2,688	
Moda :	3,000 *g*	

Sabbia Fine
Sedimento molto ben classato,
Asimmetria negativa,
Leptocurtica.

PERCENTILI	
5	2,090
16	2,332
25	2,510
50	2,688
75	2,866
84	2,930
95	3,127

CARATTERISTICHE COMPOSIZIONALI

1) % Frazione Organica :
2) % Quarzo :
3) % Plagioclasi :
4) % Minerali pesanti :
5) % Clasti vulcanici :
6) % Altri minerali :



Transetto n. 1