



SETOF Soil Erosion and TOrrential Flood
*Prevention: Curriculum Development at the
Universities of Western Balkan Countries*

Study visits to EU partners' university and analysis best practices – Reggio Calabria, Italy July 4-6, 2022

Prof. Paolo Porto

Examples of torrent control in Calabria. A case study of the torrential catchment Valanidi



Reference Number: 598403-EPP-1-2018-1-RS-EPPKA2-CBHE-JP

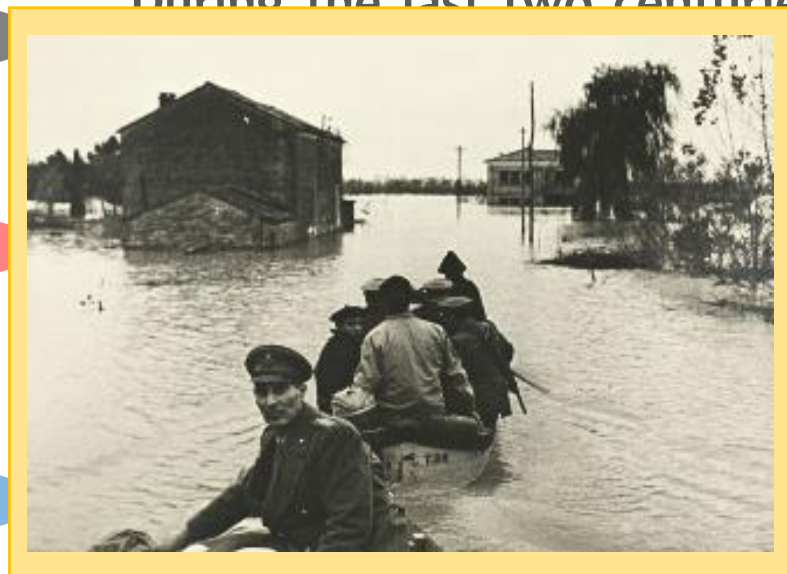
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Flood historical records in Italy

During the last two centuries, Italy was affected by major flood disasters from North to South.



Flood disasters from 18th to the first half of the 20th century led to major questions to the flood



the need to re-evaluate the approach was given after the flood disasters occurred in 1951 during the Po catchment (Polesine, Northern Italy), a smaller area

located in Calabria (Southern Italy) and part of Sicily and Sardinia were devastated by extraordinary rainfall events.

Calculations, made ex-post, documented economic losses of ca. 206.6 million Euros for the Po catchment and ca. 15.5 million Euros for Calabria, Sardinia, and Sicily (Lastoria et al., 2006).



Flood historical records in Italy

Losses of similar magnitude occurred 15 years later (November, 1966), when the River Arno overflowed in Florence (Central Italy). In that case, it was difficult to calculate the devastating effect of that flood disaster that caused the death of 35 people, damages to homes, buildings and treasured artworks and left ca. 70,000 citizens without electricity, gas or heating for days.

However, according to a report provided, it is suggested that if a similar flood were to occur today, the damages to homes and businesses could total ca. 15.5 billion euros.

Before the above events, most of the active flood disasters and can be considered only isolated events.



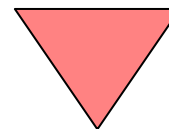


Flood historical records in Italy

Important examples in this direction were the activities carried out in Calabria (Southern Italy) after the big floods in 1951 and 1953.

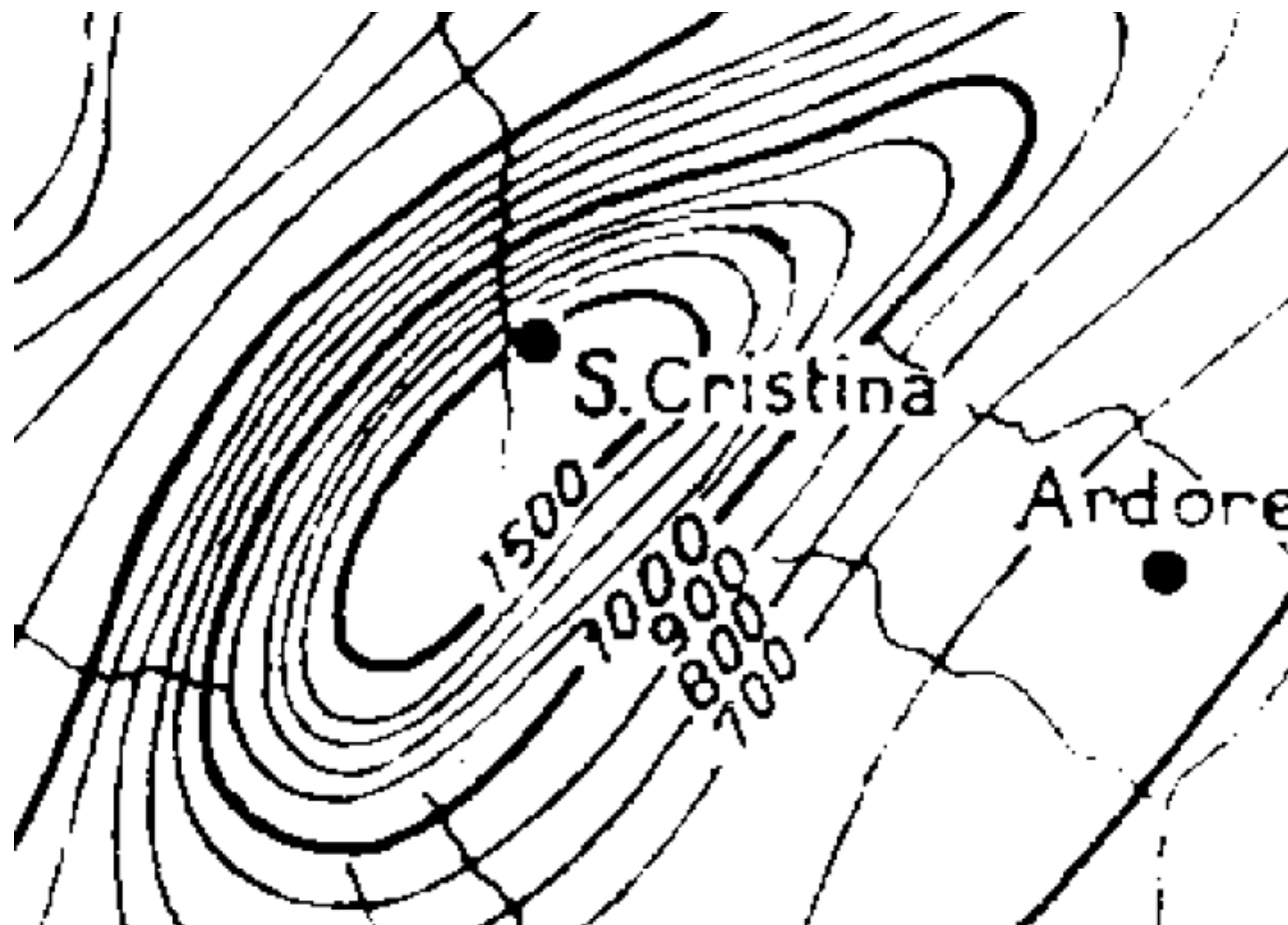
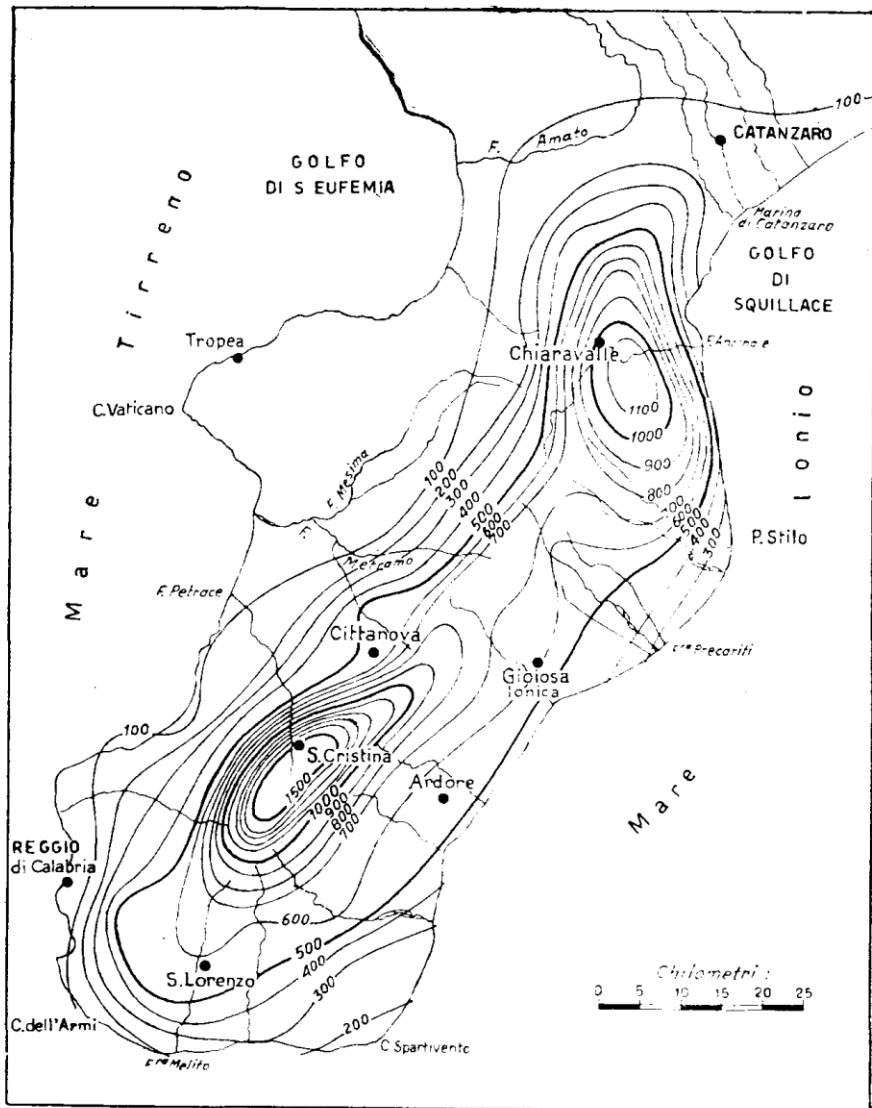
In those cases, the ‘Special Law’ 1177/55 of 26 November 1955 and the public work projects in the 1950s provided by the ‘Cassa per il Mezzogiorno’ (established by the national government in 1950 to encourage the development of public works and infrastructures of Southern Italy) were undertaken.

These were important programmes that pre-empted ‘ordinary’ planning practices and favored the formation of an approach oriented to implement ad-hoc, ‘extraordinary’ plans and projects funded from above, rather than manage from below the ‘ordinary’ government of urban transformations.





Flood historical records in Calabria – 15, 16, 17, 18 October 1951





Time window

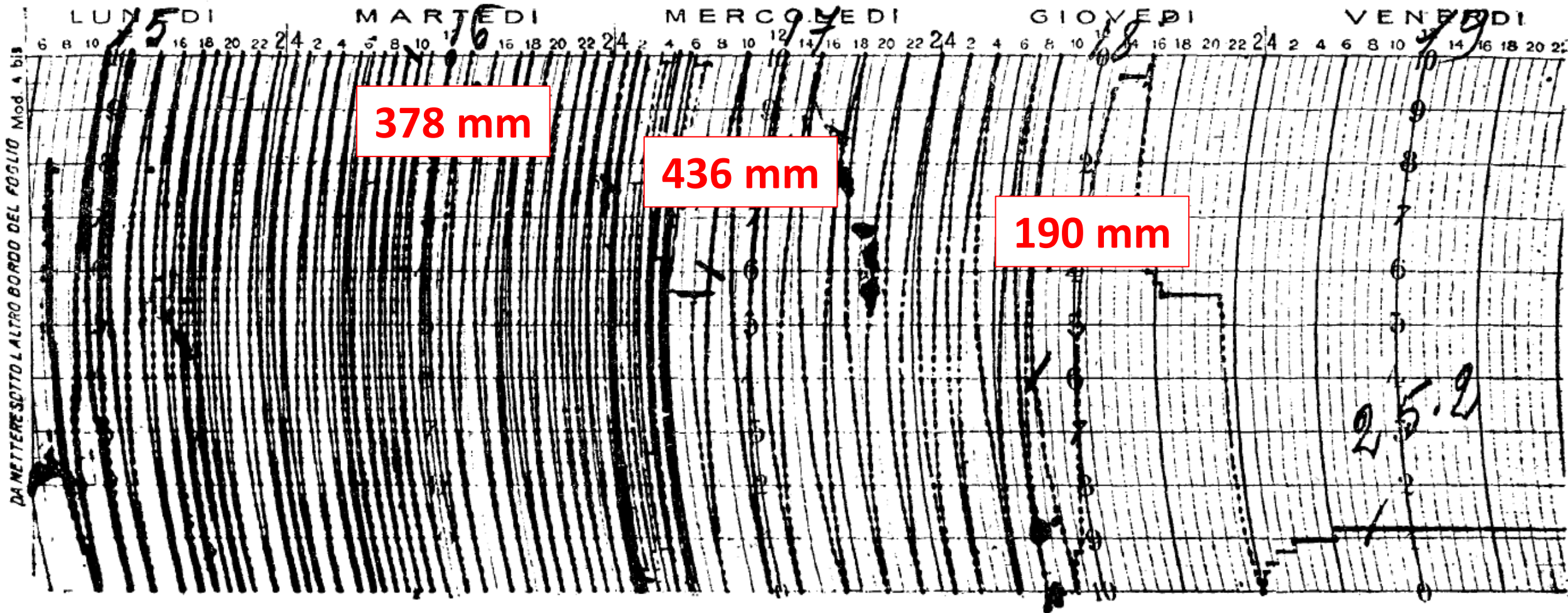
Rainfall amount

Values in mm

Location	72 hours	annual average	Ratio
Chiaravalle Centrale	1004	1575	0,64
S. Sostene	1126	1489	0,76
Badolato	928	1160	0,80
Roccella Jonica	428	677	0,63
Gioiosa Jonica	605	991	0,61
Canolo	783	1237	0,63
Bovalino Marina	511	837	0,61
Montebello	545	853	0,64
S. Cristina	1495	1503	0,99



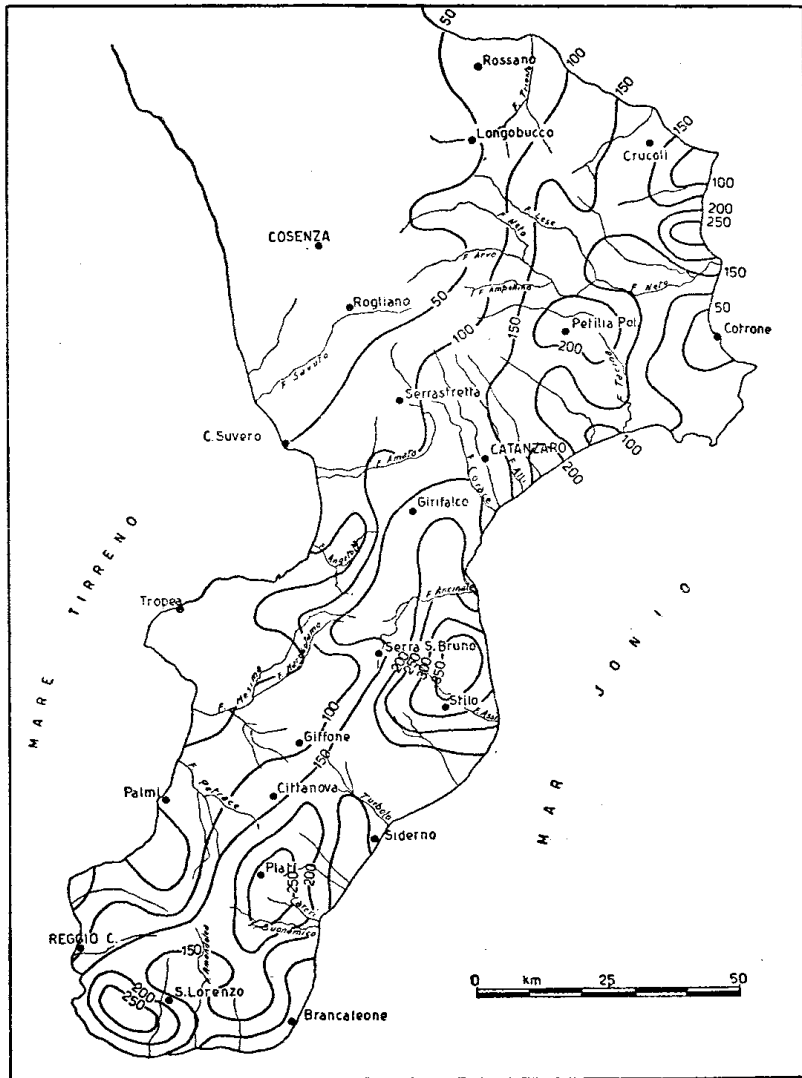
Flood historical records in Calabria – 15, 16, 17, 18 October 1951



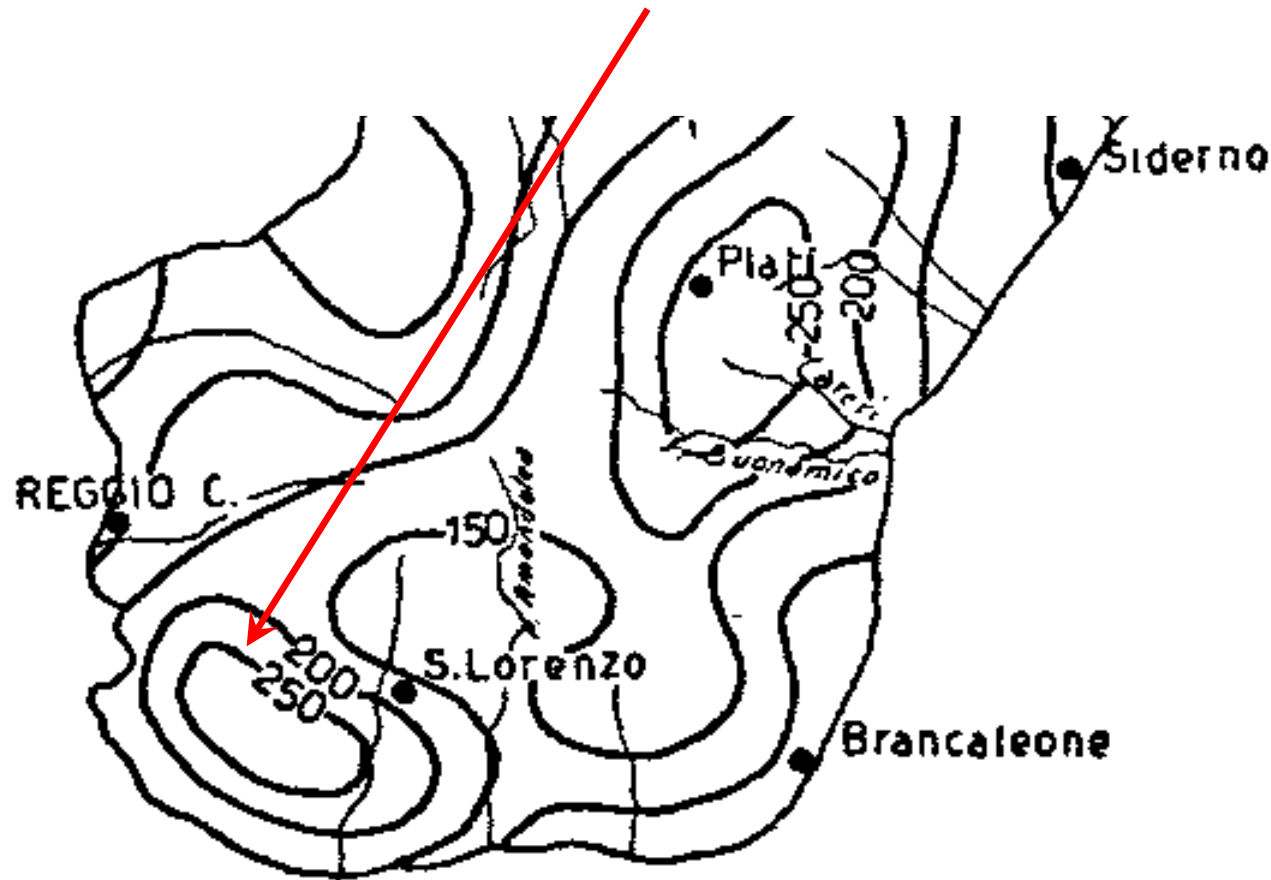
Example of Chiaravalle Centrale meteo station



Flood historical records in Calabria – 21, 22 October 1953

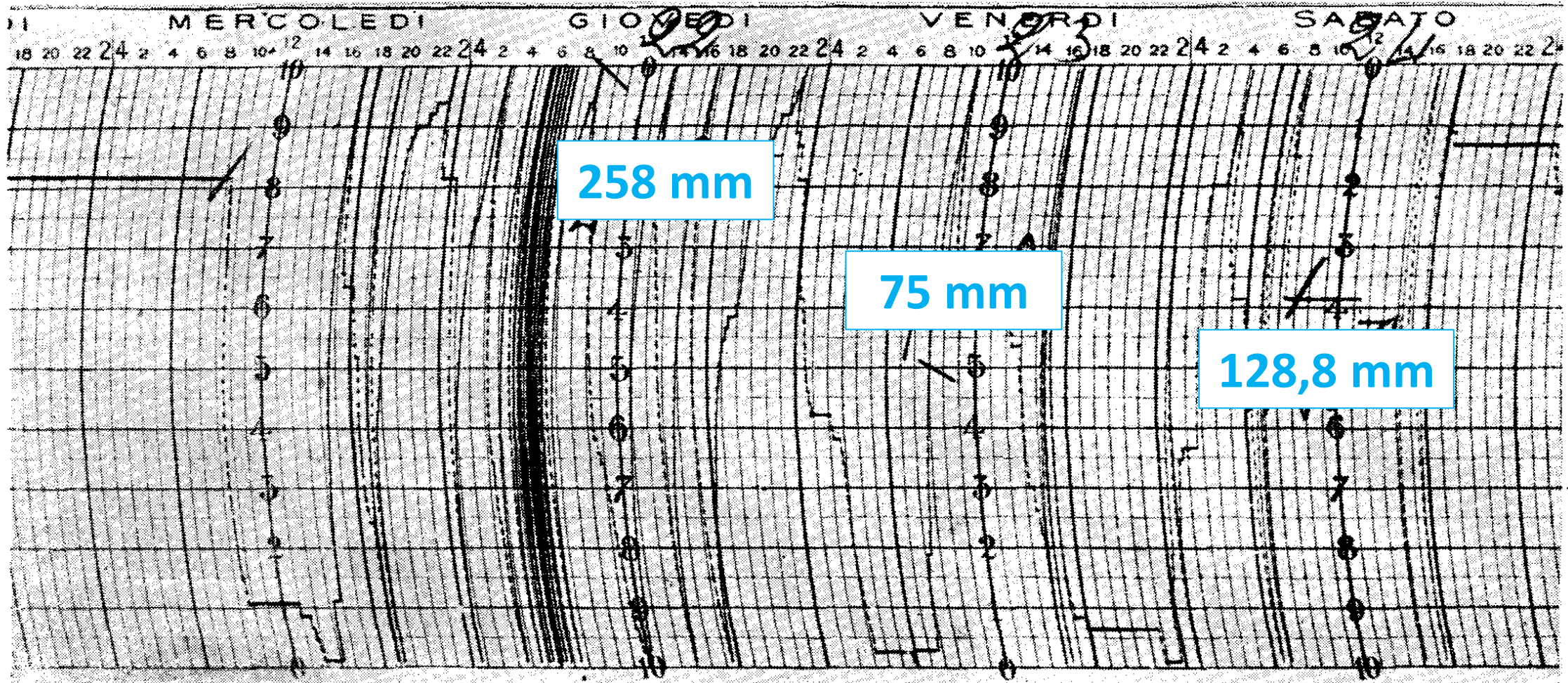
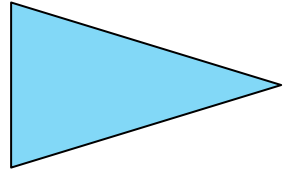


Valanidi catchment





Flood historical records in Calabria – 21, 22 October 1953



Example of Platì meteo station





Torrents (fiumare) are that particular type of streams having modest catchment areas (30-200 km²) and characterised by sudden, and often catastrophic floods, alternating with long periods of inactivity.



In many areas of Italy, dominated by the presence of torrents, the use of check structures is essential.





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Some of them have ephemeral streams draining small catchment areas (5-50 km²) and characterized by coarse bed material and very steep slopes



Because of their very large transport capacity, the construction of grade-control structures leading to stable slopes is the only economical solution to reduce damages downstream.

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The Valanidi catchment today

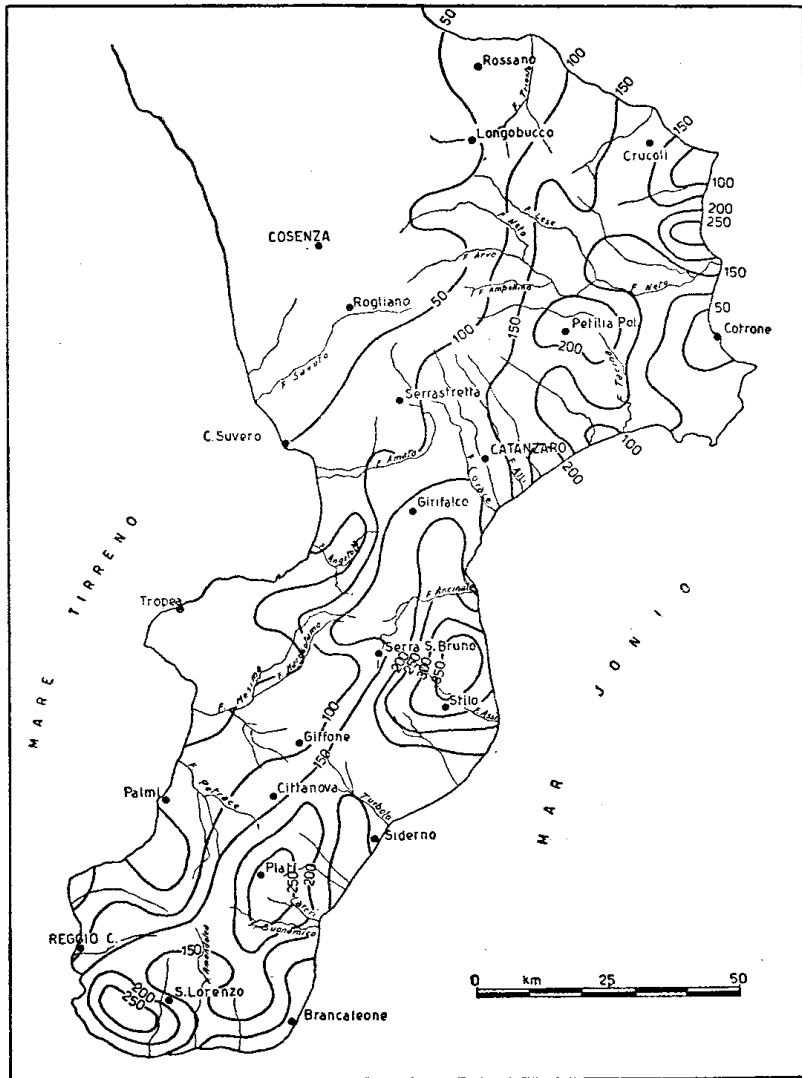


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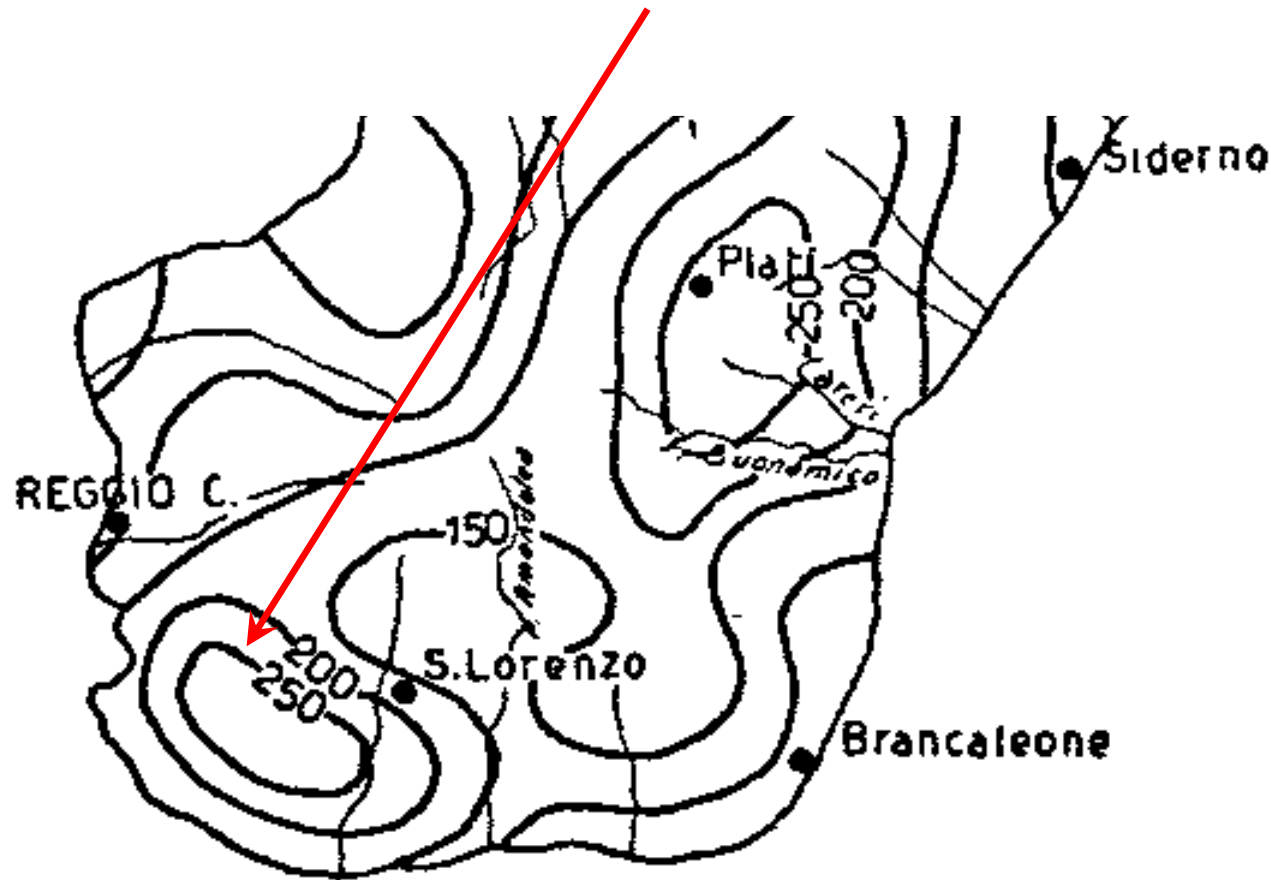




Flood historical records in Calabria – 21, 22 October 1953



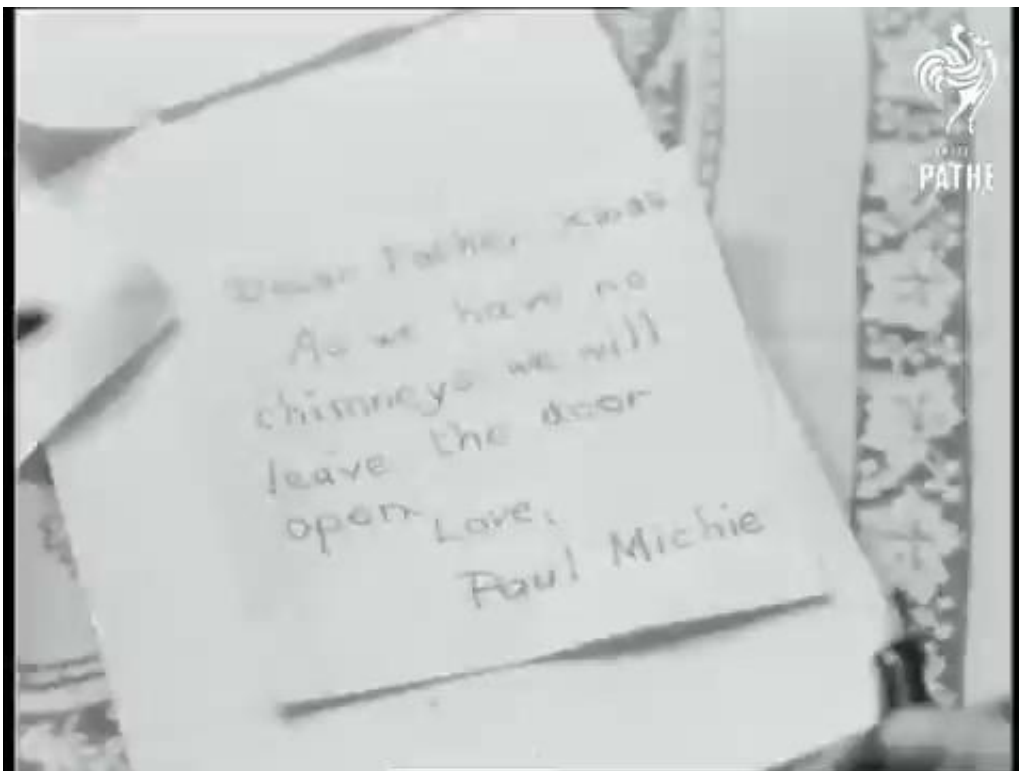
Valanidi catchment





Flood historical records in Calabria

21, 22 October 1953 – Source: Istituto LUCE





A strong activity of torrent control started during the 60s and 70s



More than 100 check-dams were built within the Valanidi catchment

Several kms of levees were also built to protect the urban areas crossed by the main stream



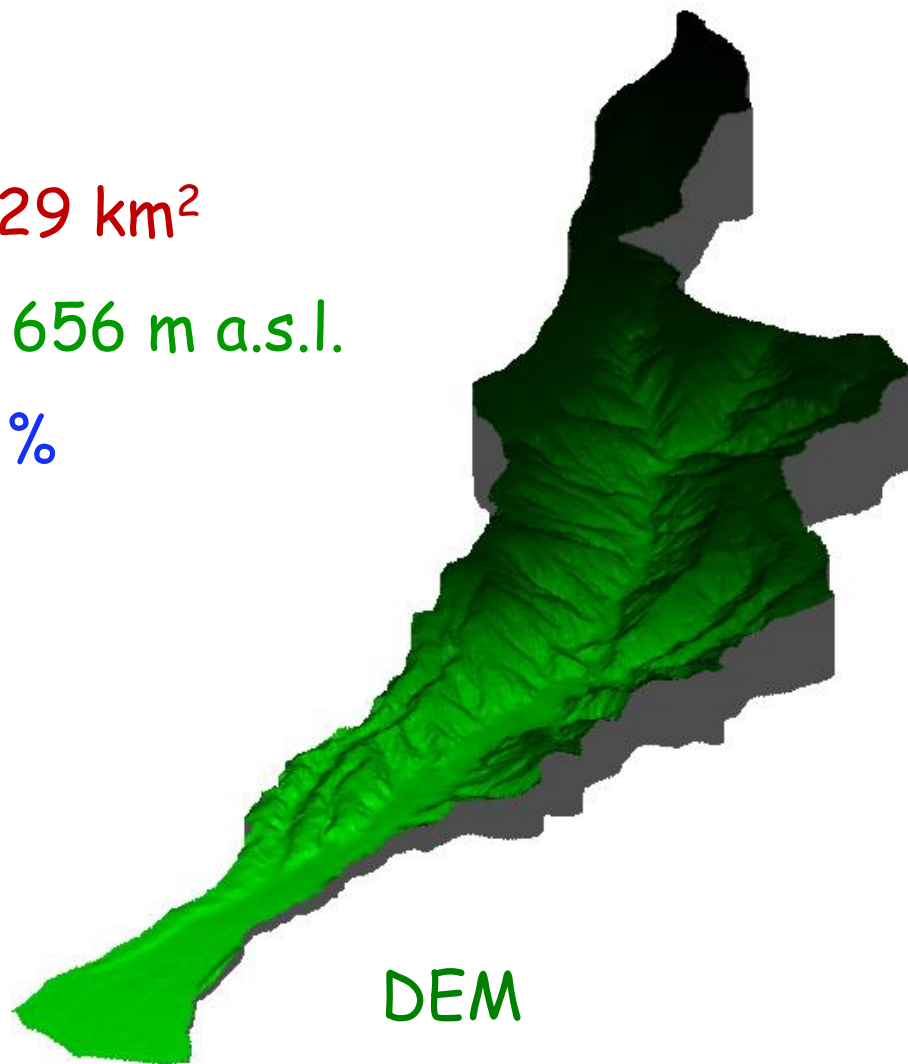


The catchment Valanidi

Drainage area = 29 km²

Mean elevation = 656 m a.s.l.

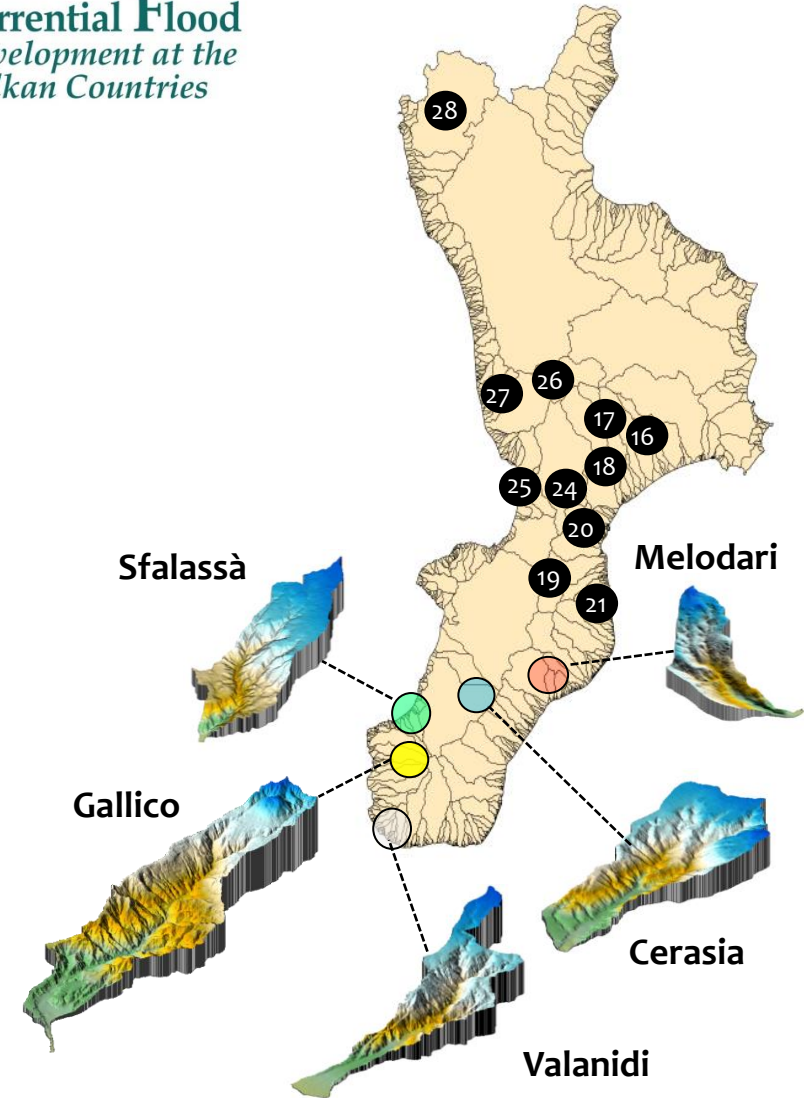
Mean slope = 33 %





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	Superficie (km ²)	N° tratti	Pmed (%)	Pmin (%)	Pmax (%)	Qmed (m ³ s ⁻¹)
Cerasia	41	15	1.64	0.71	2.75	0.649
Gallico	59	13	2.92	1.51	6.19	0.776
Melodari	6.3	15	4.08	2.40	6.10	0.285
Sfalassà	24	7	3.61	2.86	4.93	1.403
Valanidi	29	9	2.61	1.71	4.10	0.281



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Field work undertaken in 2007-2008

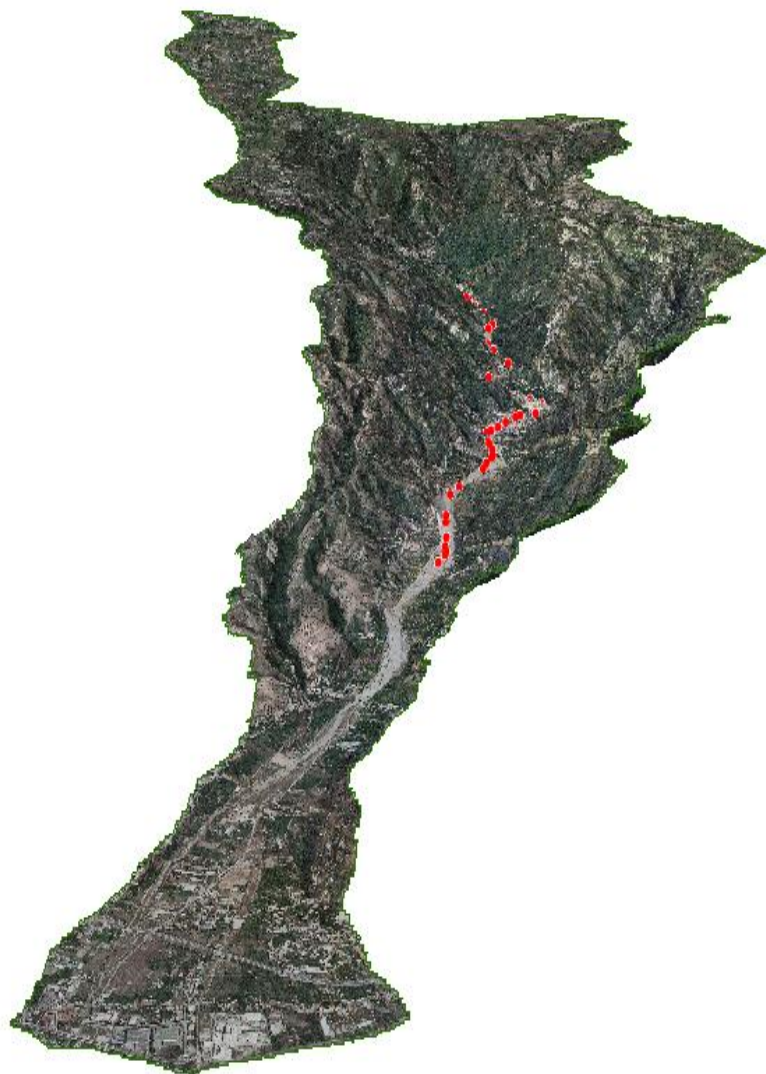


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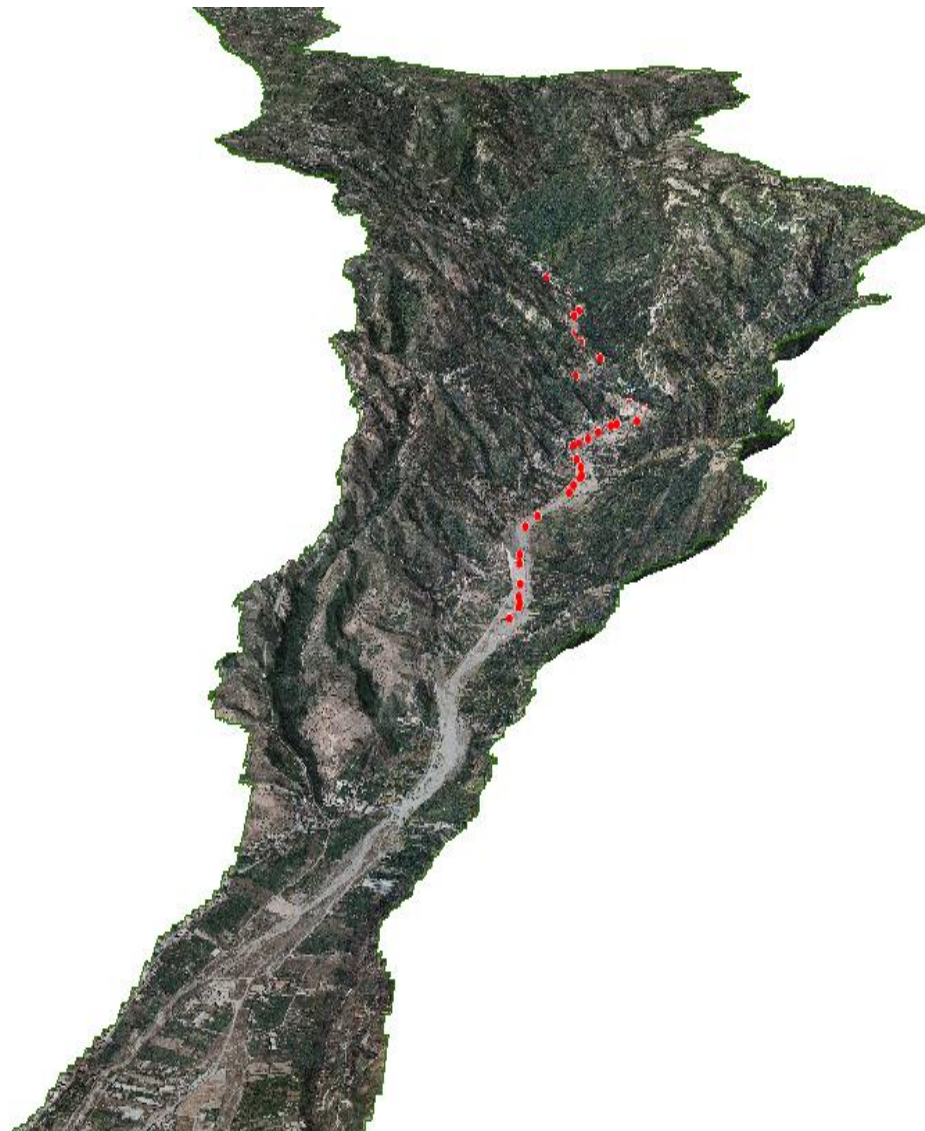


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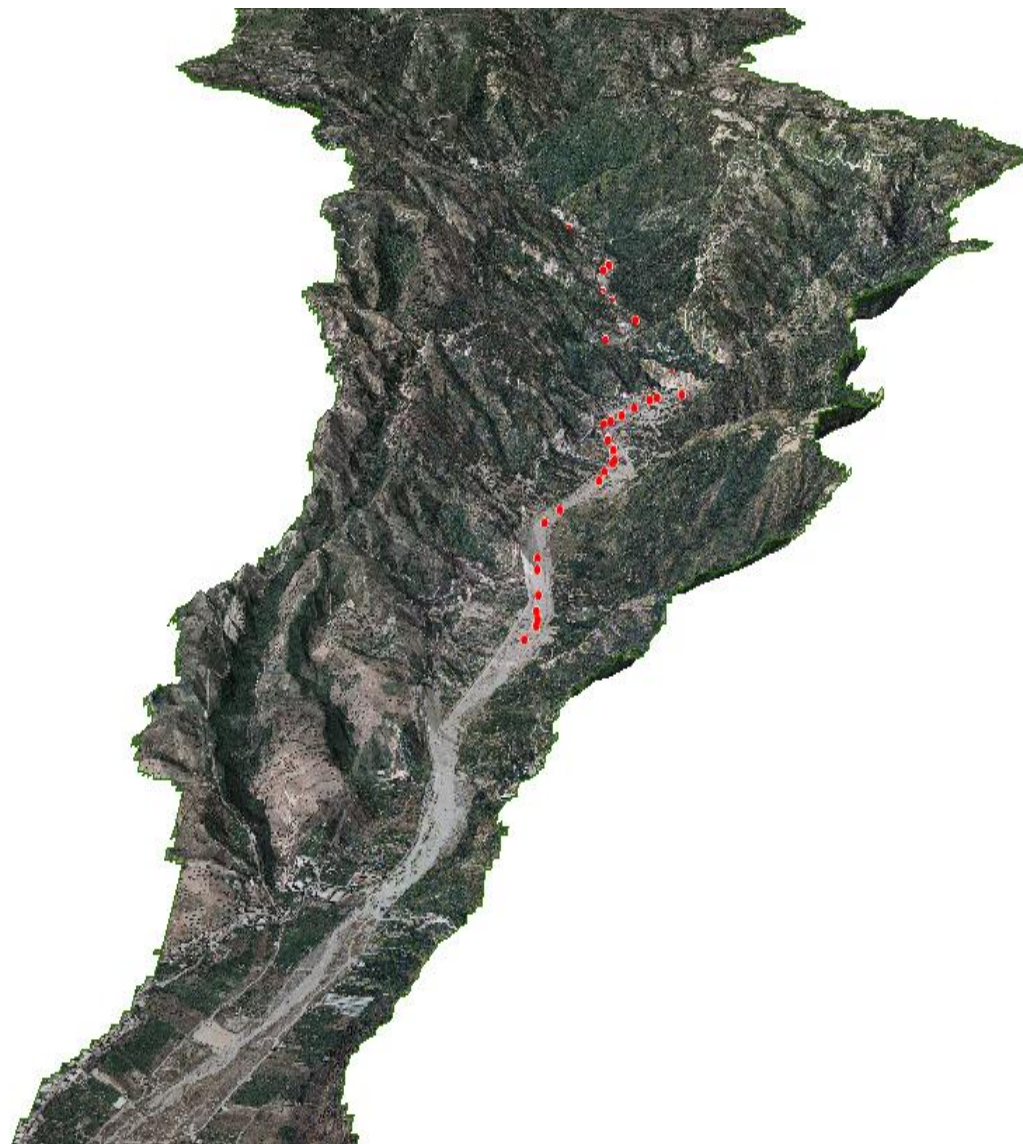


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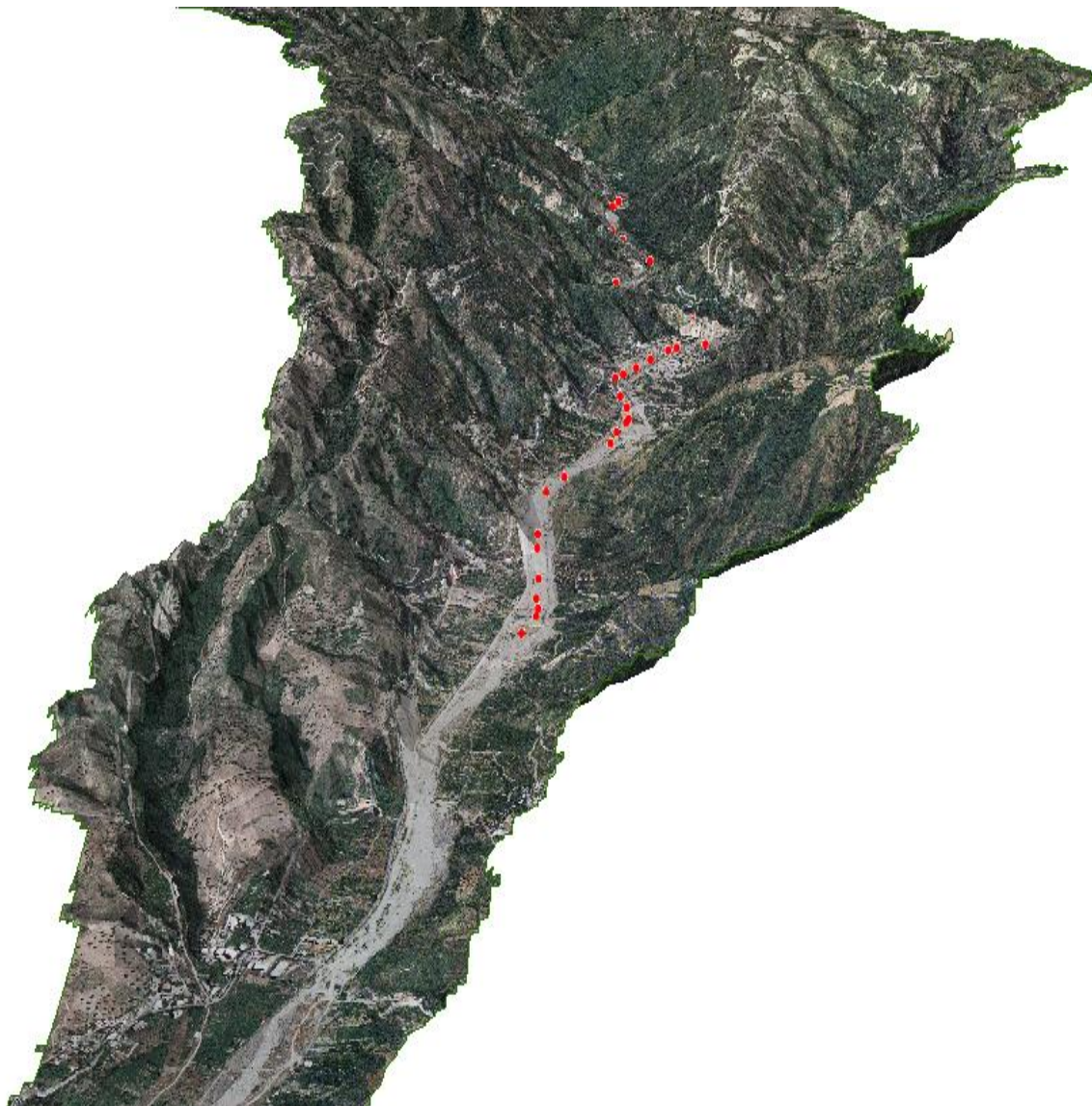


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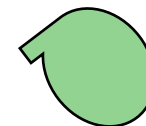


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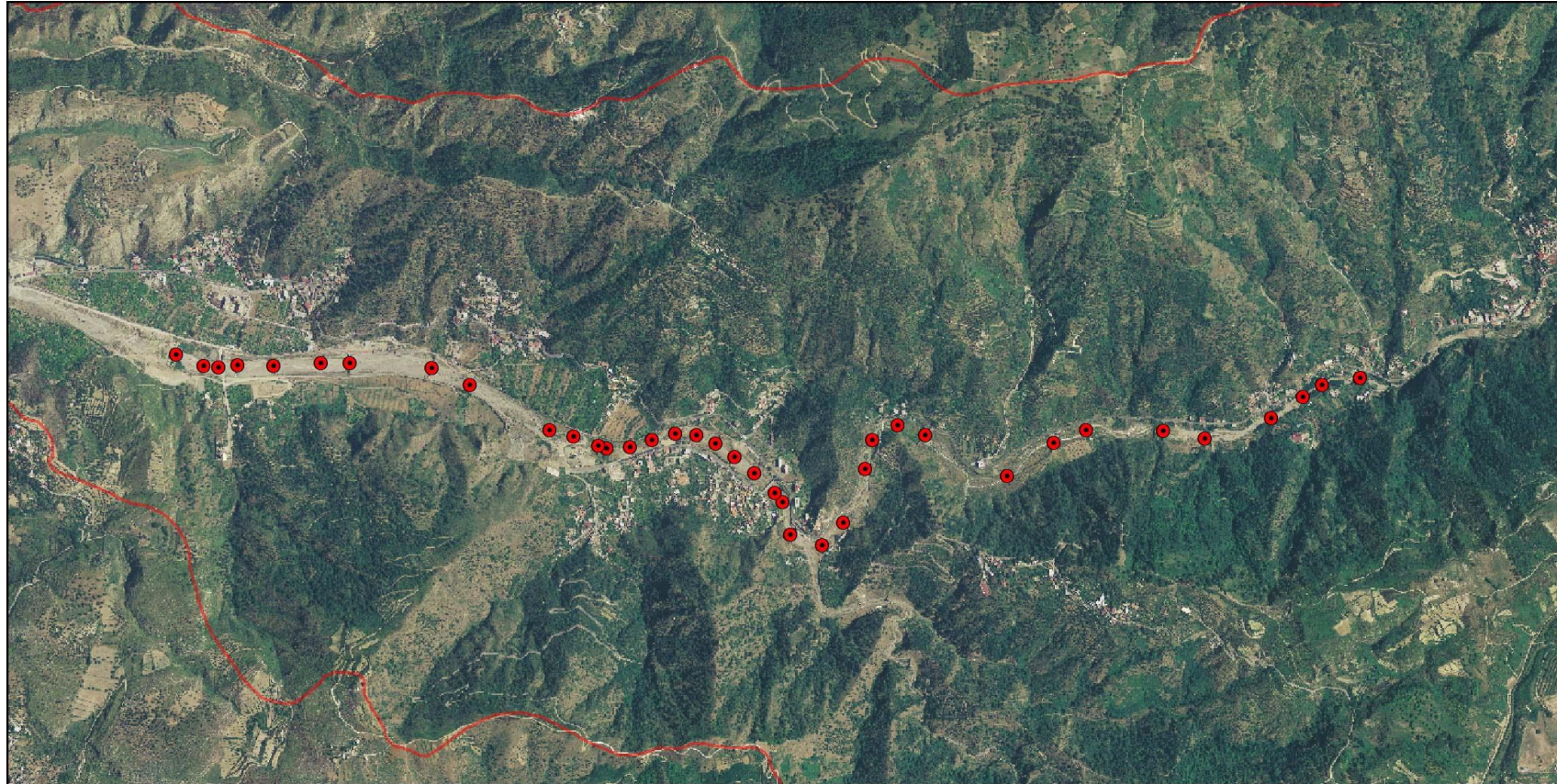


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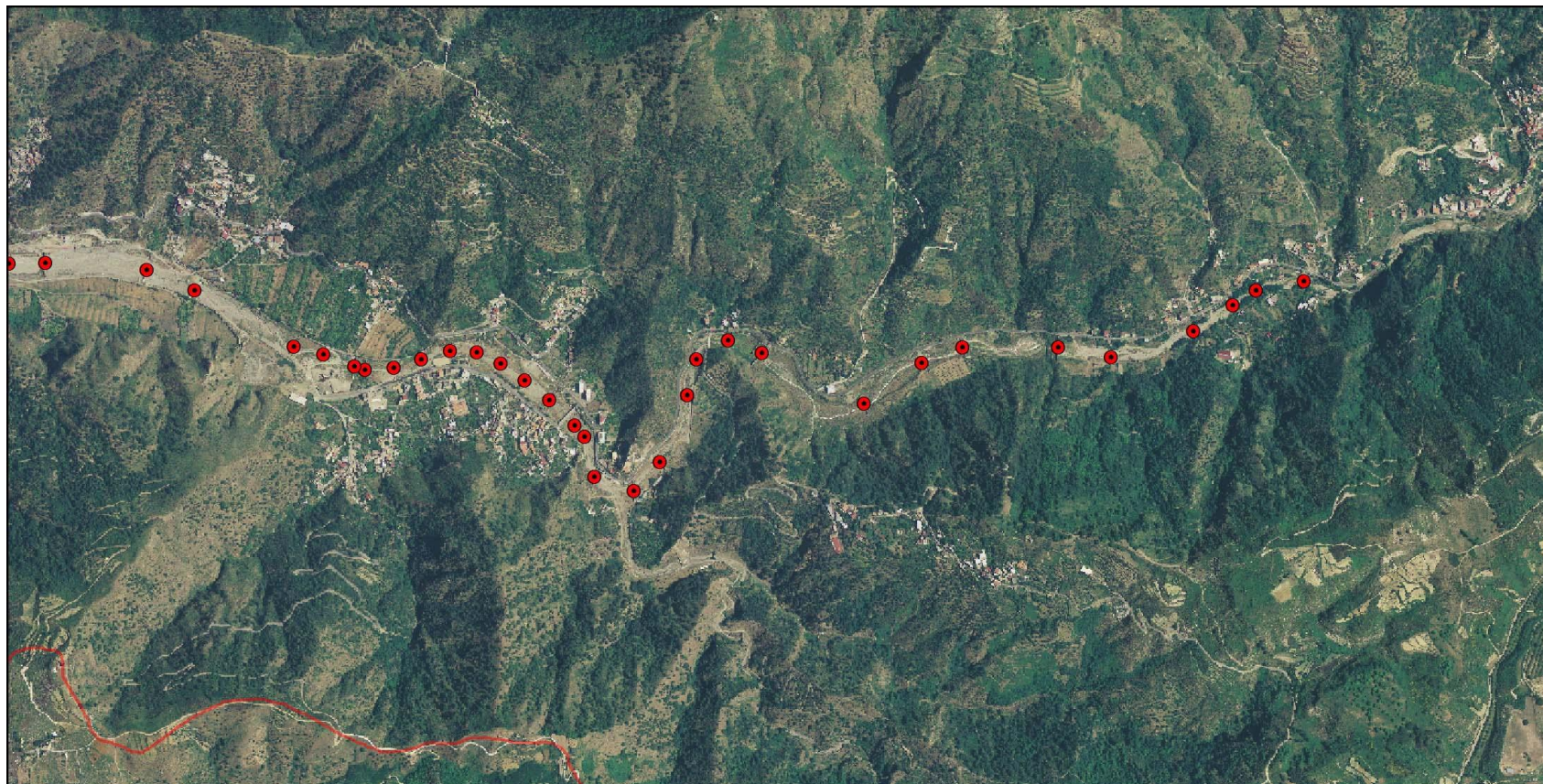


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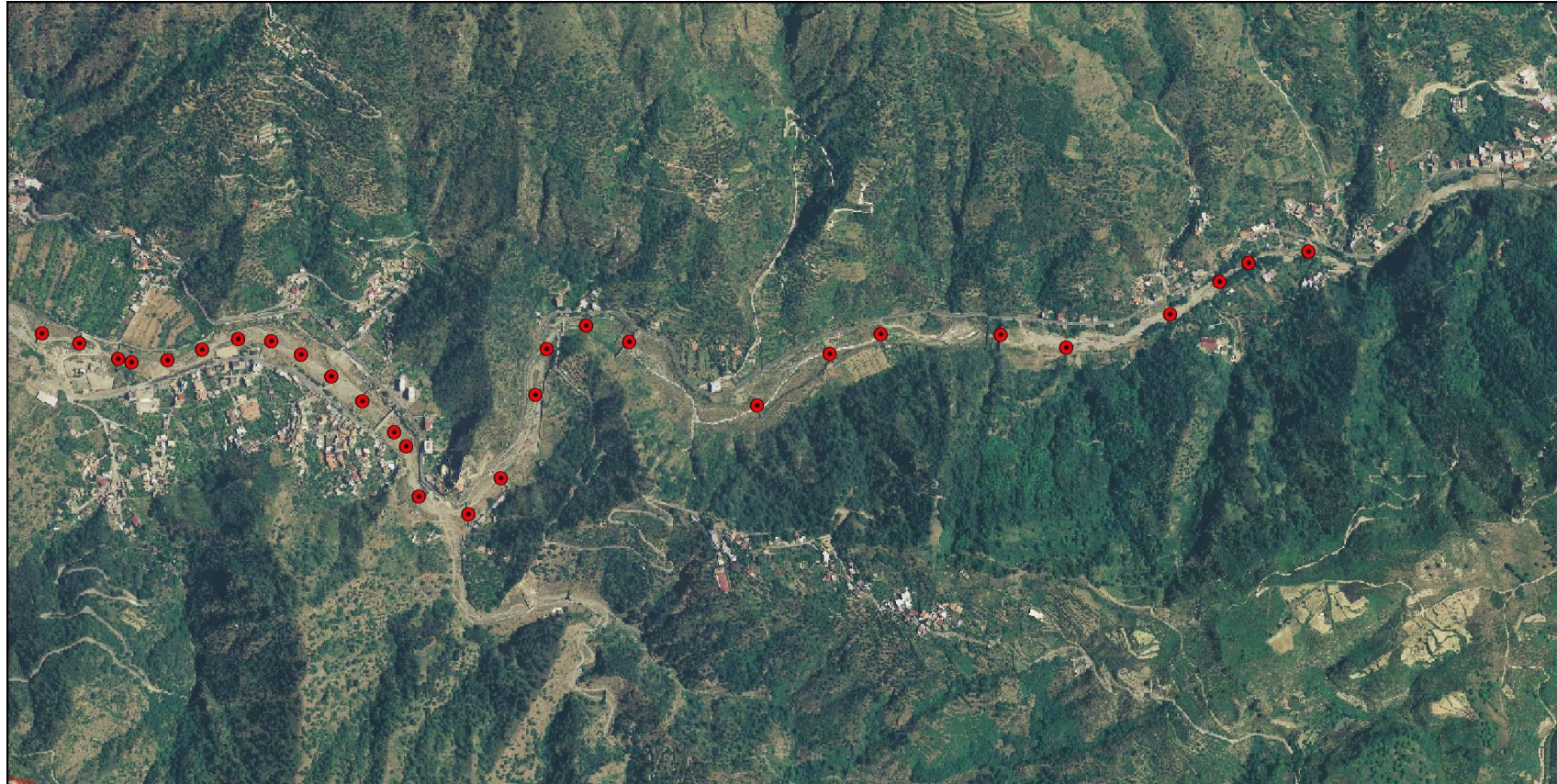


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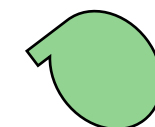


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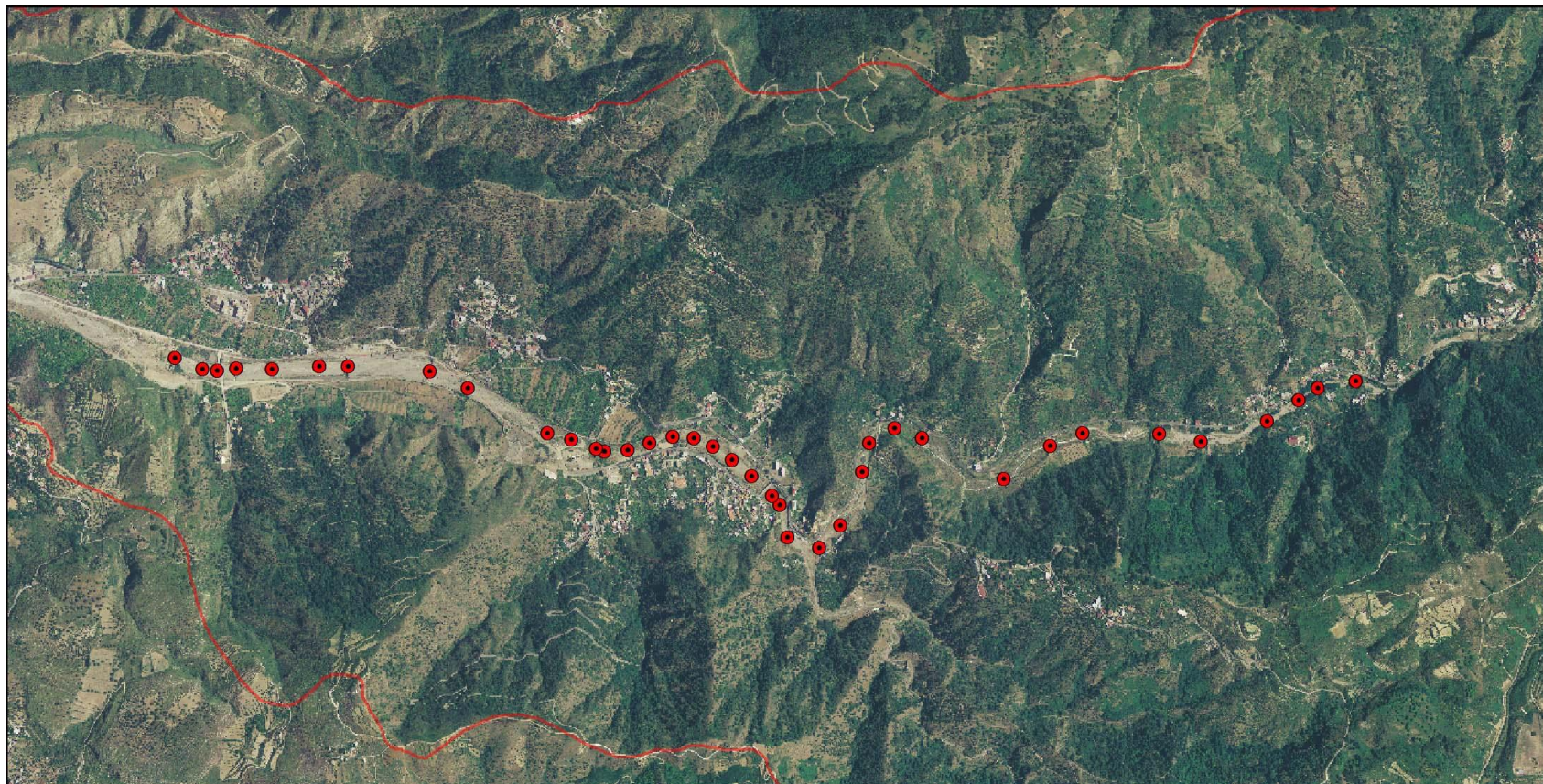


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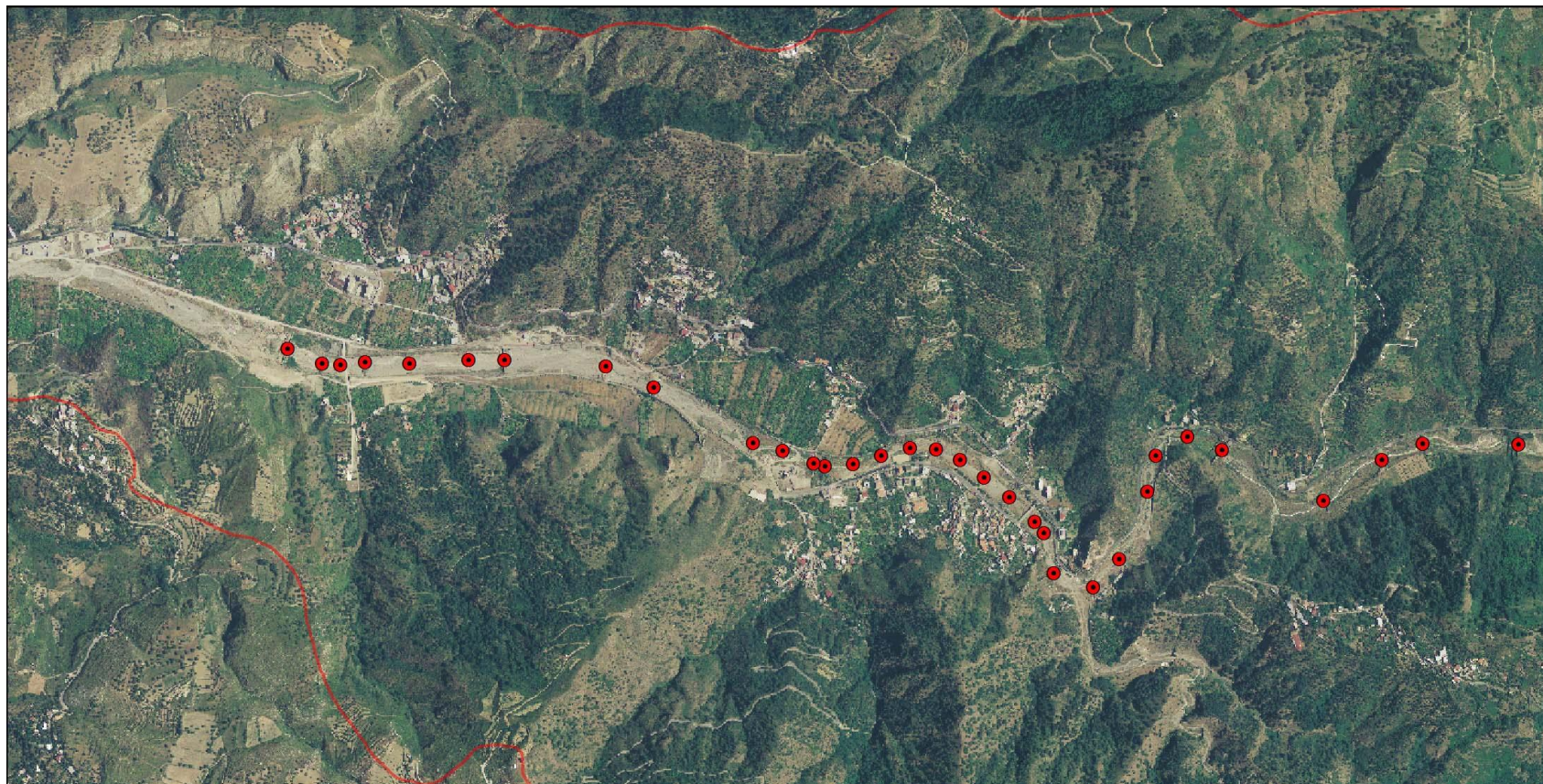


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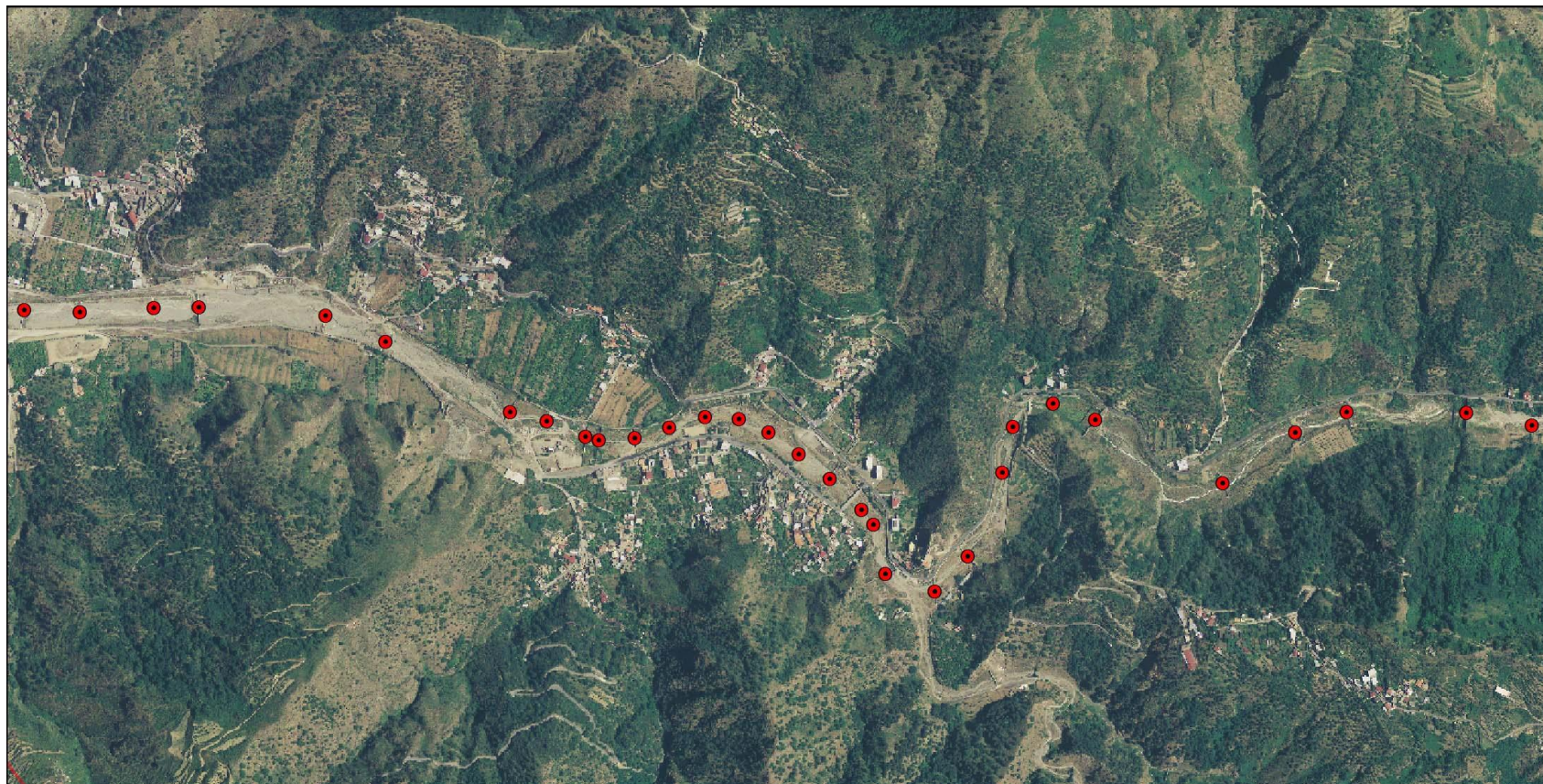


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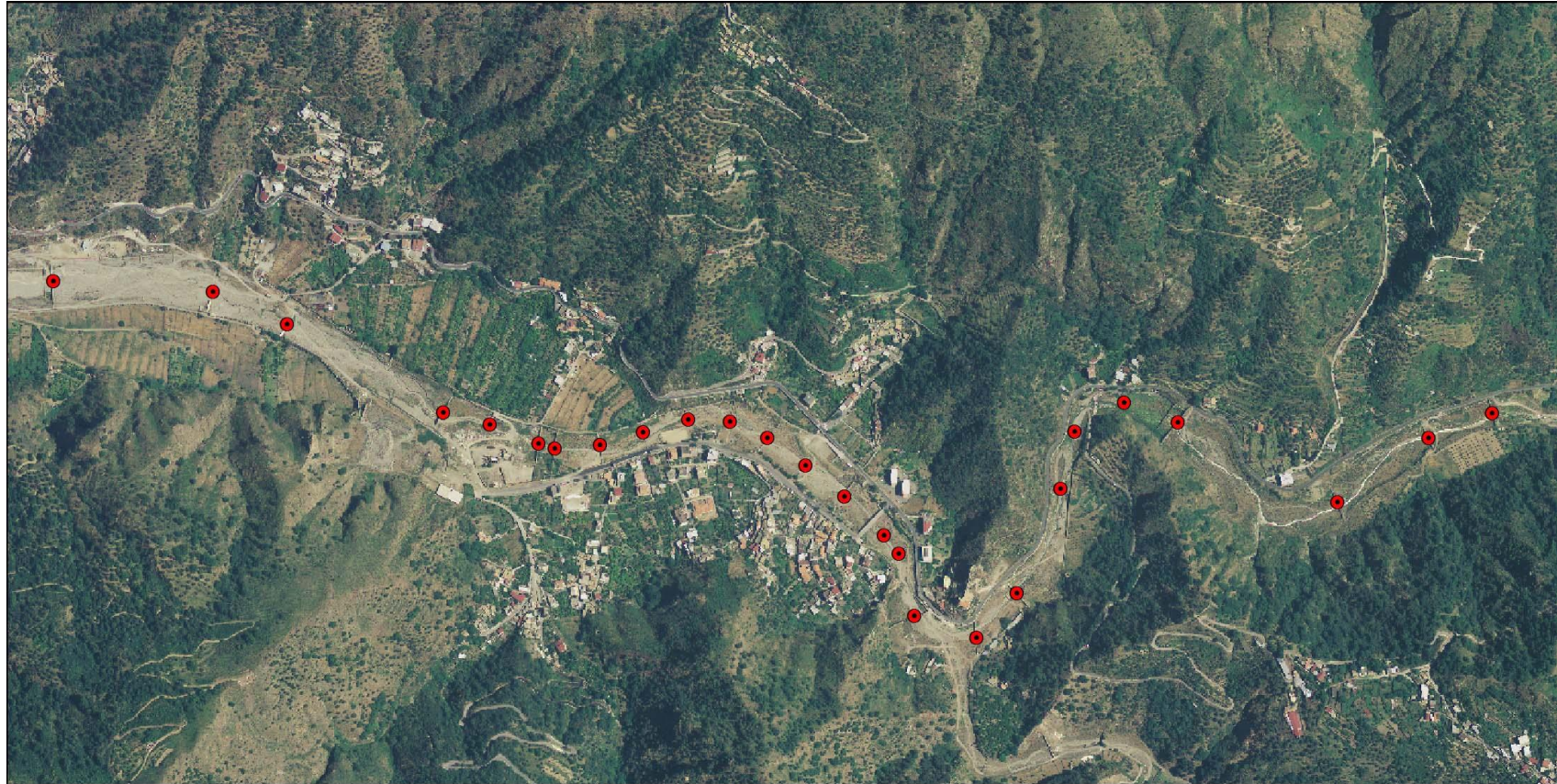


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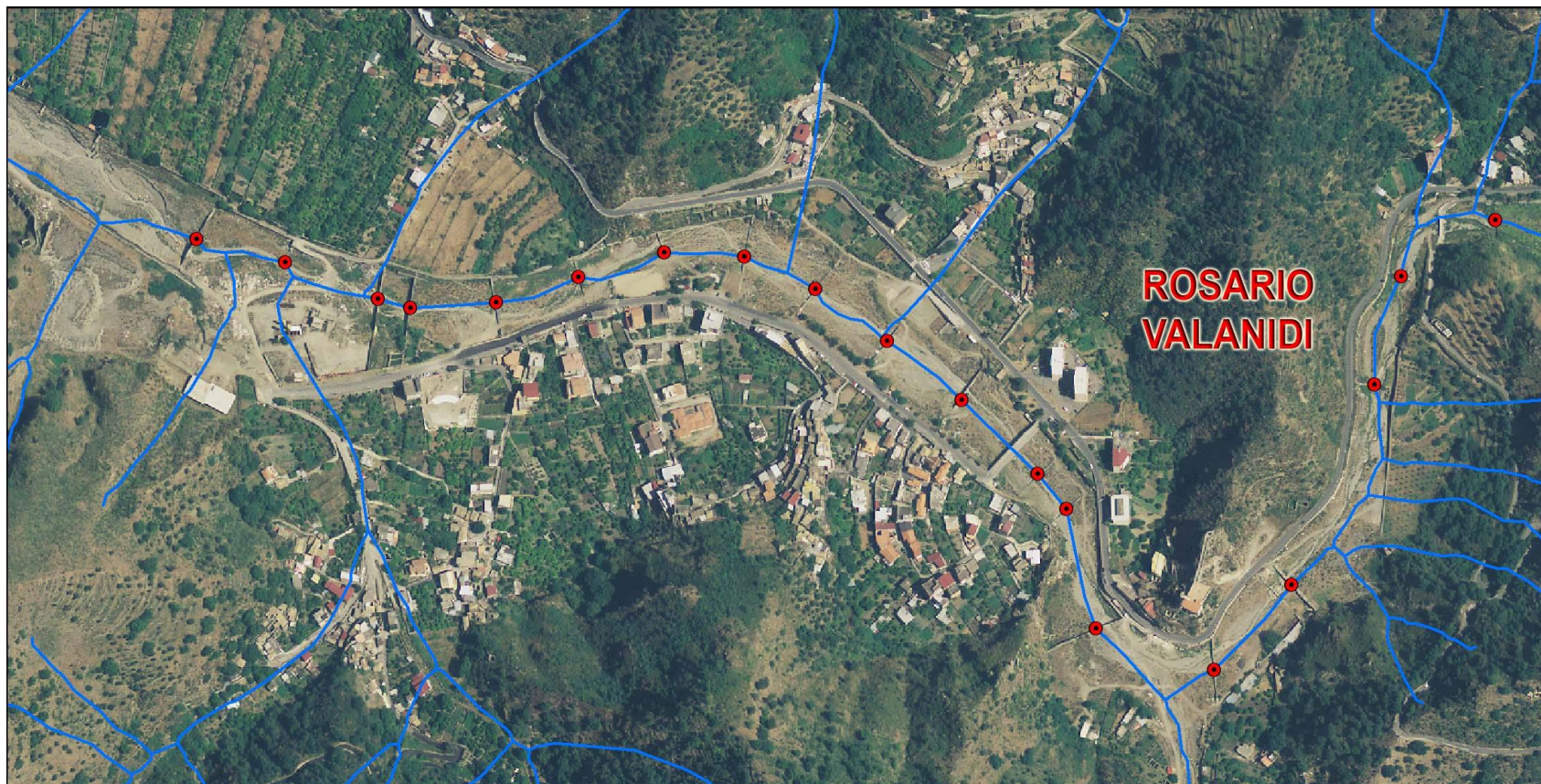


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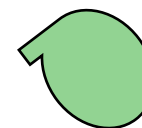




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**ROSARIO
VALANIDI**

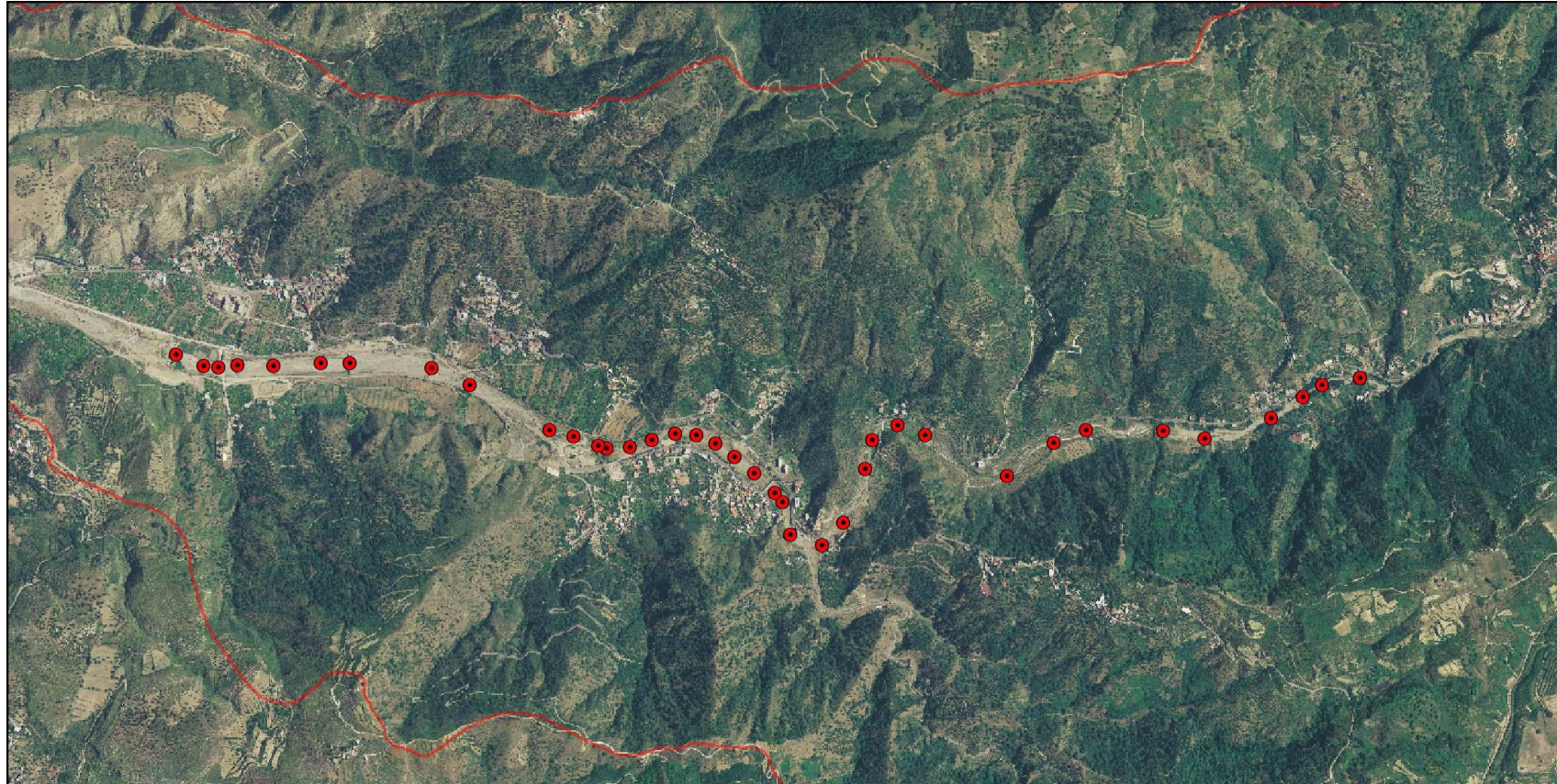


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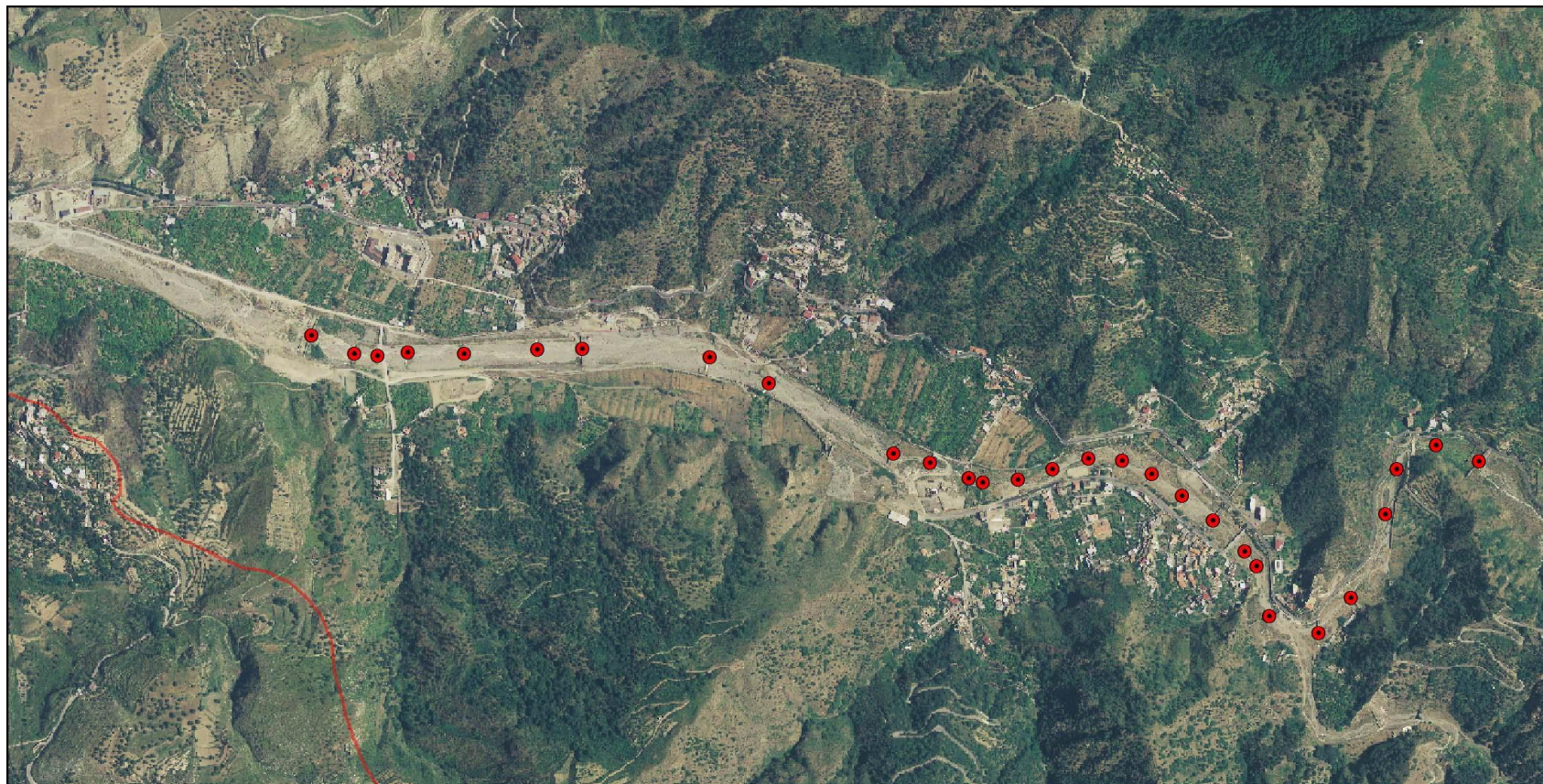


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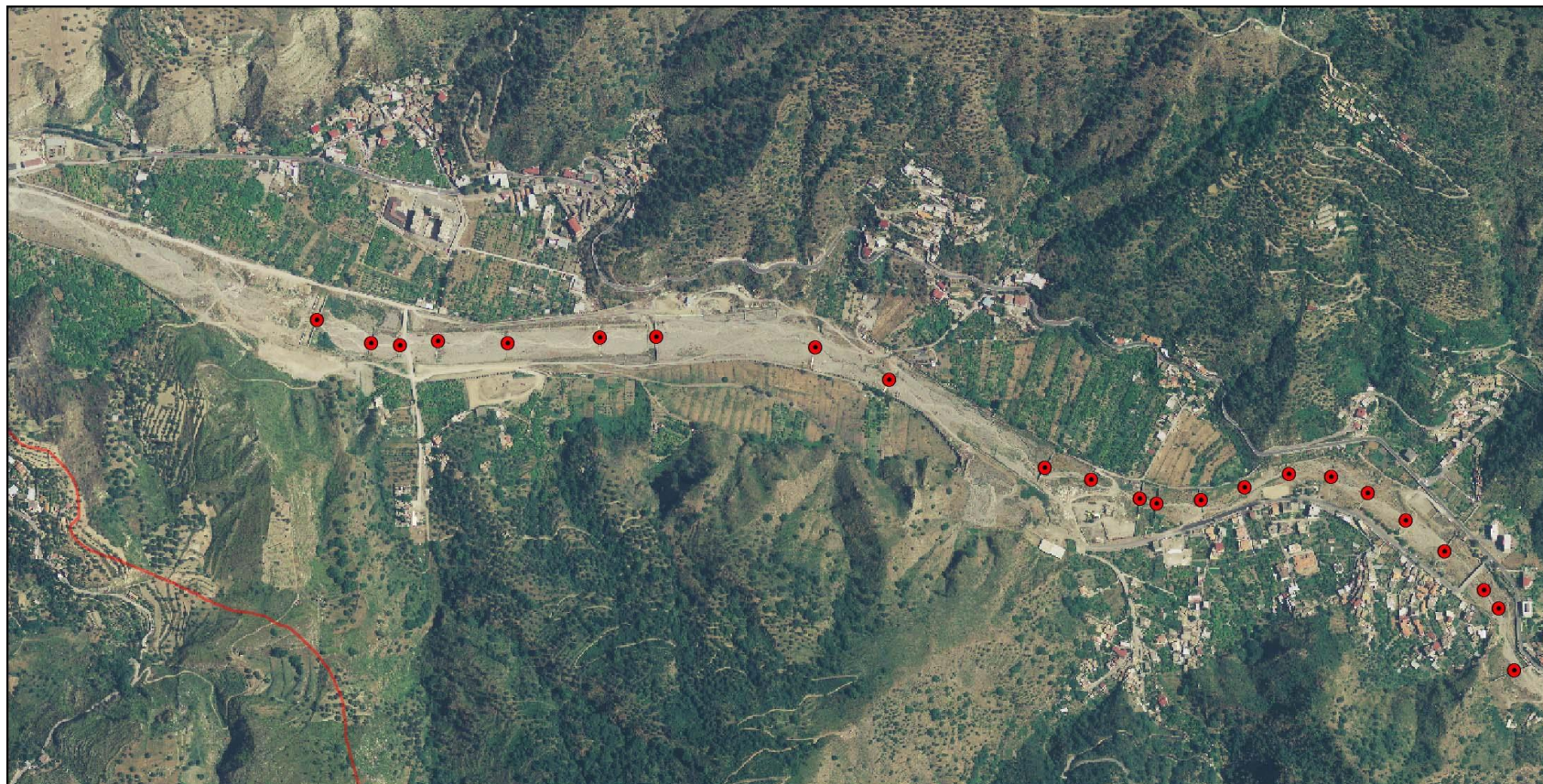


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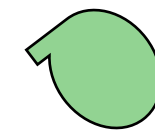


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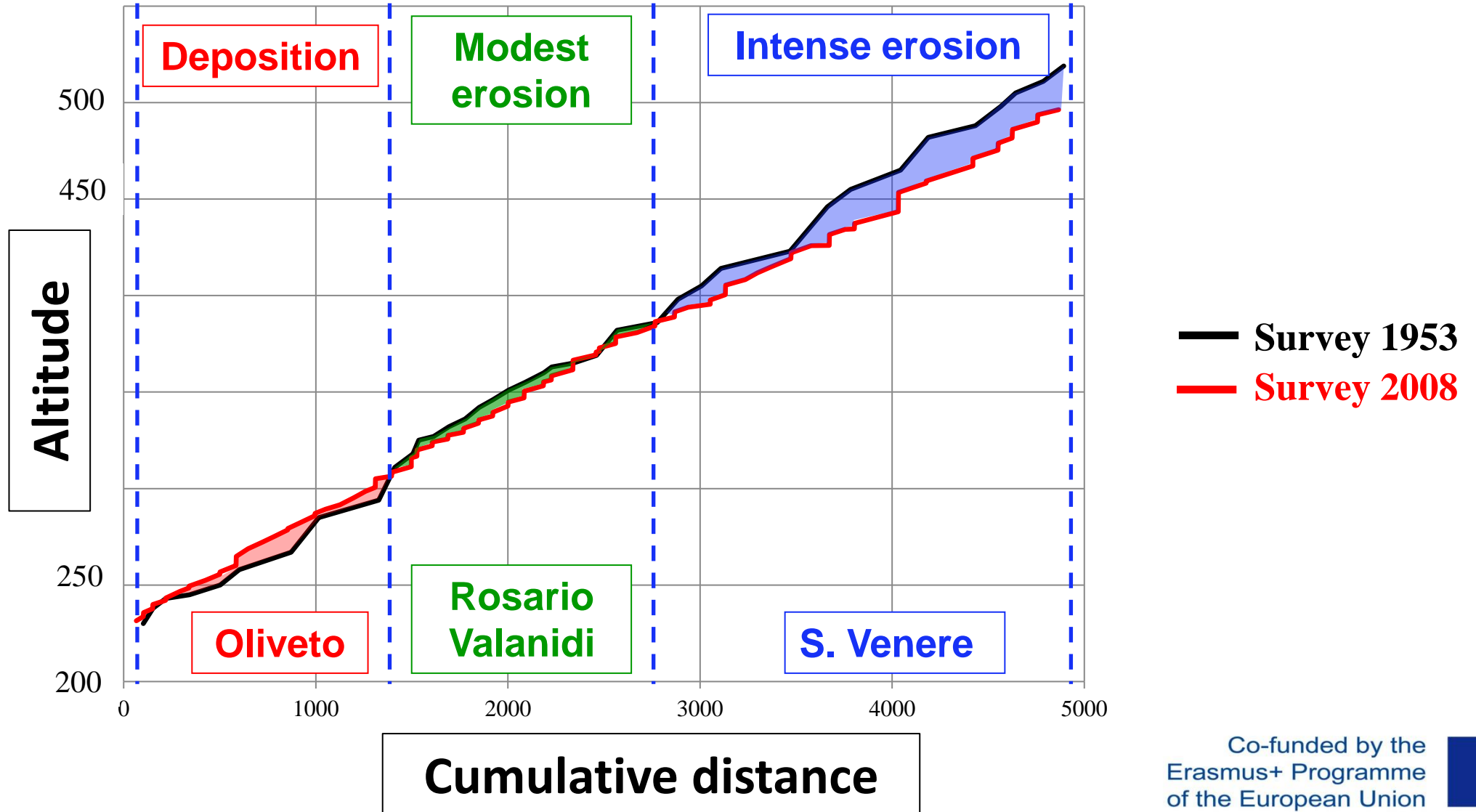


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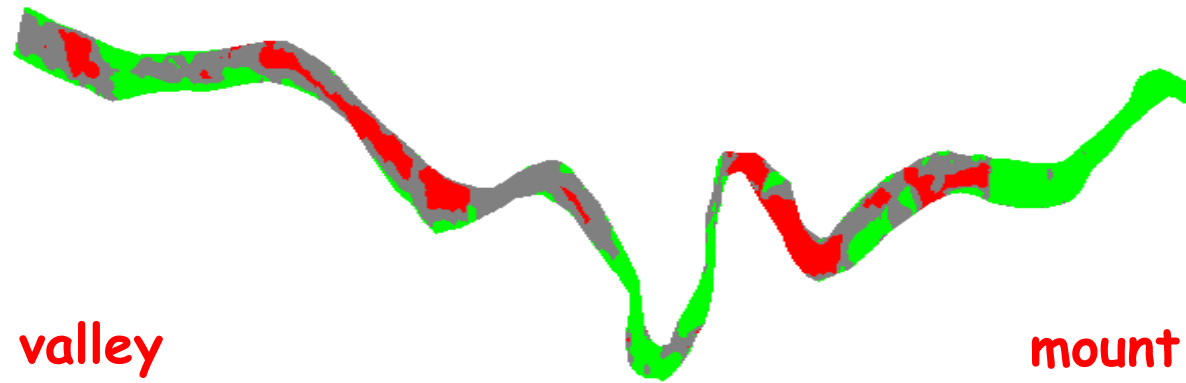


Valanidi: **past** and **present**



Areas in red indicate deposition

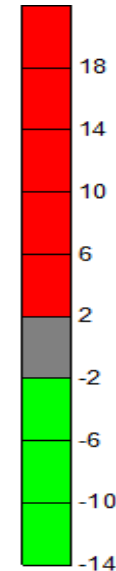
Areas in green indicate erosion



valley

mount

Areas in grey indicate equilibrium





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More recent floods in the Valanidi catchment

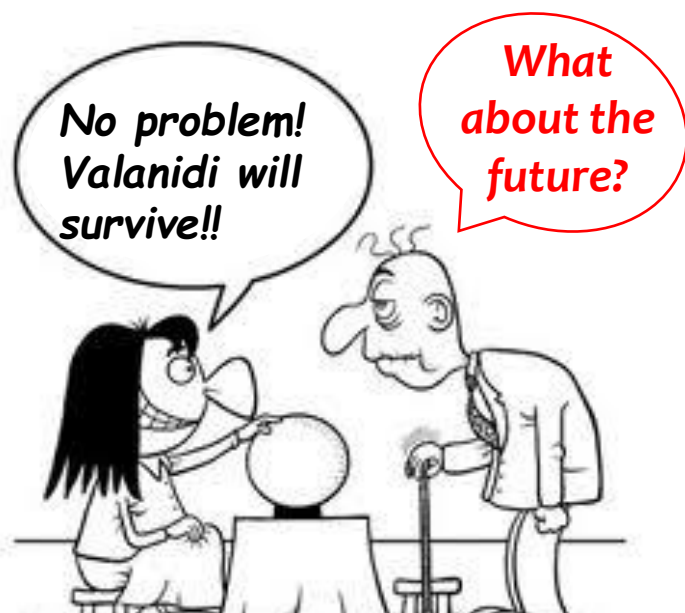
14-15/10/2018 (174 mm)

01/03/2011 (62 mm)





Predictions for the future





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Questions? Suggestions?



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