

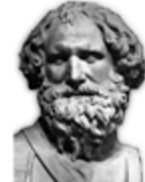


drop by drop: discovering the surface and underground waters of the etna territory



Liceo "Archimede"
Acireale

Scientifico
Linguistico
Scienze Applicate
Sportivo



etna

Etna is the biggest volcano of Europe and one of the most active between the volcanoes of the entire world.



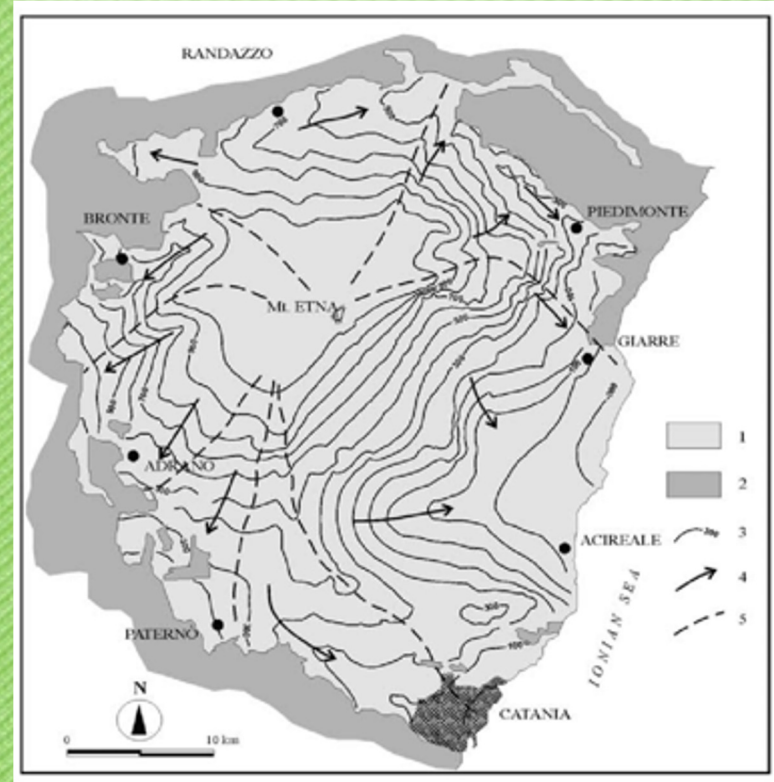
etna's craters

- Voragine
- Bocca Nuova
- Northeast Crater
- Southeast Crater



hydrographic network

- High permeability
- Small streams



Simeto and Alcantara

The margin of the Etna area is delimited for long stretches by wide river valleys: The Simeto flows in the Southern and western side, despite of the Alcantara River which flows in the Northern one.



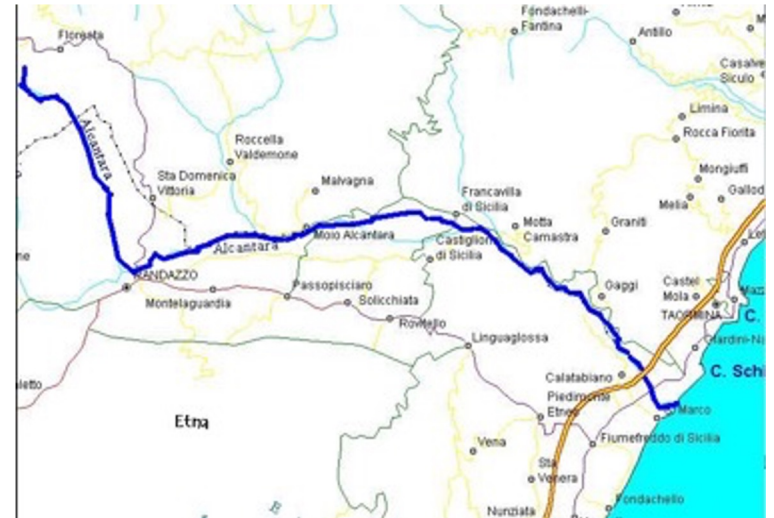
The sampling points

Not having had the opportunity to a well access to the shafts and galleries, we opted for simpler ways, but which still allowed us the



The Alcantara River

The Alcantara is a 53 km long river in eastern Sicily, marking the border of the provinces of Catania and Messina, fed by rain and mainly by the waters of the Alcantara originates from the aquifers of Etna. Nebrodi mountains at about 1,400 m.a.s.l. 1 m. from Serra Baratta(floresta), in the Messina area and flows into the Ionian sea.

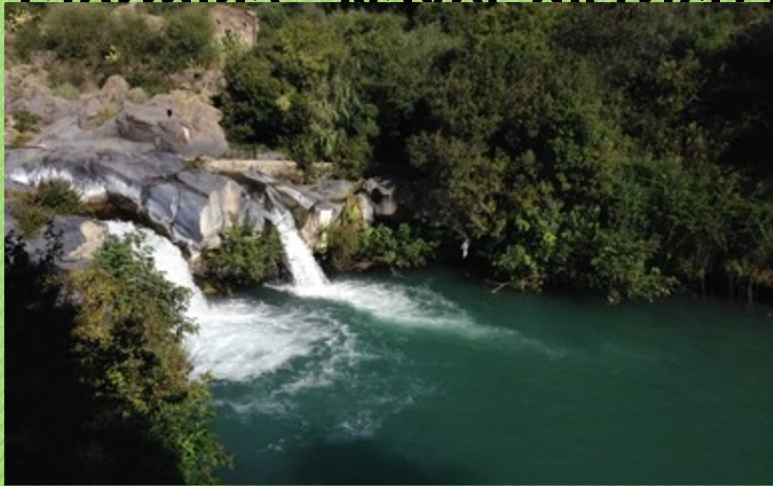


gole dell'alcantara

The river runs through the Francavilla-mouth section flowing on a lava flow that dates back to more than 3000 years ago. Over the centuries, the river modeled the famous “Gole dell'Alcantara” on this lava



We took samples of the Alcántara river from the mouth (about 2 m high) and upstream of the purifier (about 3 m high), to understand if there were influences due to the waters of the consortium waste water purifier of the Taormina - Naxos district; the analyzes gave negative



Street of the mills and nizzeti

The water mills of Aci Catena are buildings located in Aci Catena in Sicily, near the hamlet of Aci San Filippo, in the Greco-Roman valley of Reitana and constitute the historical itinerary where the Franca di S. Venera fair took place, from July 19 to August 2 of each year, from 1422 to 1615, very famous in those times, sanctioned as "Franca" (i



The construction of the mills was mainly due to the large amount of water available in the area. On the Reitana plain there is a first group of springs (Cuba springs): the springs of the Casalotto's



The second group of springs are located on the Pescheria floor, some active and others inactive. The samples were taken near the “Pigno” mill (about 115 m above sea level), and a little above, at about 200 m, where the Casalotto drainage gallery is located (121 m above sea level). Another sample was taken at "Nizzeti" (277 m above sea level) upstream of the Riviera dei

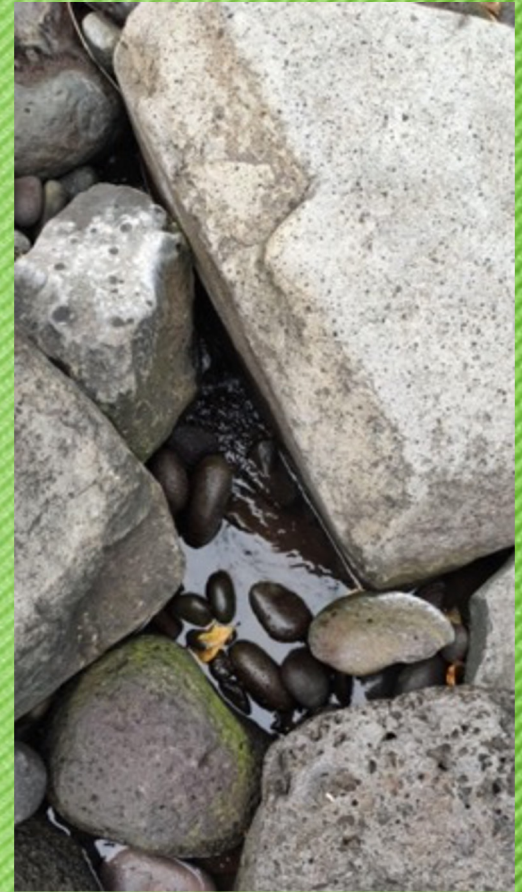


Santa Maria la Scala

The village is located on the Ionian coast at the foot of the Timpa, a gigantic cliff of tectonic origin, an important fault belonging to a fault system of the Hyblean-Maltese escarpment that crosses a



We took the samples from the “Testa dell'acqua” springs and about 100 m south of it; however we decided to take samples from two different springs, as due to periodic collapses in the timpa over the course of a calendar year, the springs are



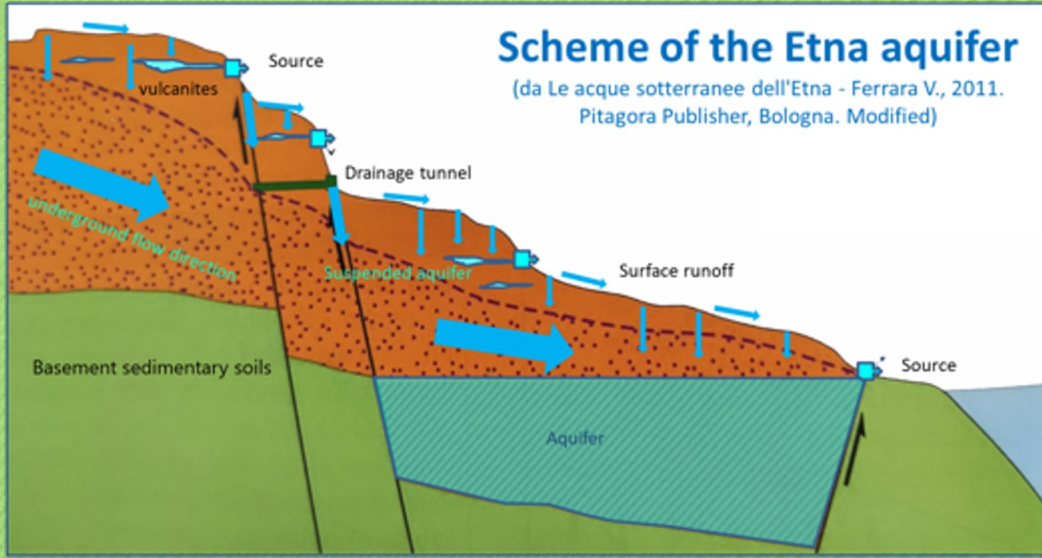
Chemical Evaluation Water Analysis

The samples were then analysed in the laboratory of our school through a procedure that is the determination of the total hardness of the water. The hardness of water is due to the presence of dissolved salts of calcium and magnesium.



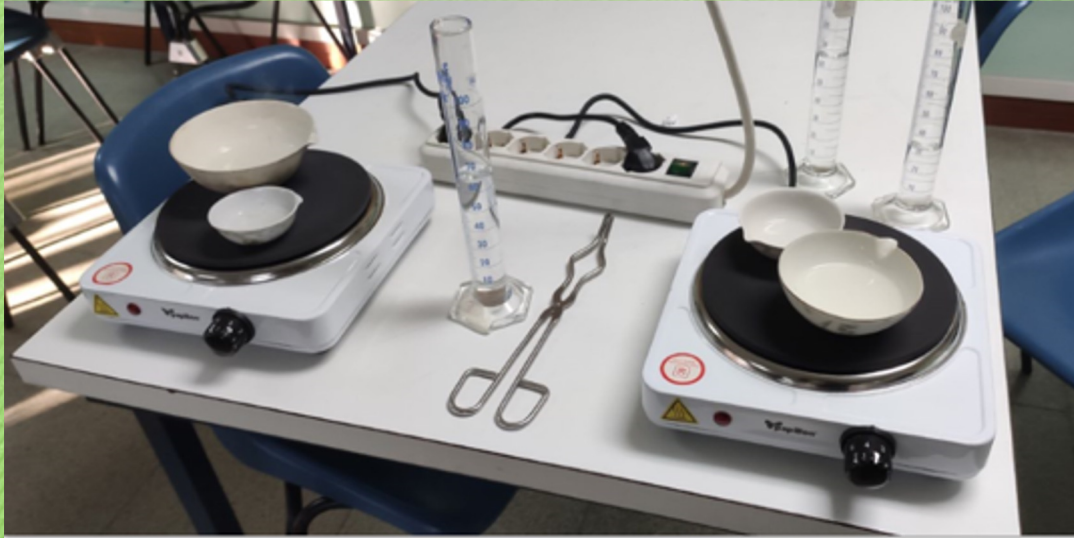
The samples were taken about 6 times in different significant periods of the year and we kept a database on the evaluation of the parameters obtained on the 6 sampling points chosen.

The sampled waters come from shallow, deep aquifers and from the rivers Alcantara and Fiumefreddo fed almost entirely by the aquifers of Etna.



hardness of the water:

- **Complexometric method**
- **blue indicator called NET (Nero Eriocromo T) which changes color from blue to**

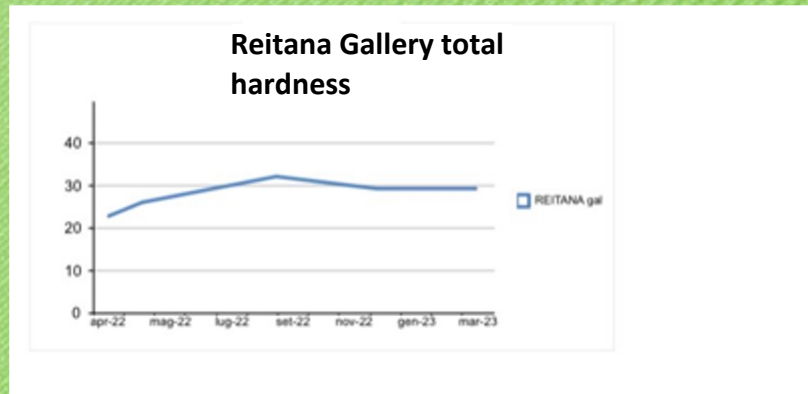
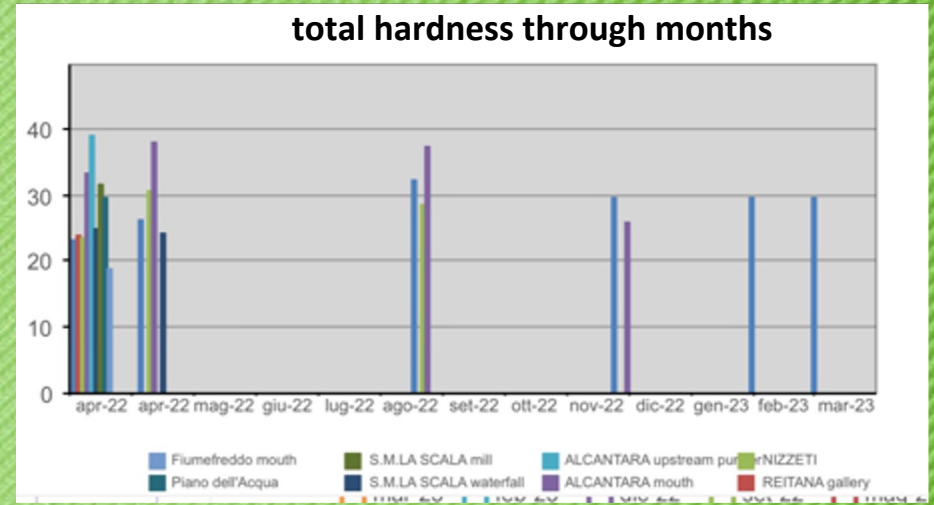
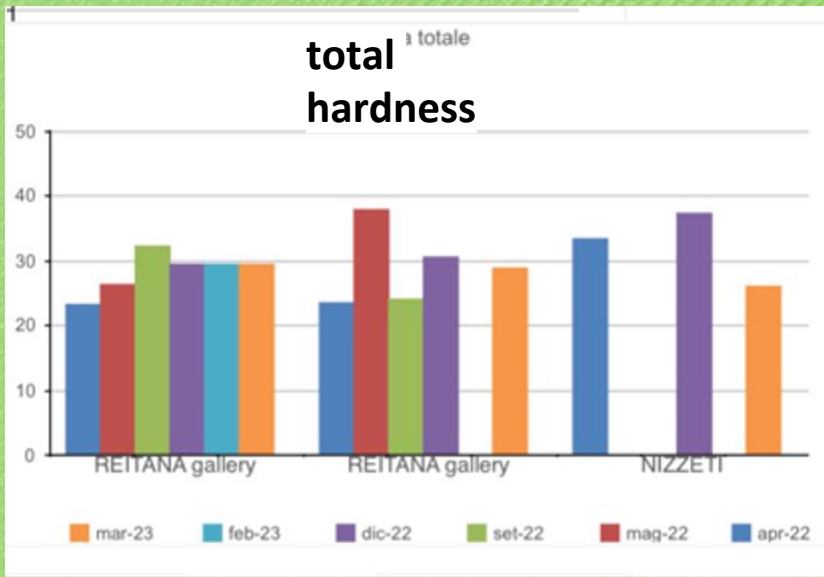


Over time, almost all parameters remained more or less stable except for two samples:

- Foce dell'Alcantara
- Santa Maria la Scala

These two got the influence of rainwater and probably also from waste water from the overhanging city of Acireale, which dilute the

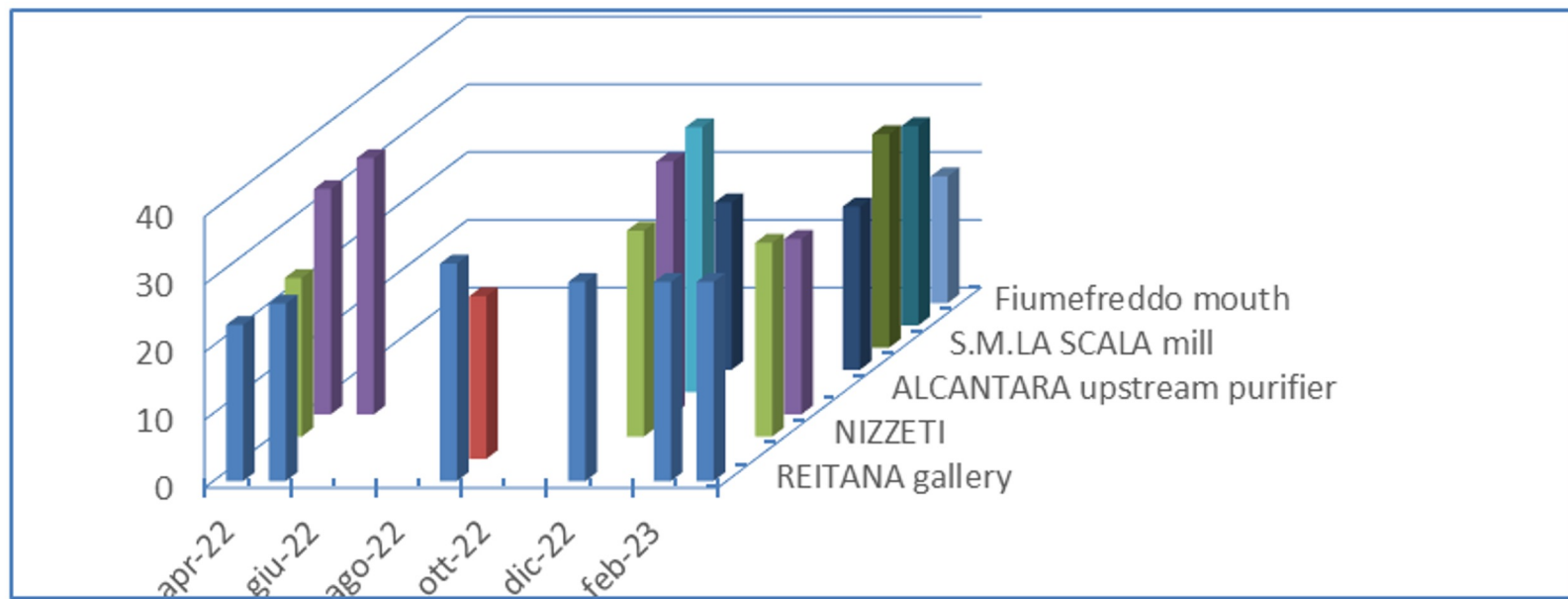
	RETIANA Cascade	RETIANA MIII	NIZZETI	ALCANTARA Mouth	S. MARIA LA SCALA Cascade	S. MARIA LA SCALA MIII	PIANO DELL'ACQUA	FUIMEFREDDO
Hardness Ca²⁺ (mg/Litre)								
dec-22	10,6		14,5	11,3	6,5	10,5		
mar-23	10,6		13,6	12,6	6,5	9,1	4,3	6,3
Total dissolved solids (mg/Litre)								
dec-22	161		157	168	142	147		
mar-23	172		162	251,1	143,6	155	325	328
pH								
dec-22	7,53	7	7,4	8,3	7,6	8,3		
mar-23	7,4		7,01	8,36	7,95	7,85	8,08	7,9
	RETIANA Cascade	RETIANA MIII	NIZZETI	ALCANTARA Mouth	S. MARIA LA SCALA Cascade	S. MARIA LA SCALA MIII	PIANO DELL'ACQUA	FUIMEFREDDO
Elct. Conduc-tivity µS/cm (20°C)								
sept-22	874	1088						
dec-22	1030	1033	948	1120	1160	860		
mar-23	1030		931	783	847	851	683	665
Ion (mg/Litre)								
sept-22		Cu ²⁺ (10) NO ₃ ⁻ (75) NO ₂ ⁻ (0,5) Cl ⁻ (0) Fe ^{2+,3+} (0)						
dec-22		Cu ²⁺ (10) NO ₃ ⁻ (75) NO ₂ ⁻ (0) Cl ⁻ (0) Fe ^{2+,3+} (0)	Cu ²⁺ (10) NO ₃ ⁻ (75) NO ₂ ⁻ (0) Cl ⁻ (0) Fe ^{2+,3+} (2)	Cu ²⁺ (10) NO ₃ ⁻ (5) NO ₂ ⁻ (0,5) Cl ⁻ (0) Fe ^{2+,3+} (0)	Cu ²⁺ (10) NO ₃ ⁻ (50) NO ₂ ⁻ (0) Cl ⁻ (0) Fe ^{2+,3+} (2)	Cu ²⁺ (10) NO ₃ ⁻ (50) NO ₂ ⁻ (0) Cl ⁻ (0) Fe ^{2+,3+} (0)		
mar-23	Cu ²⁺ (10) NO ₃ ⁻ (100) NO ₂ ⁻ (0) Cl ⁻ (0) Fe ^{2+,3+} (2)		Cu ²⁺ (10) NO ₃ ⁻ (75) NO ₂ ⁻ (0) Cl ⁻ (0) Fe ^{2+,3+} (2)	Cu ²⁺ (5) NO ₃ ⁻ (10) NO ₂ ⁻ (0) Cl ⁻ (0) Fe ^{2+,3+} (0)	Cu ²⁺ (5) NO ₃ ⁻ (75) NO ₂ ⁻ (0) Cl ⁻ (0) Fe ^{2+,3+} (0)	Cu ²⁺ (10) NO ₃ ⁻ (5) NO ₂ ⁻ (2) Cl ⁻ (0) Fe ^{2+,3+} (0)	Cu ²⁺ (5) NO ₃ ⁻ (0) NO ₂ ⁻ (0) Cl ⁻ (0) Fe ^{2+,3+} (0)	Cu ²⁺ (5) NO ₃ ⁻ (25) NO ₂ ⁻ (0) Cl ⁻ (0) Fe ^{2+,3+} (0)



**the sampled waters,
due to the excessive
presence of Cu,
(When copper is 0 in
reality it is meant
that it is <1 mg/L)
cannot be
considered potable
(intended for human
consumption), but**

legislative decree 31/2001 - part A the legal requirements and in part C the indicator parameters.			
Parameters	Parameter Values (Legal Limits)	measurement unit	Notes
Hardness	15 ÷ 50	°F	Part C
Dissolved Solids	1500	mg/L	Part C
Conductivity	2500	µScm-1 20°C	Part C
pH	6,5 ÷ 9,5	-	Part C
Cl	250	mg/L	Part C
Nitrate	50	mg/L	Part A
Nitrites	0,5	mg/L	Part A
Fe	0,2	mg/L	Part C
Cu	1,0	mg/L	Part A

total hardness



REITANA gallery

REITANA gallery

NIZZETI

ALCANTARA mouth

ALCANTARA upstream purifier

S.M.LA SCALA waterfall

S.M.LA SCALA mill

Piano dell'Acqua

Fiumefreddo mouth