

# **Geothermal Exploration in Greece**

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# Geothermal exploration in Greece

Started in the 70's by IGME, PPC for high enthalpy fields for power generation

Extended to low enthalpy fields in the 80's for agricultural applications

Geological mapping  
 Geochemical investigation  
 Schlumberger resistivities  
 Shallow boreholes

⇒ many areas of geothermal interest all over the country



# Milos island

Active hydrothermal system  
maintained by Pleistocene  
volcanic activity

Reservoir fluid  
310-323°C boiled  
seawater at 1-5 km

## Geology

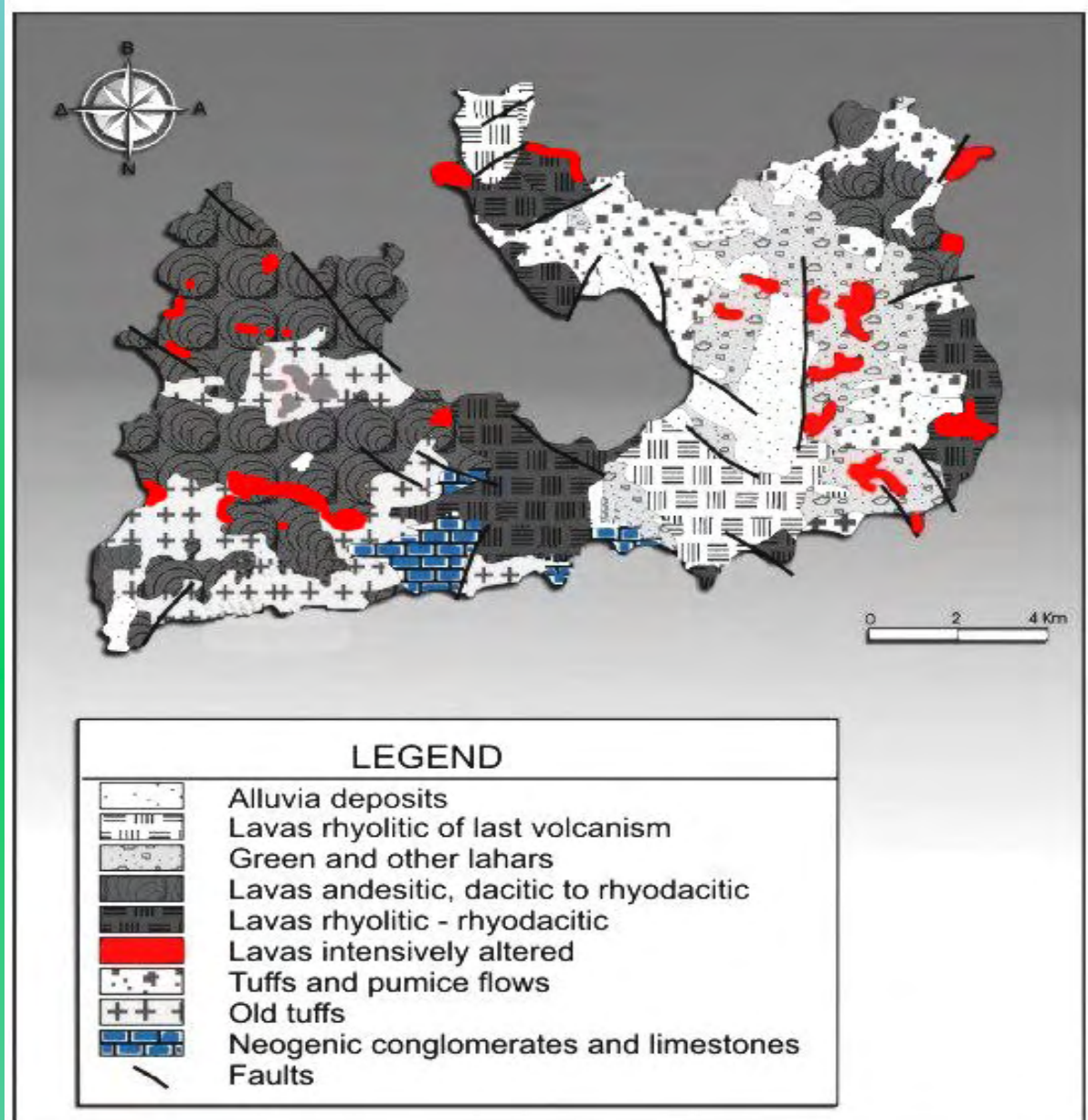
Alluvia / volcanic products  
Altered tuffs  
Neogene sediments  
Metamorphic basement

## Methodology

Geological mapping  
Thermal manifestations  
Geochemical investigation  
Schlumberger resistivities  
Shallow boreholes  
Five deep wells

## Applications

A few houses / hotels



# Santorini island

Active hydrothermal system maintained by Holocene and recent volcanic activity

## Reservoir fluid

High enthalpy boiled seawater at 1+ km

## Geology

Volcanic products  
Metamorphic basement (limestones)

## Methodology

Geological mapping  
Thermal manifestations  
Geochemical investigation  
Schlumberger resistivities  
Gravity / magnetic survey  
A few shallow boreholes

## Applications

none



# Nisyros island

Active hydrothermal system maintained by Pleistocene volcanic activity

## Geology

Volcanic products  
Metamorphic basement (limestones)

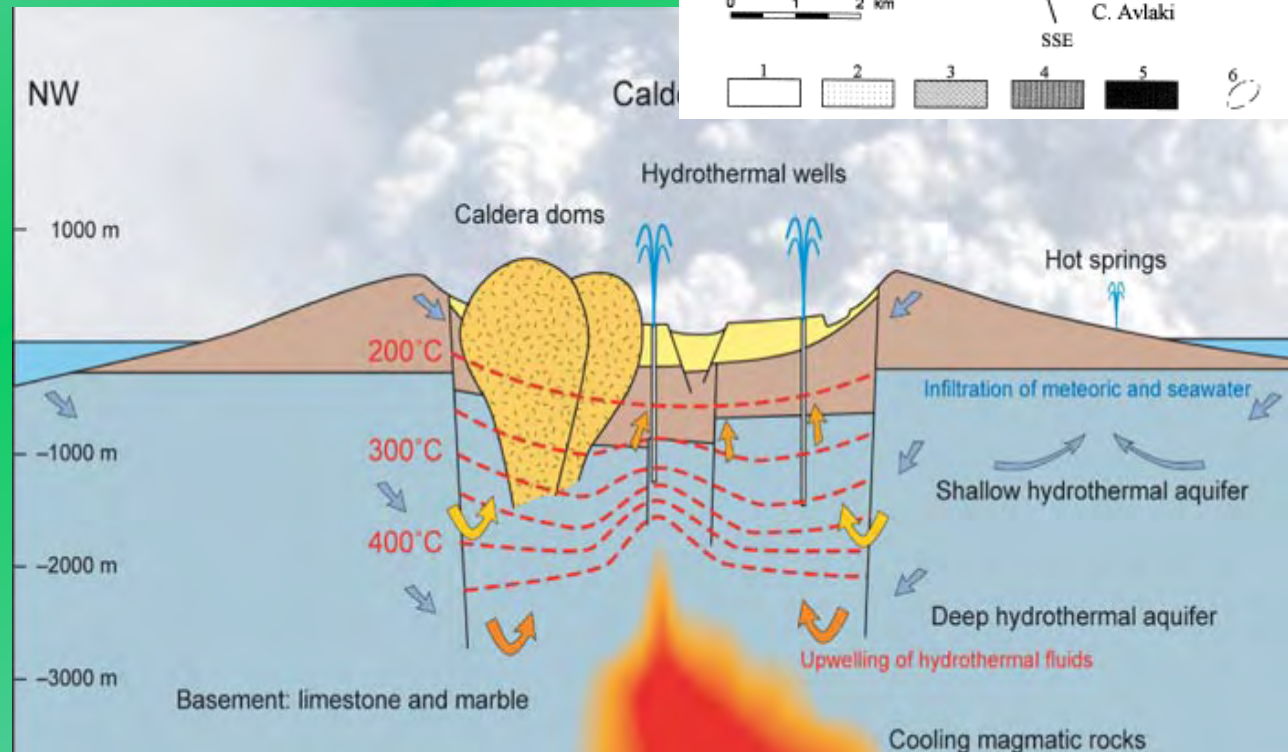
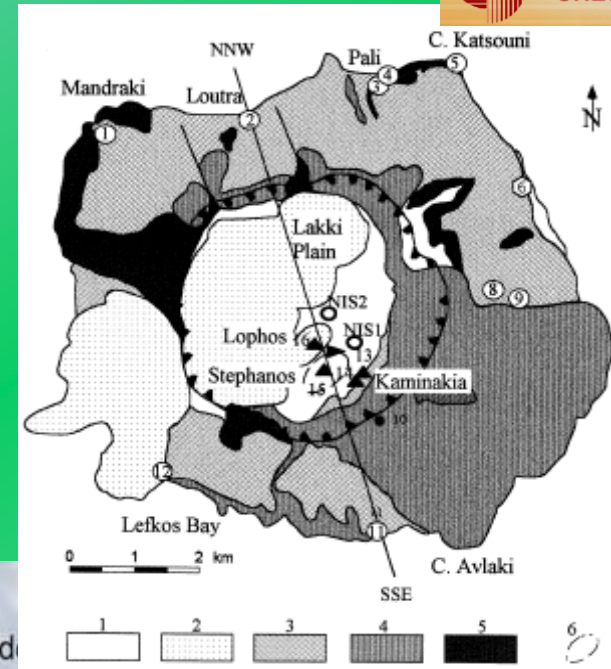
## Methodology

Geological mapping  
Thermal manifestations  
Geochemical investigation  
Schlumberger resistivities  
Two deep wells

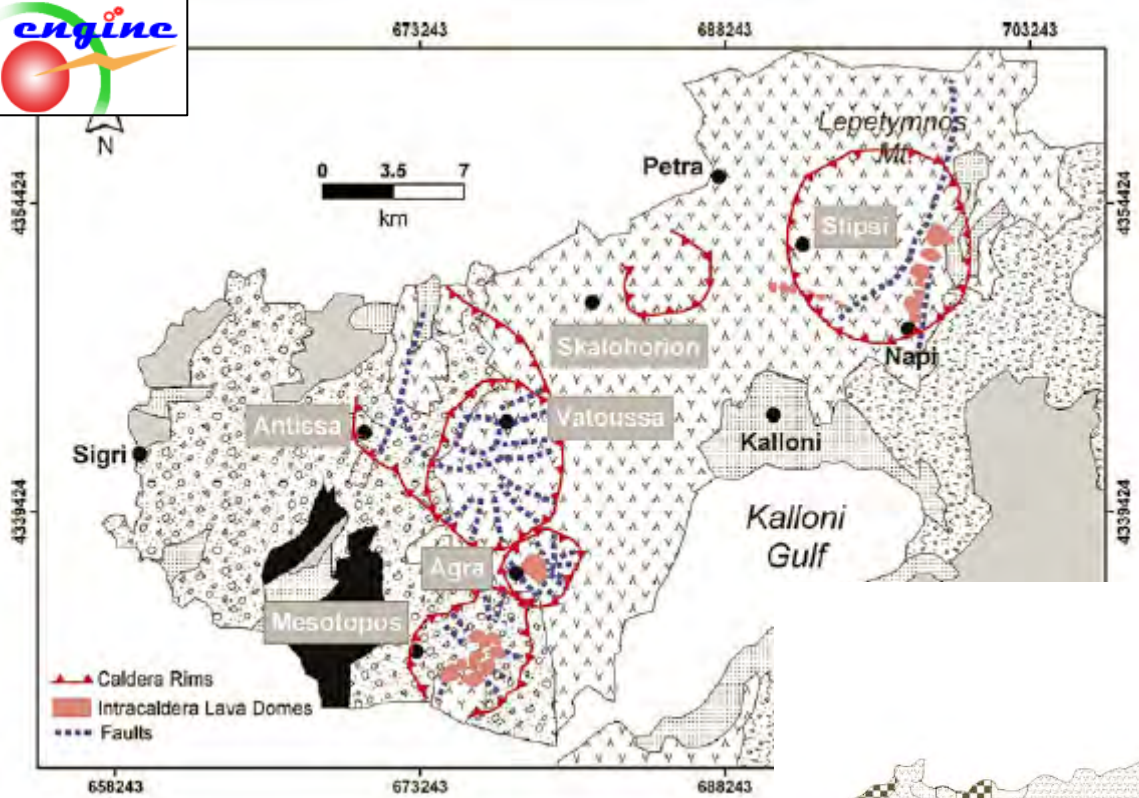
## Applications

none

Reservoir fluid  
250-350°C boiled seawater at 1-2 km  
100-150°C at shallow depth



Nisyros conceptual model by Swiss Federal Institute of Technology (ETHZ)

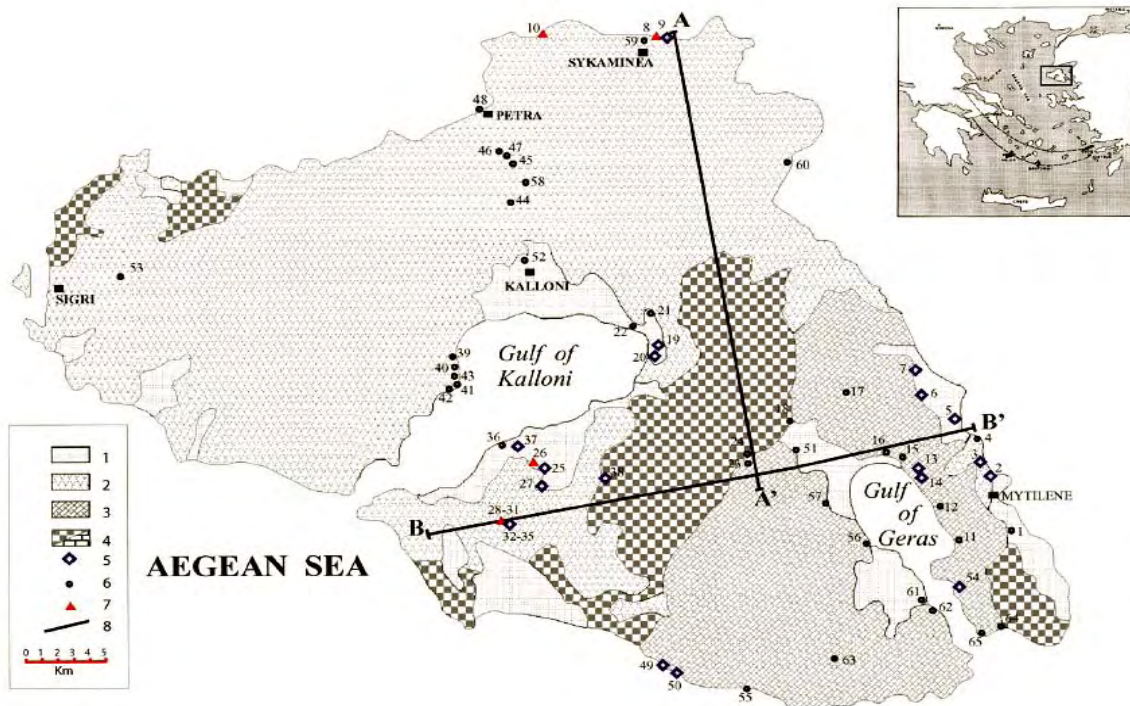


# Lesvos island

Medium enthalpy hydrothermal systems heated by Miocene volcanism

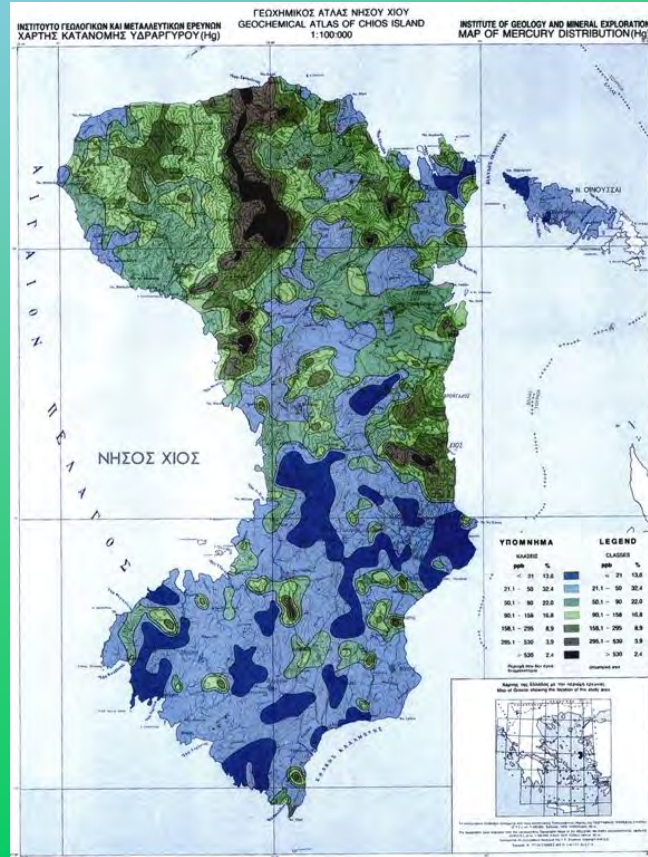
Reservoir fluid  
100-120°C saline water at 1+ km

- Methodology
- Geological mapping
- Thermal manifestations
- Geochemical investigation
- Shallow boreholes
- Deeper drilling
- Applications
- Greenhouses & spas



- (1) Pliocene-Quaternary marine and continental sediments, (2) Miocene volcanic rocks, (3) ophiolitic basement, (4) carbonate-phyllite basement, (5) cold water, (6) thermal water, (7) thermal water with associated gas phase

# Chios island

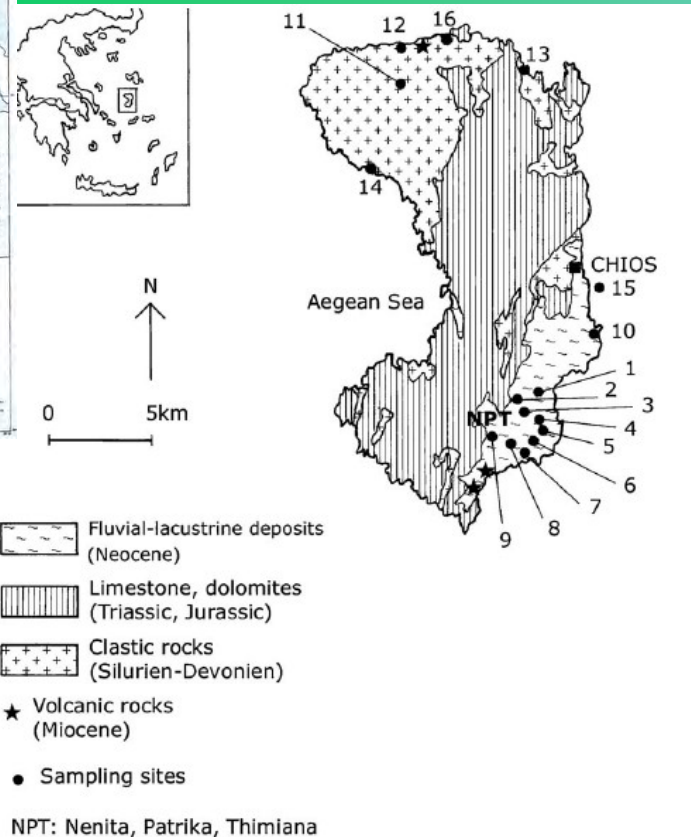


Medium enthalpy hydrothermal systems heated by Miocene volcanism

Reservoir fluid  
140-150°C boiled seawater

Methodology  
Geological mapping  
Thermal manifestations  
Geochemical investigation

Applications  
none



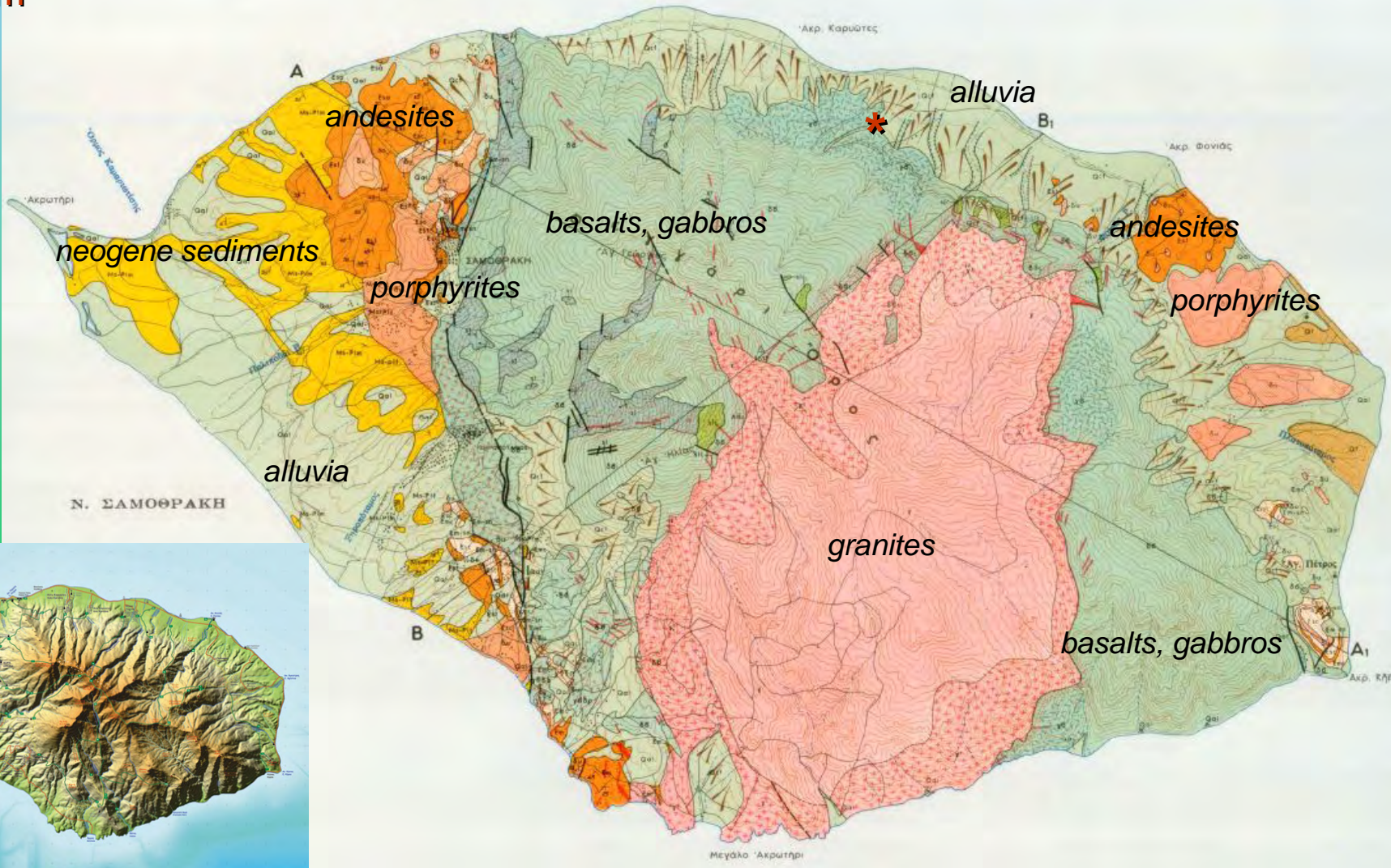
# Samothraki island

Medium enthalpy hydrothermal systems heated by Miocene volcanism

Reservoir fluid  
>100°C saline water

Methodology  
Geological mapping

Applications  
spas





# Alexandroupolis Basin

High heat flow basin (Oligocene / lower Miocene volcanism)

## Reservoir fluid

120-140°C meteoric water at 1,5-2 km

<u>area/well</u>	<u>depth</u>	<u>°C</u>
Aristino	: 200-465	30-92
Tychero	: 400	38

## Methodology

- Geological mapping
- Thermal manifestations
- Geochemical investigation
- Shallow boreholes

## Applications

- Spas & space heating



# Nestos Basin and Xanthi/Komotini Basin

High heat flow basins

## Reservoir fluid

120-150°C meteoric water at 2-3 km

<u>area/well</u>	<u>depth</u>	<u>°C</u>
N.Kessani	: 300-400	75-80
Sappes	: 250-400	38-40
L.Mitrikou	: 450	40
Magana	: 200-400	40-65
Eratino	: 550-650	65-75
	1700	115
	3000-4000	127-178

## Applications

Greenhouses, soil heating, fish farming, space heating & spas

## Methodology

Geological mapping

Thermal manifestations

Geochemical investigation

Local Schlumberger Resistivities

Shallow boreholes



# Strymon Basin

High heat flow basin

## Reservoir fluid

100-140°C meteoric water at 3-4 km

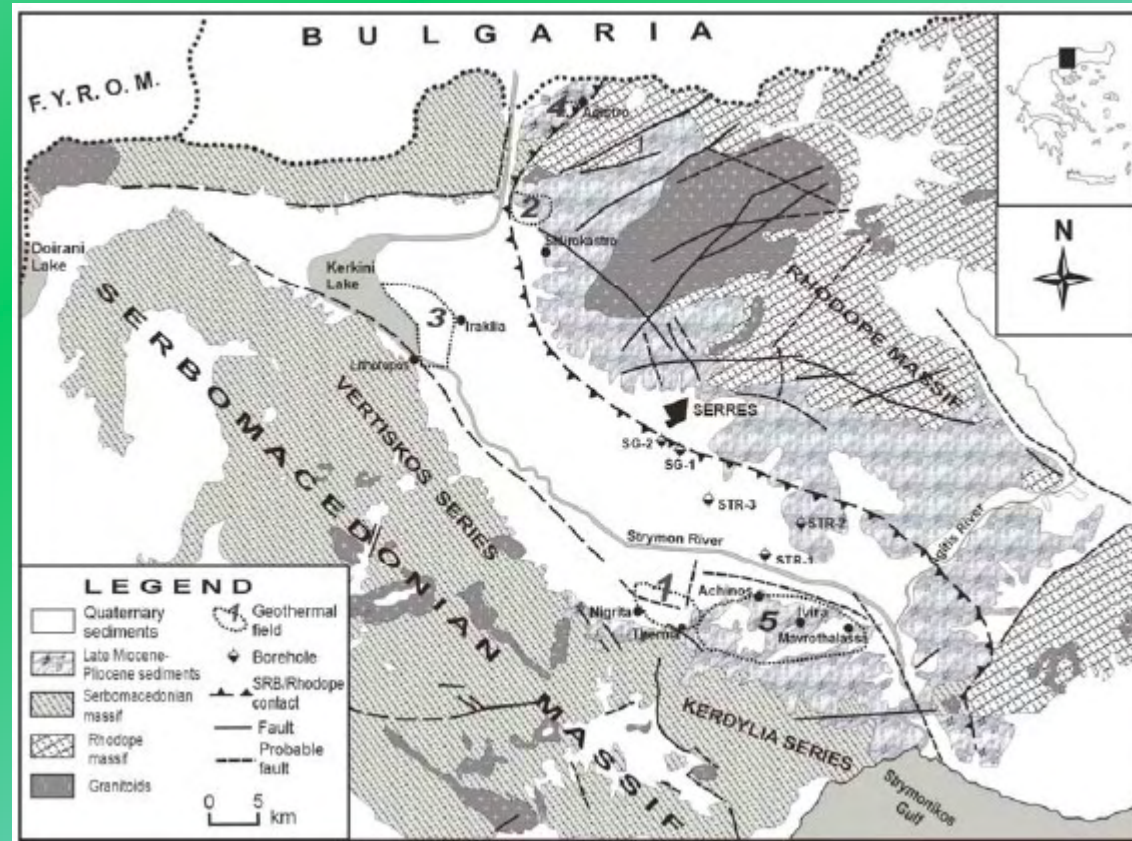
## Methodology

- Geological mapping
- Thermal manifestations
- Geochemical investigation
- Shallow boreholes

<u>area/well</u>	<u>depth</u>	<u>°C</u>
Agistro	: 70-130	40-47
Sidirokastro	: 10-450	40-65
Iraklia	: 300-450	40-62
Nigrita	: 100-400	40-65
Ivira	: 450-550	40-50
SG-1&2	: 500	20
STR-2&3	: 2678-3144	89-96
STR-1	: 2884-3651	106-135

## Applications

Greenhouses, agricultural & spas



# Other Basins

## High heat flow basins

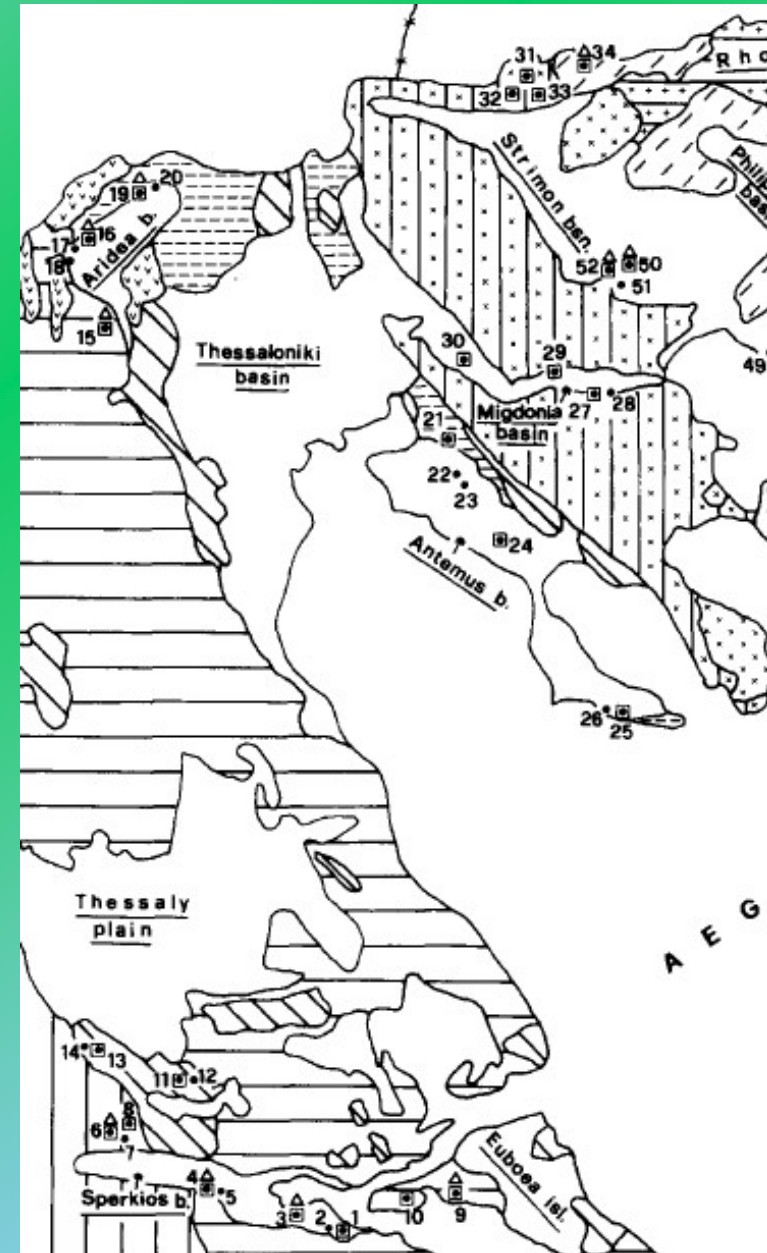
<u>Basin</u>	<u>SiO<sub>2</sub> or K/Mg temperature</u>
Mygdonia	80-100 °C
Anthemous	100-130 °C
Aridea	60-85 °C
Sperchios	80-120 °C

## Methodology

- Geological mapping
- Thermal manifestations
- Geochemical investigation
- Shallow boreholes

## Applications

- Spas & greenhouses



*Thank you for your attention*