

GRUPPO NAZIONALE DI GEOFISICA DELLA TERRA SOLIDA 33° Convegno Nazionale Bologna

Geothermal fluids monitoring by time lapse electrical resistivity tomography: the Pisciarelli fumarolic field test site (Solfatara, Campi Flegrei)

A. Fedele (1), M.G. Di Giuseppe (1), A. Troiano (1), R. Somma (1), R. Esposito (2), T. Caputo (1), D. Patella (3,1), C. Troise (1) and G. De Natale (1)

> (1) Istituto Nazionale di Geofisica e Vulcanologia – Osservatorio Vesuviano, Napoli (2) Federal University of Ceará, Fortaleza, Brazil (3) Dipartimento di Fisica, Università Degli Studi di Napoli 'Federico II'



PISCIARELLI TEST SITE



- presence of fractures
- emission of gases and fluids
 - vigorous vents and degassing pools

PISCIARELLI TEST SITE



- presence of fumaroles
- emission of gases and fluids
- vigorous vents and degassing pools

From 2006

- new vents (2009)
- increase of temperatures (110° - 115°)
- increase of seismics swarm
- increase of CO2 soil fluxes



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Time-Lapse ERT (electrical resistivity tomography)

Geophysical surveys by time lapse electrical resistivity tomography

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THE TIME LAPSE ERT: SOME CASES



EXPERIMENTAL SET-UP

7 ERT profiles have been realized in the Pisciarelli area by a dipole-dipole configuration with a full array of maximum 42 electrodes

The profiles were acquired in January 2013, in January, March, May, July, September and November 2014 respectively





EXPERIMENTAL SET-UP: Dipole-dipole array

The dipole-dipole electrode array consists of two sets of electrodes, the current (source) and potential (receiver) electrodes.

equal distance for both the current and the potential electrodes (spacing = a)



greater compactness and sensitivity to both lateral location and depth evaluation of anomaly source bodies

EXPERIMENTAL SET-UP

bubbling pool

We cross the Pisciarelli area following approximately the NS direction and were characterized by a 2.5 m electrode spacing and maximum penetration depth of about 20 m

40º49'45 71"N

mmagini: 6/19/2013

Google earth

alt 177 m 🕥

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Geothermal fluids monitoring by time lapse electrical resistivity tomography: the Pisciarelli distribute degassing testsite (Southern Italy -Campi Flegrei)

RESULTS: ERT IMAGING

Annual changes



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Annual changes

Short-time changes





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PRELIMINARY INTERPRETATION: time-lapse images





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seasonal variations

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volcanic gases

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January 2014

2014

March

80

80

gen-13

gen-14

70

70

90 100

90 100





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PRELIMINARY INTERPRETATION: Annual changes



CONCLUSIONS

Geophysical surveys by time lapse electrical resistivity tomography

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short-time variations

weather fluctuations

volcanic variations

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important geophysical tool to constrain the different contributions in active volcanic/geothermal areas