



Fluid transfer and vein thickness distribution in high and low temperature hydrothermal systems at shallow crustal level in southern Tuscany (Italy)

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Abstract

Geometric analysis of vein systems hosted in upper crustal rocks and developed in high and low temperature hydrothermal systems is presented. The high temperature hydrothermal system consists of tourmaline-rich veins hosted within the contact aureole of the upper Miocene Porto Azzurro pluton in the eastern Elba Island. The low temperature hydrothermal system consists of calcite-rich veins hosted within the Oligocene sandstones of the Tuscan Nappe, exposed along the coast in southern Tuscany. Vein thickness distribution is here used as proxy for inferring some hydraulic properties (transmissivity) of the fluid circulation at the time of veins' formation. We derive estimations of average thickness of veins by using the observed distributions. In the case of power law thickness distributions, the lower the scaling exponent of the distribution the higher the overall transmissivity. Indeed, power law distributions characterised by high scaling exponents have transmissivity three order of magnitude lower than negative exponential thickness distribution. Simple observations of vein thickness may thus provides some clues on the transmissivity in hydrothermal systems.

Keywords

Hydrothermal systems; Vein thickness distribution; Transmissivity; Tuscany

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References

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