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Study of Fluid Flow in Gedongsongo Temple Manifestation Geothermal Based on the Data of Geophysics

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Abstract

Research of several geophysics methods has been done i.eis geo-electric, Spontaneous-Potential (SP), and shallow temperature. This research aimed to make a model of fluid flow on geothermal manifestation in the Gedongsongo region. The data taking has done on December 2012. This geo-electric method shows that the depth of caprock layer is at the depth of 130 m from the surface. SP method shows the fluid flow turn to the South-East and thermoelectric effect is huge so that occurred convection-current in the region around fumarole. Shallow temperature method indicated that temperature distribution of 20 – 70^{0}C.

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Keywords: fluid flow, geo-electric, spontaneous-potential, shallow temperature, geothermal, gedongsongo

1. Introduction

Geothermal is one of alternative resources and very to produced in Indonesia due to geothermal potential in Indonesia reaching 40% world geothermal reserve. This is caused Indonesia has 129 volcanoes which potentially as geothermal development region [1].

Ungaran volcano which located in Semarang Regency, Province of Central Java is one of geothermal prospect regions which is not developed yet with potential 50 MWe. [2] do geophysics research at Ungaran volcano by using various methods gravity, Spontaneous Potential (SP), seismic, infra-red image, and measurement of shallow surface temperature (Fig. 1). The result shows the fluid flow coming from south side of the top of Ungaran volcano and flowing toward South East.

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Some of the fluids appear to the surface as geothermal manifestation which located at Gedongsongo region, such as fumarole, hot water and alteration region**.** Spontaneous-Potential (SP), and shallow temperature at the Gedongsongo region.

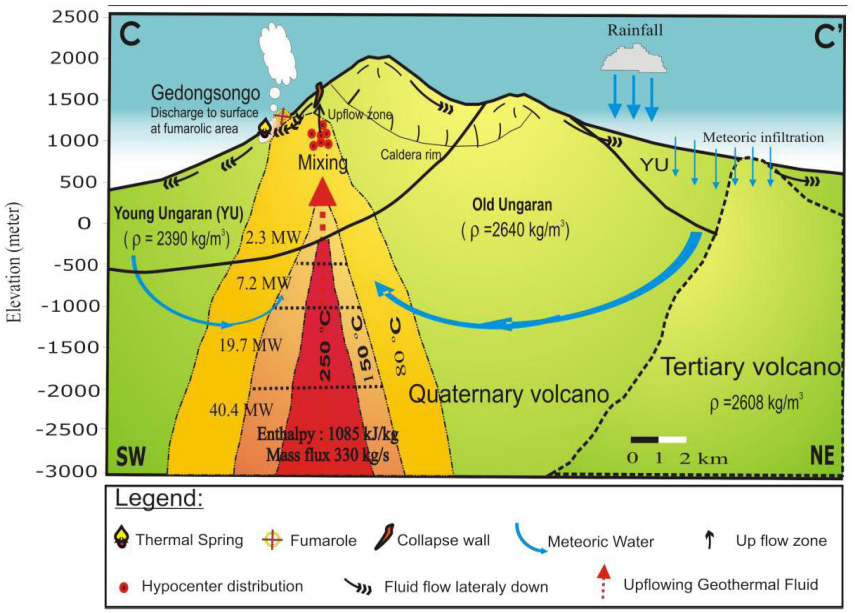

Fig. 1. Pattern of the sub surface fluid flow and its relevancy with the position of fluid output manifestation in the geothermal system model [3].

2. Geology of ungaran volcano

Ungaran volcano is the volcano with stratum volcanic typed which consist of andesite rock and toadstone. Product of the stratum volcanic form contact with tertiary formation [4].According to Ungaran Volcano in its development experiencing tectonic-collapsing which caused by gravity displacement because of the base is weak. The Ungaran volcano showed two growth class separated by rubble. The first Ungaran produces andesite rock at Under Pliosen Period, at Middle Pliosen the result more have the quality of andesite and end in rubble. The second cycle starts at Upper Pliosen Period and Holosen. The activity produces cycle of the second and third Ungaran.

[3] stratigraphy elucidated the Ungaran Volcano consist of rocks lava andesite, lava perlitic, andbrexia volcanic during the second and third of Ungaran (Fig. 2). Geology structure of Ungaran region is controlled by collapse structure which longitudinal from the west to the southeast of Ungaran. Volcanic rock compiler of pre-caldera is controlled by shear system which has an aim at northwest-southwest and southeast-southwest, whereas volcanic rock compiler of post-caldera is only contain a bit structure where this structure is controlled by regional shear system