## Global electrical conductivity model of Miyake-jima: insights into its hydrothermal and magmatic system

\*Marceau Gresse<sup>1</sup>, Takao Koyama<sup>1</sup>, Makoto Ueshima<sup>1</sup>, Yuichi Morita<sup>1</sup>, Yoichi Sasai<sup>2</sup>, Jacques Zlotnicki<sup>3</sup>, Tsuneo Ishido<sup>4</sup>, Hideaki Hase<sup>5</sup>, Wataru Kanda<sup>6</sup>, Koki Aizawa<sup>7</sup>, Derek Weller<sup>1</sup>, Tawat Rung-Arunwan<sup>8</sup>, Yasuo Matsunaga<sup>6</sup>, Hideki Ueda<sup>9</sup>, Maki Hata<sup>1</sup>, Yusuke Yamaya<sup>10</sup>

1. Earthquake Research Institute, The University of Tokyo, Tokyo, Japan, 2. Earthquake Prediction Research Centre, Tokai University, Shizuoka, Japan, 3. CNRS, OPGC-UMR6524, Aubière, France, 4. Geological Survey of Japan, AIST, Tsukuba Ibaraki, Japan, 5. Geothermal Energy Research & Development Co., Ltd., Tokyo, Japan, 6. Tokyo Institute of Technology School of Science, Tokyo, Japan, 7. Institute of Seismology and Volcanology, Faculty of Science, Kyushu University, Fukuoka, Japan, 8. Curl-E Geophysics Co., Ltd., Thailand, 9. National Research Institute for Earth Science and Disaster Resilience, Tsukuba, Japan, 10. Renewable Energy Research Center, National Institute of Advanced Industrial Science and Technology (AIST), Fukushima, Japan

Measuring the electrical conductivity of rocks is an efficient tool used to investigate volcanoes at depth. Broadband Magnetotellurics is the only technique capable of retrieving electrical conductivity structures from shallow to great depth. Hence, it is a central method in the characterization of volcanic edifices at a global scale.

Here, we present the electrical conductivity model of the Miyake-jima volcano obtained from 13 broadband magnetotelluric stations deployed in 2012. We reveal a sharp contrast between the resistive vadose-zone and its underlying conductive hydrothermal system. By combining the electrical conductivity model with hypocenters distributions, surface temperature and  $\mathrm{CO}_2$  surveys, we highlight the shallow plumbing system of the volcano: deep magmatic fluids rise through a narrow path, interact with the hydrothermal system before being finally released in the main fumarolic area inside the caldera.

Keywords: Hydrothermal system, Magnetotellurics, Miyake-jima, Electrical conductivity, Volcano