

## Application of EM-ACROSS to investigate underground structures of the Kusatsu-Shirane Volcano, Japan

\*Keiichi Ishizu<sup>1</sup>, Yasuo Ogawa<sup>2</sup>, Kuo Hsuan Tseng<sup>2</sup>, Sohei Serita<sup>2</sup>, Takahiro Kunitomo<sup>6</sup>, Takuto Minami<sup>4</sup>, Hiroshi Ichihara<sup>3</sup>, Grant Caldwell<sup>5</sup>, Wiebke Heise<sup>5</sup>, Ted Bertrand<sup>5</sup>

1. University of Hyogo, 2. Tokyo Institute of Technology, Japan, 3. Nagoya University, 4. Kobe University, 5. GNS Science, 6. Ontake Science Lab

We have constructed a controlled source electromagnetic transmission system called ElectroMagnetic-Accurately Controlled, Routinely Operated, Signal System (EM-ACROSS). The basic idea of EM-ACROSS is to enable long stacking times by repeatedly transmitting a precisely controlled signal. As a result of long-time stacking, a high signal-to-noise ratio can be achieved. High-precision signal control of the transmitter is conducted by synchronizing with a 10 MHz GPS signal. In addition to the basic concept, our EM-ACROSS has the following feature: two dipole antennae simultaneously transmit independent sets of signal time series consisting of eight sinusoids. The two sets are slightly different in frequency and can be recorded by the receiver without interference. This allows efficient data acquisition without turning off single dipole transmission. Our EM-ACROSS was applied to an investigation of the Kusatsu-Shirane Volcano, Japan. Phreatic eruptions frequently occur at the Yugama crater of the Volcano. A 0.5 km north-south dipole and a 1.0 km east-west dipole were placed at about 3 km from the Yugama crater. The current values were about 5 A for the north-south dipole and 3 A for the east-west dipole. Eight receivers were placed around the Yugama crater to record the electromagnetic fields from the transmitters. The processed electromagnetic data with a stacking period of 1 week showed a high signal-to-noise ratio even at receiving points 3 km apart from the transmitter.

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