

A study on depth of investigation (DOI) and footprint of airborne time-domain electromagnetic (TEM) surveys.

*Shogo Komori¹, Yuji Mitsuata¹

1. National Institute of Advanced Industrial Science and Technology

In about three decades, airborne electromagnetic (AEM) surveys have been greatly improved by European communities to be used for an investigation with overwhelmingly greater horizontal coverage and data density than conventional on-land EM measurements (Siemon et al., 2009). In Japan, there has been a number of case studies on frequency domain (FD) AEM, and a modern airborne TEM technique is also begun to be adopted for an exploration of resources [i.e., geothermal energy (HELITEM: JOGMEC, 2013; 2014)]. By virtue of the diagonally-downward propagation of the time-domain EM wave with time (so called “smoke ring”), the airborne TEM generally can provide greater depth of investigation (DOI) than the FDEM. However, little is known about the DOI and footprint of the airborne TEM, because of the propagation property. In the present study, we will examine the propagation pattern of the EM waves with time transmitted from a loop above Earth’ s surface in detail under some conditions (i.e., background resistivity, transmitter loop height and size, transmitted waveform, and receiver height), in order to quantitatively define the DOI and footprint.

Keywords: airborne electromagnetic survey, time domain, depth of investigation, footprint, smoke ring