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Slingram EM surveys for the delineation ofseasonal change in the near-surface resistivity around a river levee

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We conducted resistivity mapping surveys around a river levee for tracking the seasonal change in the near-surface ground water condition. A Slingram-type horizontal-loop electromagnetic induction tool was adopted for the surveys. Slingram method is effective to map large area or profile the near-surface resistivity anomaly. The survey area was set in and around Aino-shima District, Suzaka City, Nagano Prefecture. A total of 6,000 point data were measured over a 1 km by 3 km area around a levee using a commercially available Slingram system GEM2 in rainy and dry seasons in 2009.

The data were processed to reconstruct the near-surface resistivity maps using a 1-D inversion technique proposed by Mitsuhata et al. (2006). It was characteristic that river side of the levee showed relatively high resistivity (low conductivity). In contrast, low resistivity zones were concordantly delineated along the interpreted paleo-channels at the land side. Accordingly, the maps demonstrate that Slingram EM method is helpful to map 2D near-surface resistivity structure that affects ground water flow across a levee system.

Keywords: Slingram EM survey, resistivity, river levee, seasonal change