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Self potential method applied to salt-affected soils of Thailand

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Soil salinization in Northeast Thailand is caused by natural phenomenon (climate, rock salt deposit, saline groundwater) (Japakasetr and Workman 1981) as well as by human activities (wood cutting, water storage, groundwater pumping, etc) (Williamson et al., 1989). Salt-affected soils are formed as bare saline patches in lowland paddy soils under groundwater influence. High salinity level in rainfed rice fields depletes the annual crop yields (Yuvaniyama et al., 1996). Much research has been undertaken to survey salinity extent, to explain the causes and to recommend measures to be taken by the farmers. Recent works focused on the explanation of origin and how salts reach the ground surface, namely based on hydrogeological and geochemical data (Srisuk, 1994; Imaizumi and al., 2001).

The electrical spontaneous polarization method (Perrier et al., 1997), so called self potential method (SP) was newly performed in December 2005 to identify the spatial distribution of saline patches in dry season at a lowland scale. Non polarizing electrodes (18 cm long, Pb metal/$PbCl_2$ metal-ion couple and saturated NaCl electrolyte) were used in field. One electrode consisted as a reference potential and was fixed in soil surface at a given location. Another electrode was mobile within a 1.5 ha area at each 5 m squared mesh and along two perpendicular transects at each 5 m step (250 m and 150 m). The potential difference of the dipole was measured using a high impedance voltmeter.

SP values are ranged from -20 mV to +20 mV and mapped using Surfer™ software. The SP mapping is in accordance with a previous mapping of the bulk electrical conductivity performed in dry and rainy seasons using a Geonics™ device (EM38) and

with an aerial view of the site. Negative SP values are linked to the highly saline areas. Our first results reveal that SP method is full of promise in saline environment and can be used to assess the soil salinity degradation at a low cost. The interpretation of SP signals are in process combining complementary geochemical and hydrological groundwater data (35 piezometers network) and geological data (three 20 m rotary drilled boreholes).

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