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論 文 要 旨

THESIS SUMMARY

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学籍番号： Student ID Number	12D18031	指導教員（主）： Academic Advisor(main)	Assoc. Prof. Jiro Takemura
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要旨（英文 800 語程度）
Thesis Summary (approx.800 English Words)

Environmental sustainability is a core issue for world development. Impact of human activities (electric power industry, industry, mining and mineral processing, agriculture and forestry) and natural processes (geological, hydrological, and biological process) are the primary causes of environmental problems. There are many kinds of the environmental problem which have drawn much attention from many researchers, organizations, institutes, and local governments. Among the environmental problem, this research aims to investigate environmental evaluations of soil salinity and groundwater behavior in the deep subsurface under a coal mine.

Problem associated with soil salinity in the paddy field and risk evaluation against floor heaving of deep subsurface under a coal mine are the global environmental problems. Given no similar existing researches, this dissertation addresses the five objectives as follows: 1) to confirm salt stress in the rice can be detected by field reflectance or not during repining stage just before harvest, 2) to evaluate cost effective methods for enhanced monitoring of soil salinity in the paddy field at early stage, 3) to confirm the hyperspectral remote sensing technique to detect soil salinity using reflectance of rice and soil, 4) to construct groundwater modeling of Mae Moh open pit Mine in North Thailand with respect to control of floor heave using Modflow simulation, and 5) to study the stability analysis of floor heaving in the Mae Moh open-pit mine of Thailand. With these objectives, the thesis is structured into eight chapters, starting with the background & motivations in Chapter 1 and a brief but detail reviews of relevant literatures in Chapter 2 and Chapter 5.

The first part of this dissertation is focused on the soil salinity problem that is included in Chapter 3 and Chapter 4. To achieve the goal, the soil salinity analysis using remote sensing technique was examined. The electrical conductivity (EC) of soil is selected as the salinity indicator while field hyperspectral technique is chosen for spectral reflectance measurement. The results of this study might be useful for those who are working in the fields of remote sensing and crop science for monitoring the spread of saline soils and estimation of the effects of soil salinity on rice plants.

In Chapter 3, a case study responding to the objectives of this study of soil salinity was

presented. The site investigation is carried out to observe the encountered problem occurred. The chapter particularly presents the geological setting and source of soil salinity in northeastern Thailand. Field investigations of various paddy fields in northeastern Thailand were carried out in late November 2010 during the ripening season just before harvest in an attempt to realize the applications of the field hyperspectral technique for monitoring the spread of saline soils and estimation of the effects of soil salinity on rice plants. Jasmine rice and glutinous rice were two different rice species selected for this study. The statistical analysis revealed that the changes in soil EC were significantly sensitive to the ripening stages of both jasmine rice and glutinous rice planted at different levels of soil salinity. Among reflectance measurements, canopy reflectance was highly correlated with soil EC. The highest correlations are found in the near infrared (NIR) and shortwave infrared (SWIR). However, the estimated accuracies of relationship between soil EC and reflectance of glutinous rice were relatively lower than those of jasmine rice. In Chapter 4 explains the relationships between electrical conductivity of soil and reflectance of the soil in northeastern Thailand. Relationships between soil EC and reflectance of soil have been determined by simple linear regression (SLR) analysis. Large distributions of low correlation, the magnitude values of the coefficient of determination (R2) were less than 0.55, are dispensed over the entire region. Even though the weak correlation was found, this study could be used as the fundamental of the soil reflectance took from the paddy field and soil salinity. Additionally, soil reflectance measurement, soil chemical properties, the relationship between electrical conductivity and leaf area index was explained.

The second part of this dissertation focuses on the environmental problem in open pit mine which is included in Chapter 6 and Chapter 7. Mae Moh lignite open pit mine was selected as a case study. The current deepest level of the pit is about 300 meters in the northeast mine area while the final depth will be 490 meters at the end of production. Based on the geotechnical investigations, the Basement formation located in the Central Pit (C1) area mainly consists of argillite with high water pressure. For this reason, this research aims to investigate the behavior of groundwater and establish the rational dewatering program from the aquifer to reduce adverse groundwater pressure for the safe excavation with minimum impact on the surrounding environment. The result from this research can be applied to secure the stability and reduce the environmental impact of deep excavation of coal mining. Due to the complex geological condition in Mae Moh, the model is created according to the simplified geological and hydrological setting proposed by previous researchers. Finally, the key findings are summarized, and the future recommended works are suggested in Chapter 8.