



Investigating Algal Reefs in Xinwu, Taiwan, by using Electrical Resistivity Tomography Method

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The Guanxin algal reef, which is locating along the coastal line of Guanyin and Xinwu districts in the Taoyuan city, is the biggest and most complete algal reef in Taiwan. It is consisted of the calcified crustose coralline algae and is one of the most important ecosystems on the northwestern coast. Algal reefs grow extremely slow and expand only 0.1 to 80 mm annually; as a result, any investigation in the algal reef area must be implemented very carefully to reduce potential influence on the environment. Reefs have special electrical property; therefore, it is suitable for applications of electrical exploration methods. The Electrical Resistivity Tomography (ERT) is a fast, non-destructive, and inexpensive surficial geophysical survey method, and therefore it is widely used to investigate reefs. In this study, we used ERT method to investigate the location, distribution area and depth of algal reefs in order to provide a reliable reference of coastal engineering and the establishment of ecosystem refuge. The study area is from the south coast of Fulin river to the south coast of Guanyin river. There are four ERT survey lines, three of them are 960m long and parallel to the shoreline, and the other one is 240m long and perpendicular to others. According to the Archie's Law, we calculated the porosity from the resistivity profile to estimate the depth of reefs beneath each survey line and verified the estimates with the data obtained from drilling well. The results show that the upper boundary of the algal reefs is 0-1.5m deep (there are sands above), and the lower boundary is 4-6m deep (there are gravels below) in the study area. In addition, all profiles obtained from the north-south survey lines show that the depth of the algal reef becomes shallower in the range of 100m in the southernmost end, which indicate the southern boundary of the reef distribution.