Resistivity Module Unit 5: “Integrated Geophysical Interpretation and Comparison with Ground Truthing”

Student exercise

Lee Slater, Department of Earth and Environmental Sciences, Rutgers University Newark, Newark, New Jersey

# 5.1 Introduction

In this unit, you will explore spatial associations between the three-dimensional electromagnetic (EM) conductivity inversions and the visible patterns of Salicornia (Pickleweed) introduced in Unit 1. The Arcview Storymap started in Unit 1 includes a tool for you to overlay inverted electrical conductivity patterns for different depths on aerial photographs of Harrier Meadow that highlight the patches of Pickleweed. Using this tool, you will investigate how conductivity patterns vary with depth and explore for evidence for a relationship between electrical conductivity and Pickleweed patches based on the hypothesis introduced in Unit 1. You will then perform an integrated interpretation of both the EM and electrical imaging inversions (from Unit 4) along with the results of direct sampling (coring, pore water sampling, soil characterization) conducted at locations selected using the electrical conductivity patterns observed in the EM dataset. The student answer sheet will guide you through some qualitative assessments of the correlation between physical and chemical properties of the sampled soils and soil electrical conductivity from the EM inversions. The student answer sheet finishes by asking you to evaluate the extent to which the geophysical dataset and available direct measurements support the hypothesis pertaining to the cause of the Salicornia clusters introduced in Unit 1, i.e. “salinity tolerant plants are thriving in areas of locally elevated electrical conductivity”

# 5.2 Tasks

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| Task 5.2.1: Interpreting resistivity imaging datasets  Watch the narrated ‘*Geophysical Interpretation and Comparison with Vegetation Patterning*’ slideshow accompanying this unit.   1. Answer the questions in Task 5.2.1 of the student worksheet. |

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| Task 5.2.2 Visualizing and interpreting 3D electromagnetic (EM) conductivity mapping datasets After watching the narrated ‘*Geophysical Interpretation and Comparison with Vegetation Patterning*’ slideshow accompanying this unit, turn your attention to the story map for this project first introduced in Unit 1. The story map contains an interactive tool for assessing the relationship between the inverted electrical conductivity structure at different depth levels and the vegetation patterns from the high-resolution aerial photography. You should get familiar with using the slider to drape and then peel away the conductivity image from the aerial photograph showing the vegetation patterns. There is one image/slider for each of the seven layers (this includes the infinite lowermost layer). Note that you can zoom in on the image, which can help to reduce the relative size of the yellow points highlighting the location of each Dualem measurement in the dataset. The yellow points are useful as they highlight some areas where measurement density is low and the interpolations of the electrical conductivity structure should be treated with caution.   1. After familiarizing yourself with this tool, answer the questions in Section 5.2.2. of the student worksheet. |

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| Task 5.2.3 Using ground truth data to support geophysical observations  Watch the narrated ‘*Geophysical Interpretation and Comparison with Ground Truthing*’ slideshow accompanying this unit.   1. Answer the questions in Task 5.2.3 of the student worksheet. |

# 5.3 Assessment

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| Complete all parts of the student worksheet provided with this module.  The grading rubric below will be used to grade the module. |

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| **Component** | **Exemplary** | **Basic** | **Nonperformance** |
| Section 5.2.1 | 4-5 points:  Thoughtful answers to all three questions in the student worksheet showing full comprehension of slideshow content | 2-3 points:  Thoughtful answers to at least two questions in the student worksheet showing partial comprehension of slideshow content | 0–1 point:  Weak attempt at questions and significant gaps in understanding of slideshow content apparent |
| Section 5.2.2 | 4-5 points:  Thoughtful answers to the two questions and effective use of the slider tool provided in the story map | 2-3 points:  Thoughtful answers to one of the two questions and demonstrated use of the slider tool provided in the story map | 2-3 points:  Weak answers to the questions and limited evidence of use of the slider tool provided in the story map |
| Section 5.2.3 | 6-7 points:  Thoughtful answers to all six questions in the student worksheet showing full comprehension of slideshow content | 4-5 points:  Thoughtful answers to four-five questions in the student worksheet showing partial comprehension of slideshow content | 1-3 points:  Weak attempt at questions and significant gaps in understanding of slideshow content apparent |