Assignment: Electromagnetic induction, gamma ray sensing and peat thickness mapping

Introduction

The aim of this assignment is to compare measurements carried out with two different sensors with the observed peat thickness for a field in the Nørreå Valley near Ø Bakker.

The two sensors include a DUALEM421 electromagnetic induction instrument and a gamma radiometric sensor. The exercise describes the steps for the comparison. The report from this section must contain the following elements.

1 Data visualization

Create maps showing:

a. The EC_a measurements from the HCP4m channel.
b. The count rate from the gamma ray sensor.
c. The peat thickness measurements.

Describe and compare the patterns in the maps.

2 Descriptive statistics

Calculate descriptive statistics for the HCP4m channel, the count rate, and the peat thickness measurements.

3 Interpolation

Interpolate the EC_a from the HCP4m channel using kriging. Describe the nugget, range, and sill of the variogram model and explain what they mean. Repeat the process for the count rate and compare the two variograms.

4 Analysis

Produce a map of clusters based on the interpolated EC_a and count rate. Present a table with the minimum, maximum and mean peat thickness for each of the clusters. Argue for the number of clusters that you used.

5 Discussion

Account for the soil properties that affect the electrical conductivity and gamma radiation of the soil, and explain the relationship between EC_a, gamma ray measurements, and peat thickness. Use the article about the Nørreå Valley site as a reference (Beucher et al., 2020).

References

Amélie Beucher, Triven Koganti, Bo V. Iversen and Mogens H. Greve, 2020. Mapping of Peat Thickness Using a Multi-Receiver Electromagnetic Induction Instrument. Remote Sensing 2458; doi:10.3390/rs12152458