



HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
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MATEMAATTIS-LUONNONTIEDELLINEN TIEDEKUNTA
MATEMATISK-NATURVETENSKAPLIGA FAKULTETEN
FACULTY OF SCIENCE

Tiedekunta – Fakultet – Faculty Faculty of Science		Koulutusohjelma – Utbildningsprogram – Degree programme Master's program in material science	
Tekijä – Författare – Author Antti-Jussi Kallio			
Työn nimi – Arbetets titel – Title The Chemical Path of Eroded Soil Field Soil from Field to Bottom Sediment with K-edge X-ray Absorption Near Edge Spectroscopy.			
Työn laji – Arbetets art – Level Master's thesis	Aika – Datum – Month and year January 2019	Sivumäärä – Sidoantal – Number of pages 72	
Tiivistelmä – Referat – Abstract <p>Eutrophication is a global challenge, where chemical processes in bottom sediments play a key role. Eroded field soil is carried to sea by runoff waters and will ultimately become the bottom sediment. In this work methods were develop to follow the evolution of the chemical state of the sediment with iron K-edge X-ray absorption near edge spectroscopy. The chemical state of the sediment, and especially the chemistry of iron is linked to the release and binding of phosphorus in the bottom sediments.</p> <p>The chemical path of field soil was simulated by first measuring the absorption spectra of dry soil. The soil was then mixed with sea water, and organic carbon and/or sulfates were added in order to simulate the various conditions present at the bottom of the sea. The absorption spectra were measured after 24 hours and after two months of anaerobic incubation.</p> <p>In order to measure the spectra of soil-water mixtures, a sample preparation method was developed, where the sample is gellified. The gel makes the suspension uniform and homogeneous. Sample preparation was done in both aerobic and anaerobic conditions.</p> <p>This work also describes the theory of X-ray absorption spectroscopy, and especially how to interpret various features from X-ray absorption near edge spectra, like for example oxidation state, coordination chemistry and electronic properties. How to simulate the spectra starting from the Fermi's golden rule is discussed.</p> <p>The spectrometer used in the measurements and its components are discussed in detail. A specific sample environment for the measurements was also developed.</p> <p>The measured spectra are compared with various spectra obtained from different reference iron compounds and the amount were estimated. Ultimately the result gives information on the various chemical processes of iron in sediments.</p>			
Avainsanat – Nyckelord – Keywords Eutrophication, Erosion, X-ray Absorption Spectroscopy			
Säilytyspaikka – Förvaringställe – Where deposited Kumpula Science Library			
Muuta tietoa – Övriga uppgifter – Additional information			