Inland wetlands with sulfidic sediments provide ideal conditions for Akaganéite formation

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The prevalence of sulfidic sediments in inland wetlands has been recognized in the last few years in many parts of the world including Australia (Lamontagne et al., 2006). Under conditions of very high salinity, the oxidation of iron sulfide minerals in these sediments can cause extreme acidity and the formation of a range of secondary iron oxides. This study was done to evaluate the mineralogy and morphology of sediments collected from the oxidized surface layer of an inland acid sulfate soil in south-western NSW. X-ray diffraction (XRD), transmission electron microscopy (TEM) and scanning transmission electron microscopy combined with energy dispersive X-ray spectroscopy (STEM-EDS) techniques were used to characterize the minerals present in these sediments. After removing halite and gypsum, akaganéite was identified as the major mineral phase in the sediments; K-jarosite was also present in small amounts in some sediments. The chemical analyses of washed sediments using STEM-EDS showed that akaganéite had an average Fe/Cl mole ratio of 6.7 and a structural formula of $Fe_8O_8(OH)_{6.8}(Cl)_{1.2}$. The highly saline-acidic solutions (pH ~ 2, EC = 216 dS/m) at the Bottle Bend lagoon provide ideal conditions for the crystallization of akaganéite, which is rarely observed in soils (Bibi et al., 2011).

References

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Notes