Evidence of kaolinite alteration in hypersaline tidal flat soils on the NE Brazilian coastline



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Introduction

Hypersaline tidal flats (HTF) are very common on the Brazilian coastline and also on a global scale. The formation of HTF soils is a natural process in which the mangrove ecosystem is replaced by a new hypersaline environment. In this study, we present evidence of transformation from kaolinite to smectite in HTF soils. Results from one soil profile are reported





Hypersaline tidal flat ecosystem (Ceará State, Brazil)



(black line) and calculated (red line) XRD patterns. K-S is the dominant mineral phase and occurs in a range of kaolinite layers (100 - 95 %, 80 -60 %, 37 %). The table is referent to the A soil horizon, but all horizons





B) The positive correlations indicate that the soil amorphous phases act as a Si source for mineral transformations.

C) The average number of layers in the coherent scattering domain (Nmed) decreases as the number of smectite layers increases within the K-S mineral. This can be interpreted as a consequence of the turbostratic disorder generated by the transformation process.





TEM-EDS:

Mean chemical composition of 1 to 4 individual crystals. The data show minerals with different AI_2O_3 and MgO proportions, which is due to the different mixed-layer minerals in the samples. These results support the XRD modeling.





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