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Clay Minerals are controlled by the environment – Clay Minerals control the environment

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Where clay minerals are analyzed in soils, often there is some confusion, because in the widespread loess-affected and moraine landscapes of Europe quite a variety of clay minerals is found. The sources of these minerals are inherited from the local solid rock, transported through different processes, transformed through mineral changes and inherited from paleo-environments. Very often a miserable assemblage in the clay fraction is found with mica clay, smectite, kaolinite, chlorite and also some quartz. In order to understand the current dynamic of clay mineral formation, very detailed and quantitative analysis in comparison of horizons and landscape are necessary. It is much easier to through light on the development, if conditions are looked for where a single specific mineral can be formed like short range order minerals from volcanic ashes or smectites from basaltic parent material. Old leaching land surfaces will form kaolinitic and in tropical areas gibbsitic clay fractions. In arid environments of deserts and desert fringes, palygorskite and sepiolite can dominate. In general, clay minerals buffer the environment. This is mainly due to the extraordinary large interfaces between mineral surface and pore systems. In the last years mainly the processes of buffering through charging soil solution and of buffering through mineral organic compounds have been analyzed. Development of new microscopic and spectromethods have brought great progress in understanding the role of clays in soil environments.