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# Weathering mineralogy and geochemistry as a function of time in soils developed in moraines from Antarctica and the Sierra Nevada range and dune sands from Oregon (USA)

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Traditionally, weathering reactions were seen as a progression of a breakdown of the mineral structure to become more and more disordered. In addition Al is usually assumed to be immobile under circumneutral pH. We found evidence of high Al mobility and the neoformation of allophane in Oregon dunal soils. 20,000 year old dunal soils form pure allophane, by the replacement of wood, as well as gibbsite, and vermiculite. Based on those results we wanted to test the hypothesis of the weathering progression as a function of time. Therefore we collected soil profiles in the following areas without inherited clay minerals but with controlled weathering ages: i. 20 ka, 200 ka, 2 MA old glacial tills in Taylor Valley (Mc Murdo Dry Valleys, Antarctica); ii. 20 and 80 ka old weathered glacial tills in the Sierra Nevada (Yosemite and Kings Canyon National Parks); iii. 900 year, 20 ka and 120 ka year weathered Oregon coastal dunes. The focus was on the characterization of the neoformed minerals in the soils: the *short range ordered minerals* (allophane, imogolite, ferrihydrite) and well as the *long range ordered minerals* (smectite, vermiculite, halloysite, and kaolinite). We analyzed the mineralogy and geochemistry of the $<2\mu$m and $<0.2\mu$m size fractions. We used oriented and random powder XRD. For the geochemistry we determined the major and trace element chemistry using microprobe of pressed pellets.