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Weathering: methods and techniques to measure

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Surface recession takes place when weathered material is removed from the rocks. In order to know how fast does weathering and erosion occur, a review of several methods, analyses and destructive and non-destructive techniques to measure weathering of rocks caused by physico-chemical changes that occur in bedrocks due to salt crystallization, freezing-thaw, thermal shock, influence of water, wind, temperature or any type of environmental agent leading to weathering processes and development of soils, in-situ in the field or through experimental works in the laboratory are addressed.

From micro-scale to macro-scale, from the surface down to more in depth, several case studies on in-situ monitoring of quantification of decay on soils and rocks from natural landscapes (mountains, cliffs, caves, etc) or from urban environment (foundations or facades of buildings, retaining walls, etc) or laboratory experimental works, such as artificial accelerated ageing tests (a.a.e.e.) or durability tests -in which one or more than one weathering agents are selected to assess the material behaviour in time and in a cyclic way- performed on specimens of these materials are summarised.

Discoloration, structural alteration, precipitation of weathering products (mass transfer), and surface recession (mass loss) are all products of weathering processes. Destructive (SEM-EDX, optical microscopy, mercury intrusion porosimetry, drilling resistance measurement, flexural and compression strength) and Non-destructive (spectrophotocolorimetry, 3D optical surface roughness, Schmidt hammer rebound tester, ultrasound velocity propagation, Nuclear Magnetic Resonance NMR, X ray computed micro-tomography or CT-scan, geo-radar differential global positioning systems) techniques and characterization analyses (e.g. water absorption, permeability, open porosity or porosity accessible to water) to assess their morphological, physico-chemical, mechanical and hydric weathering; consolidation products or methods to stop or to slow down their weathering or durability and stability of soils and rocks are also topics where the methods and techniques deal with the quantification of weathering.

Cultural stone weathering studies contribute substantially to the knowledge of weathering rates revealing the importance of specific weathering agents and weathering factors.