



Soil physical properties changed induced by dry-wet cycles in the water-level fluctuation zone of Three Gorges Reservoir region, China

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In southwest China, a grand hydraulic engineering called Three Gorges Dam (TGD) was completed and under full power run since 2009, making a total area of 349 km² along Yangtze River exposing the dry-wet cycles by its impounding of water step by step from the elevations of 135 m in summer season to 175 m in winter season at each year. As populated area, the environmental issues aroused by the TGR have centered on water quality, biodiversity, sedimentation, downstream riverbed erosion and pollutants (both heavy metals and organic pollutants) transportation. All these are regulated or affected by soil structure and pore network, directly or indirectly. Thus, the study of soil physical quality changed induced by these seasonal dry-wet cycles is crucial. The objective of this study is: (1) to describe soil structural status in WLF zone of TGR by combination of laboratory measures and visual evaluation method; (2) to describe the pore system in this zone by both SWRC and CT images; and (3) to address the changes of soil physical quality changed by seasonal dry-wet cycles. Our results showed a deterioration of soil structure (indicated by a high S_q score in VESS) and soil aggregate stability (indicated by low MWD and the mass fractal dimension D_m) in lower land of TGR. The data from both soil water retention curve and micro-CT image demonstrates a going –worse of soil physical quality by decreasing of soil pore number and porosity as well as a shift of drainable micro-pores ($0.1 < r < 125 \mu\text{m}$) to non-drainable micro-pores ($r < 0.1 \mu\text{m}$) in the lower land of TGR.